U.S. Department of Transportation

BUDGET ESTIMATES

FISCAL YEAR 2013

FEDERAL AVIATION ADMINISTRATION

SUBMITTED FOR USE OF
THE COMMITTEE ON APPROPRIATIONS

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OVERVIEW

Introduction

For over 50 years, the Federal Aviation Administration (FAA) has proudly delivered the world's leading aviation system, setting an unparalleled standard for safety and efficiency that is emulated globally. Since 2001, we have coordinated more than 120 million successful flights on U.S. commercial aircraft, transporting over seven billion passengers safely to their destinations. Commercial aviation fatality rates are at historic lows and the number of commercial air carrier accidents has decreased nearly 80 percent since the mid-90s. In the last 10 years, 16 new runways have opened at large commercial airports. And we've put in place financial systems that have helped us more efficiently account for and save taxpayers' money. Despite our many successes, much remains to be done.

Our greatest challenge and greatest contribution to America's future is a sweeping modernization of aviation using a vast array of transformational technologies we call the Next Generation Air Transportation System (NextGen). NextGen will make air travel safer and more efficient while providing for a cleaner environment while bolstering America's continued economic growth. The next fifteen years promise to be a pivotal time in the history of air transportation, as the face of aviation is transformed around the world. Parts of NextGen can already be found on the ground and in cockpits, improving air travel for both passengers and aviation professionals today. From flight decks to control towers, our system is already evolving, delivering better access through innovation.

Our budget is a responsible and well-considered approach to achieving the Administration's vision for aviation leadership while aggressively controlling costs in a way that never compromises our mandate to provide the safest, most efficient air transportation system in the world. This $15.2 billion budget continues the deployment of key NextGen benefits to our aviation stakeholders, maintains critical safety programs, and modernizes our aviation infrastructure at a total funding level that is 4.6 percent lower than FY 2012. We are streamlining our organization and processes to gain the benefits of a shared services business model while we carefully prioritize those technologies and programs that will most improve safety and efficiency. The FAA remains deeply committed to providing the safest, most advanced and efficient aviation system in the world, and to ensuring air transportation is safe and efficient wherever U.S. citizens travel.

Overview by Appropriation Account

Operations

The FY 2013 request of $9.7 billion is an increase of $65 million (0.67 percent) above the FY 2012 enacted level. This will fund inflationary and collectively bargained adjustments for FAA's workforce, as well as the maintenance of critical air traffic control services. The FY 2013 request maintains modest FY 2012 increases to critical Aviation Safety inspector and Commercial Space Transportation staff. These established staffing levels allow FAA to perform additional safety inspections and the rulemaking and certification activities necessary to move NextGen forward. We must certify aircraft, equipment, procedures, and space launches to keep aviation's economic engine running.

The Operations budget request includes a $10 million increase for Performance Based Navigation (PBN). This funding will be used to streamline the development and deployment of navigation procedures used at our nation's busiest airports. These high-altitude performance-based routes will provide increased efficiency and flexibility to the aircraft using them, as well as reduced delays and significant savings in fuel costs and usage.

The commercial spaceflight industry will benefit our economy, our national security, our industrial base, and our goal for international leadership in this emerging field. Based on the latest industry indicators, FAA forecasts more than 40 launch and reentry operations in 2013, a tenfold increase from 2011. These increased activity levels create a corresponding number of licenses, environmental assessments, safety analyses, and safety inspections, and the budget includes $846 thousand to meet this significant increase in workload. FAA will use this funding to augment existing staff by contracting additional safety experts, doubling the resources assigned to operational safety oversight functions in our field offices, and also to increase the number of simultaneous safety analyses we can perform.

To ensure that the Federal Contract Tower program remains cost effective in the future, FAA proposes an adjustment to the Federal Contract Tower Cost Share program. The budget proposes to increase the local cost share cap from 20 to 50 percent so less cost-effective towers would bear more operational costs. The FAA will also use newly-available, site-specific cost information to update benefit-cost ratios used to determine local share. As a result of these actions, FAA anticipates $2 million in savings in FY 2013.

To support the President's Campaign to Cut Waste and promote more efficient spending, FAA has looked carefully at ways to further promote efficient spending practices. This effort will reduce overall Operations spending in the areas of travel, information technology, printing, contracts, supplies and equipment by $110 million from FY 2010 to FY 2013. The FY 2013 request includes $66 million in administrative efficiencies.

Facilities & Equipment (F&E)

The budget allows FAA to meet the challenge of both maintaining the capacity and safety of the current National Airspace System (NAS) while keeping our comprehensive modernization and transformation efforts moving forward. The FY 2013 request of $2.85 billion represents a 4.4 percent increase from the FY 2012 enacted level.

The F&E NextGen portfolio is $955 million in FY 2013, an 11 percent increase above the enacted FY 2012 enacted level. This funding provides FAA with the resources needed to continue our ongoing NextGen modernization activities, including nation-wide Automatic Dependent Surveillance – Broadcast (ADS-B) deployment, and tower data link services for revised departure clearances. In addition, funding is requested for follow-on En Route Automation Modernization (ERAM) software development for future NextGen capabilities, Tower Flight Data Manager (TFDM) to maximize the efficient collection, distribution, and update of data in the terminal area, and Aviation Safety Information Analysis and Sharing (ASIAS) to provide a national resource for use in discovering common, systemic safety problems that span multiple airlines, fleets and regions. A more detailed discussion of the NextGen effort is included in Section 5 of this submission.

The remainder of our investment – representing over $1.9 billion – will be in legacy areas, including aging infrastructure, power systems, information technology, navigational aids, and weather systems. To support NextGen's mid-term goals, the Terminal Automation Modernization/Replacement (TAMR Phase 3) program will deploy Standard Terminal Automation Replacement System (STARS) hardware and software to continue the convergence to a single Terminal Automation platform. ERAM will replace our aging En Route Host Computer System and backup used at 20 FAA ARTCCs. The FY 2013 budget request further supports identification, analysis and development of ERAM software changes needed to complete capability milestones by the end of FY 2013.

In FY 2013, FAA plans to award two tower construction contracts. Funding is also requested to replace and upgrade aging aerospace medical equipment needed to perform research in pilot certification and performance, aircrew health, atmospheric and radiation risk data, and other medical areas to keep FAA in the forefront of aeromedical research.

Research, Engineering & Development (RE&D)

The FY 2013 request of $180 million is an increase of $12.4 million (7.4 percent) over the FY 2012 enacted level. This request supports FAA's continued work in both NextGen and other research areas such as fire research and safety, propulsion and fuel systems, advanced materials research, and continued air worthiness.

The RE&D NextGen portfolio is $67 million, an increase of $7.3 million over the FY 2012 enacted level, and supports NextGen-specific research into wake turbulence, human factors, and "clean" aircraft technologies. This includes $12 million for the Joint Planning and Development Office (JPDO) to continue their leadership in coordinating interagency initiatives.

The FAA's System Safety Management Program will provide an infrastructure that enables the free sharing and analysis of safety information provided by government and industry sources. This program offers methodologies, research studies, and guidance material to systematically assess potential safety risks and apply proactive solutions to reduce aviation accidents and incidents. The program also conducts operational research and analysis to maintain or improve safety and to improve terminal area efficiency.

FAA must meet our nation's growing need for Unmanned Aircraft Systems (UAS). Our RE&D request continues to support this critical area, providing $5.9 million to develop minimum performance requirements for Ground Control Stations and to revise standards and guidance that address UAS crew resource management and training for both pilots and crewmembers.

The Environment and Energy program (including NextGen) is funded at $34.6 million. This program supports a range of research activities, including research to mature certifiable clean and quiet aircraft technologies, and develop sustainable fuels. The program also supports enhanced NextGen environmental research via the continuous low energy, emission and noise (CLEEN) program and other vehicles.

Grants-in-Aid for Airports

Airports remain a critical part of the aviation system infrastructure. Our FY 2013 request provides the funding needed to ensure safety, capacity, and efficiency at our nation's airports through a combination of grant funding and an increase in Passenger Facility Charges (PFCs). Our $2.4 billion request supports our continued focus on safety-related development projects, including runway safety area improvements, runway incursion reduction, aviation safety management, and improving infrastructure conditions.

The FY 2013 Budget proposes to lower funding for the ongoing airport grants to $2.4 billion by eliminating guaranteed funding for large and medium hub airports. This proposal is consistent with the recommendation of the President's National Commission on Fiscal Responsibility and Reform.

To assist the airports that need the most help, the budget continues to support smaller commercial and general aviation airports that do not have access to additional revenue or other sources of capital. At the same time, our proposal allows larger airports to increase non-Federal Passenger Facility Charges (PFC) that provides them with greater flexibility to generate their own revenue.

The Budget provides $103 million for Personnel & Related Expenses – an increase of $2 million over the FY 2012 enacted level to cover annualization of new hires. The budget also provides $29.3 million for Airport Technology Research to support enhanced safety and pavement research efforts and conduct noise studies. In addition, the budget provides $15 million for Airport Cooperative Research.

NextGen

NextGen is the continuous improvement and modernization of our national airspace. This comprehensive initiative integrates new and existing technologies, including satellite navigation and advanced digital communications.

This transformative change in the management and operation of how we fly will reduce delays, save fuel, and lower carbon emissions. The combined initiatives that make up NextGen will provide the consumer with a better travel experience.

The FY 2013 NextGen portfolio totals $1,034 million, allocated among Facilities & Equipment programs, Research, Engineering & Development, and Operations activities. The NextGen section of this budget request provides more detail about planned FY 2013 NextGen activities and accomplishments.

Airports are economic catalyst for their communities. NextGen will help communities make better use of their airports. More robust airports can attract new jobs, and help current employers expand their businesses, realizing all the benefits of aviation. By doing this, the U.S. will strengthen its economy and help communities realize all the benefits that aviation can bring.

The current system simply cannot accommodate anticipated growth in the aviation industry. Congestion continues to increase at many of our nation's busiest hub airports, a problem that will only be compounded when traffic levels are starting to rebound from the impact of the economic recession.

The business case for our NextGen investment has become a reality. Performance-based navigation offers better routes, added capacity, improved on-time performance, and lower fuel bills. NextGen will ultimately yield vast savings and efficiencies for both our nation and aviation industry. The FY 2013 budget request reflects FAA's unwavering commitment to delivering on the promise of NextGen. Our investment in NextGen is already yielding benefits, as demonstrated in the following examples:

- In the Gulf of Mexico, ADS-B-equipped helicopters cut 5-10 minutes off flight time, saving about 100 pounds of fuel per flight.
- JetBlue Airways has partnered with us to equip some of its aircraft with ADS-B so we can collect data from real world use of this technology. Its A320s will fly more direct routes from Boston and New York to Florida and the Caribbean.
- Southwest Airlines estimates it will save $60 million per year in fuel when it uses NextGen's Required Navigation Performance (RNP) procedures at airports across the country. These procedures were implemented at a dozen airports in January, 2012.
- Airlines flying across the Pacific will be able to use a combination of improved capabilities to save an estimated 200 to 300 gallons of fuel per flight.

NextGen is changing the way the air transportation system operates – reducing congestion, noise, and emissions, expanding capacity and improving the passenger experience. According to our latest estimates, NextGen will reduce total flight delays about 38 percent by the end of this decade, while providing $24 billion in cumulative benefits to the traveling public, aircraft operators, and the FAA. Aircraft owners will save about 1.4 billion gallons of fuel during this period, reducing carbon dioxide emissions by 14 million tons.

These benefit models include major NextGen air traffic management improvements, major airport infrastructure projects and the carbon dioxide emission reductions that result from our advanced systems and procedures. These models do not yet include other environmental effects, emissions benefits from sustainable alternative fuels, the fuel-efficiency benefits of airframe and engine improvements, security benefits and infrastructure projects at smaller airports. We will continue to update our integrated NextGen benefits estimates as we develop and validate improved modeling capabilities, and as new economic or operational conditions warrant.

We have begun to compile and review a set of metrics for measuring outcomes and performance associated with NextGen improvements. These metrics are likely to measure such improvements as increased throughput at airports, reduction of emissions, and reduced flight times.

We must synchronize our own NextGen investments with those of other government agencies, airport authorities and the private-sector aviation community. If a major contributor falters in its commitment to NextGen, the effectiveness of the others' commitments could be at risk. Achieving NextGen's promise requires that operators equip their aircraft to use the systems and procedures that NextGen delivers. For some capabilities, that means they also must invest in associated ground equipment, procedures development and personnel training.

The FAA is addressing this challenge in several ways. We are adhering to our schedules for deployment of NextGen infrastructure, showing operators they can be confident that the capabilities for which they equip will be ready when their aircraft are ready. In support of our best-equipped, best-served concept, we are analyzing near-term opportunities that would provide meaningful operational incentives to operators that adopt NextGen avionics.

NextGen's contribution to our nation's economic recovery and future leadership is vital. We recognize the fiscal challenges our nation faces. America's future demands that we continue to invest in modern technologies that pave the way for tomorrow's capabilities. We continue to work in full partnership with industry, other agencies and departments, and with our labor groups to achieve a shared vision, leveraging powerful technologies and setting new standards for the future of global aviation.

Joint Planning and Development Office (JPDO)

JPDO ensures efficient coordination and collaboration among NextGen partner agencies, and reinforces agency accountability for NextGen through agency plans and reports that complement the long-term strategic plan. It addresses key interagency priorities identified by the Cabinet-level Senior Policy Committee for NextGen. Without the benefit of a dedicated, co-located interagency entity, the nation could expect increased costs due to both the duplication of systems and the development of systems that will not work together for all missions (civil, defense and homeland security). This office maintains a future focus and is designed to provide the broader perspectives and insights that are necessary for Department decision-makers to review and assess NextGen investment and policy decisions.

Today, the JPDO has completed its visionary planning role and is prepared for a new role in NextGen leadership coordinating interagency initiatives or resolving interagency issues. The JPDO's FY 2012 work plan focused on supporting a broad federal view of NextGen and several priority areas such as information sharing and dissemination of weather and flight data, ensuring harmonization exists among the global aviation systems and continuing to promote and develop integrated surveillance capabilities. The JPDO's efforts have resulted in a national approach to complex NextGen related issues and reduced duplicative efforts which ultimately leads to cost savings.

The $12 million request for FY 2013 enables JPDO to continue coordinating goals, priorities and research activities within the federal government for NextGen and UAS integration. JPDO will continue leading efforts with NextGen partners to formulate and develop a national plan to achieve the integration of UAS into our airspace. JPDO will also continue to facilitate transfer of technology and review research activities such as those related to safety, weather, noise and emissions, and secure data exchange. In carrying out its plans, JPDO will ensure participation by the public and consult with stakeholders from the private sector.

Going forward, the JPDO will promote a common view of the airspace. In NextGen, the airspace will be more integrated across civil aviation, defense and homeland security. This need for integration will make airspace more complex while all missions must operate together. Further, the pace of technology is unfolding rapidly requiring all departments to have full situational awareness of new developments.

Immediate Transportation Investment

The budget request assumes the enactment in FY 2012 of the President's Immediate Transportation Investment initiative to put Americans back to work while rebuilding and modernizing America's roads, rails and airports. This initiative includes $1 billion to support NextGen efforts and $2.0 billion to fund additional projects in the Airport Improvement Program (AIP).

While many aircraft flying today are equipped to fly in fast lanes, the current airspace design and infrastructure essentially keeps all the traffic in the local lanes. In order to provide better use of airspace, FAA needs to design the interconnecting system, develop efficient on and off ramps, establish the supporting infrastructure, and publish the maps that will allow aircraft to take advantage of 21st century technologies already available in their cockpits. The $1.0 billion provided by the Immediate Transportation Investment will accelerate delivery of this infrastructure, including significant investments in the areas of Future Facilities, Performance Based Navigation (PBN), and NAS-Wide ADS-B Implementation.

Most of the Airport Improvement Program funding will be used for runway construction and other airport improvement projects aimed at increasing overall system efficiency in the future. Airports in all size categories are eligible to compete for the $2.0 billion in one-time funding.

To more equitably distribute the cost of air traffic services across the aviation user community, the Budget proposes to establish a new $100 per flight surcharge for air traffic services. Military aircraft, public aircraft, piston aircraft, air ambulances, aircraft operating outside of controlled airspace, and Canada-to-Canada flights would be exempt from the surcharge. In a challenging budget environment, we believe it is essential that those who benefit from our world-class aviation system help pay for its ongoing operation. And we want to ensure that everyone is paying their fair share.

Cost Savings and Administrative Efficiencies

Our budget reflects our ongoing commitment to realizing cost efficiencies. We have taken a hard look at our organizational structure and we are making changes to create a more streamlined and efficient Agency. The cornerstone of our current effort is our shared services concept. Functions and business processes are increasingly centralized to realize efficiencies and economies of scale, while providing more cost effective service to internal lines of business.

The FAA has taken aggressive measures to support the President's Campaign to Cut Waste. We have scrubbed our organizational processes to further promote efficient spending practices. This effort will reduce overall FAA spending in the areas of travel, information technology, printing, contracts, supplies and equipment by $114 million from FY 2010 to FY 2013. The FY 2013 request includes $66 million in new administrative efficiencies.

The FAA's Cost Control Program has tracked an average of $94 million in cost avoidance per year and a total of $680 million in cost avoidance since the program's inception in 2005. In FY 2012, we are on track to save $99 million, resulting from our Flight Services Contract, Real Property reductions, and administrative efficiencies.

Many Air Traffic Organization processes have been standardized under a "shared services environment" concept with regional resources consolidated under service centers. Since implementation began in 2006, we have realized a net savings and cost avoidance of approximately $330 million. The Agency will achieve more than $1.9 billion in combined cost savings and cost avoidance through the contracting out of FAA's Flight Services function.

Effective management of worker compensation claims has resulted in cost avoidance of over $120 million since FY 2005. Our efforts to help cut waste in this area will continue in FY 2013.

As in most businesses, information technology (IT) investments can become expensive and quickly obsolete. To address this concern, we have become more proactive about IT decisions by implementing agency-wide IT initiatives to consolidate Agency resources while realizing increased efficiency.

Some of our successful IT cost avoidance initiatives include the following:

- Server Consolidation (projected $3.1 million in 2012);
- Video Conferencing Initiative (projected $5.8 million in 2012); and
- National Wireless Program (projected $1.1 million in 2012).

As a result of these and several other IT initiatives, FAA has achieved cost avoidance of over $200 million since FY 2005. The FY 2012 savings target is $35 million, with continued savings in FY 2013.

The Strategic Sourcing for the Acquisition of Various Equipment and Supplies (SAVES) initiative was an ambitious effort initiated in FY 2006 to implement private sector best practices in the procurement of administrative supplies, equipment, IT hardware, commercial off-the-shelf software, and courier services. Eight national contracts in five different categories are managed through the SAVES program. Through the SAVES contracts, FAA has achieved over $100 million in cost avoidance since 2006, and this program will continue in FY 2013.

Implementing DOT's Strategic Goals

Safety

Safety is FAA's primary mission and our FY 2013 budget request reflects this most important of strategic objectives. The FAA will continue to focus resources on helping air travel become even safer. We have identified and eliminated many of the major risks in the system and we will continue to act on the remaining safety challenges and keep air travelers safe. Approximately 49 percent of our FY 2013 budget will be required to maintain and improve the agency's safety programs. Our day-to-day operations in the four key programs of Air Traffic, Aviation Safety, Airports, and Commercial Space Transportation contribute toward a reduction in air transportation related injuries and fatalities.

The FAA's implementation of a Safety Management System (SMS) is a critical component of our overall approach to safety. SMS is a systematic and continuous management process based on proactive identification of hazards and analyses of their risk. SMS gives us the foundation to gather information that takes safety to the next level. Our Aviation Safety Information Analysis and Sharing (ASIAS) team gathers crucial safety information data sources and uses sophisticated analysis tools to detect trends, identify precursors, and assess risks. We are pushing the science of advanced data analysis, developing cutting-edge tools to find emerging threats, as well as identifying previously undiscovered risks that are buried in terabytes of safety information.

Aviation safety inspector staff are key to leveraging standardized SMS processes to implement an integrated, risk-based method of oversight while supporting FAA's efforts in rulemaking, certification, and outreach activities that will move NextGen forward. This budget pays for safety inspectors who inspect the latest generation of innovative aircraft that Americans are building. We do not want to be the choke-point in the assembly line. We want to certify aircraft, equipment and procedures to keep the nation's aviation economic engine running.

The FAA Safety Priority Goal for FY 2012- FY 2013 is to mitigate aviation risk to the American public both in air and on the ground by identifying and addressing aviation accident precursors by September 30, 2013. Two key indicators for this Priority Goal are (1) Reduce commercial aviation air carrier fatalities to no more than 6.7 in FY 2016 and (2) Reduce the general aviation fatal accident rate per 100,000 flight hours by 10 percent over a 10-year period (2009- 2018) from no more than 1.1 per 100,000 flight hours in FY 2010 to no more than 1.02 in FY 2016. We achieved the target for the Commercial Air Carrier Fatality Rate with no fatalities in FY 2011. Although we did not meet the target for the General Aviation Fatal accident rate in FY 2011, the rate has improved from the FY 2009 result.

The FAA will continue to work on focus areas for reducing aviation related injuries and fatalities, such as in the air tour industry and Helicopter Emergency Medical Services (HEMS). Flying in inclement weather or in instrument conditions, even in a properly equipped aircraft with a properly rated pilot, increases risk. The HEMS weather tool will be enhanced in 2012 to provide additional altitude and location specific data to increase safety. The FAA will collaborate with NASA to develop measurement technology and forecast capability of the high ice water content conditions that represent a critical safety hazard.

The FAA has worked diligently over the last twenty years to develop a program dedicated to ensuring the safety of aging aircraft. As a result of thorough research, we have put in place stringent requirements to prevent fatigue damage that encompass both aircraft design and maintenance. As part of this effort, we also issued a widespread fatigue damage rule to proactively address additional required maintenance actions to further ensure the safety of older aircraft.

A third key indicator for the Aviation Safety Priority Goal is to implement 80 percent of approved interventions to mitigate the top 5 hazards associated with airborne losses of separation. This is a new FAA measure for FY 2012. This indicator measures success in mitigating the identified risks in the National Airspace System (NAS). Implementations of these interventions will help lower the number of high risks identified in the NAS.

Finally, FAA reduction of runway incursions continues to be included as a key indicator for the President's Aviation Safety Priority Goal. As such, we place a high priority on initiatives that sustain and build on our progress in reducing runway incursions. In FY 2011, the agency ended the year with 953 runway incursions and met our Priority Goal target to reduce the number of runway incursions to less than 959 incursions. We continue to implement ambitious training programs for pilots, controllers and airport operators. We will implement solutions through technologies and advanced programs such as Runway Status Lights, Airport Surface Detection Equipment and new airport design standards. We will also continue to improve upon existing technologies like Engineered Materials Arresting Systems, which safely stop aircraft overruns. The Runway Incursion Reduction Program remains a catalyst for the acquisition of promising safety technologies that have reached a level of maturity appropriate for transition and implementation into the NAS.

Although the vast majority of runway incursion events pose no danger to the safety of passengers, each one is still documented and analyzed as a precursor of more serious events. It should be noted that the increase in runway incursion events may be due, in part, to an increase in reporting. The recent increase of events aligns with the transition to a non-punitive reporting system that encourages air traffic controllers to self-report mistakes. Also, our runway safety outreach to FAA staff, airports and the pilot community has elevated awareness of surface navigation procedures, which may also be contributing to an increase in reporting. But while the total reported number of incursions may have increased, over the past five years we have achieved a dramatic reduction (over 75 percent) in the most serious runway incursions. Pilot deviations continue to be the main source of incursions, followed by vehicle/pedestrian deviations and operational errors/deviations.

The FAA continues to oversee and enable the safe development of the commercial space transportation industry. The Administration's 2010 National Space Policy establishes specific goals to strengthen stability in space by, among other things, promoting safe and responsible operations in space. Our FY 2013 budget request enables FAA to perform the activities necessary to maintain our spotless safety record in the rapidly developing industry of commercial human space flight. The FAA will develop safety requirements, policies, processes and procedures to address and safeguard this burgeoning industry.

The FAA's 2013 budget supports continued aviation safety research, focusing on critical areas such as unmanned aircraft systems, fire and structural safety, and airworthiness. It further supports enhanced safety and pavement airport technology research. Weather systems research continues in naturally occurring atmospheric hazards including turbulence, severe convective activity, aircraft icing, and restricted visibility.

Aviation safety initiatives supported by this request will improve professional development, leadership training, and standardized qualifications and experience requirements for Part 121 air carriers flight crewmembers; continue to implement a safety management system; expand capabilities within the Aviation Safety Information Analysis and Sharing program; and continue the establishment of a database matching program with other federal entities to identify airmen who have intentionally falsified their Application for Airman Medical Certificate.

State of Good Repair

As good stewards of our aviation system, we apply asset management principles proactively to maintain and modernize our airport runways. We recognize the safety benefits of ensuring that pavement, marking and lighting at airports identified in the National Plan of Integrated Airport Systems (NPIAS) meet current safety and design standards. Delaying infrastructure investments today means that the long term cost to our nation – to our passengers and our environment – will far exceed the cost of going forward with the technology.

Airport infrastructure, particularly airfield facilities, is exposed to constant heavy use and harsh environmental conditions. Runways, taxiways, and aprons are designed to withstand the heavy equipment that operates on them, but even this infrastructure requires frequent maintenance and rehabilitation in order to keep it in good working condition. Runways and taxiways must be kept clear of snow, ice, and ponding water that can jeopardize aircraft directional control or braking action. Chemicals and plowing, as well as freeze-thaw cycles, all take a toll on runways, taxiways, and other paved areas. The smallest bit of broken asphalt or concrete can represent a major safety hazard to aircraft.

We have had a target to ensure that 93 percent of runways are in good condition for the past several years, and we have exceeded that goal, most recently reaching 97.2 percent. AIP grants will continue to support this goal by funding airport pavement and lighting system rehabilitation projects, treatments to minimize hydroplaning in wet conditions, obstruction removal in runway approach zones, perimeter fencing to prevent wildlife entry, and aircraft firefighting equipment. By continuing to surpass this target we are not only achieving the goal of a state of good repair, but we are also contributing to our overall primary goal of safety.

Economic Competitiveness

Our most critical investment for economic competitiveness is NextGen. The concept is simple: NextGen is a set of technologies, processes, procedures and policy that together will revolutionize how people fly. It is a radical departure from ground-based radar to satellite control and navigation. It is a game changer for the controller, the pilot, and the passenger. But we are well aware that is not the whole story. If we want to get maximum return on the investment, if we want to support unconstrained market growth in aviation, we must take an aggressive approach to upgrading our infrastructure to maximize the benefits of NextGen. At some point, keeping the legacy systems going becomes more costly than replacing them with new technologies.

NextGen involves the total overhaul of our National Airspace System to make air travel more convenient and dependable while ensuring our stakeholders have the safest and most secure flights possible. It is the integration of new systems, new procedures, new aircraft performance capabilities, renewable fuels, new supporting infrastructure, and a new way to do business as the Air Transportation System.

The NextGen portfolio of investments focuses on the implementation and integration of key NextGen transformational technologies. The capabilities these technologies provide begin a shift of information flow from the ground to the cockpit. These include: Automatic Dependent Surveillance-Broadcast (ADS-B), System Wide Information Management (SWIM), Data Communications, NextGen Network-Enabled Weather (NNEW), and NAS Voice Switch (NVS).

Our NextGen efforts further include supporting Performance-Based Navigation (RNAV/RNP) between select metropolitan areas. Deployed over a three-to-four year period, these high-altitude performance-based routes will provide increased efficiency and flexibility to the aircraft using them, as well as significant savings in fuel costs and usage.

We have already seen the benefits of implementing ADS-B in the Gulf of Mexico. For example, helicopters are saving about 100 pounds of fuel per ADS-B-IFR flight. We have also seen an approximate operational time savings of 10 percent in instrument flight rules (IFR) operations.

For FY 2012 and FY 2013 FAA has added a new Priority Goal, achieve initial operating capacity on En Route Automation Modernization (ERAM) at all 20 continental United States En Route Centers by September 30, 2013. ERAM enables FAA to maximize its use of airspace, substantially increase the number of flights that can be tracked and displayed, and enhance its back-up capability. In CY 2011, we achieved initial operating capability at five En Route Centers and anticipate meeting this Priority Goal by 2013.

Environmental Sustainability

Environmental protection and addressing the energy challenge are vital elements to ensure continued domestic air transportation viability and global leadership. We are continuing efforts to reduce greenhouse gas emissions, improve water use efficiency, prevent pollution, and improve building energy consumption.

Environmental pressures on the national and international aviation system will continue to increase as growth in aviation activity returns. We contribute to DOT's environmental sustainability outcomes to:

- reduce carbon emissions, improve energy efficiency, and reduce dependence on oil
- reduce transportation–related pollution and impacts on the ecosystems
- increase the use of environmentally sustainable practices in the transportation sector

Satellite-based technologies are revolutionizing aviation. Aircraft will be safer, quieter, more efficient, burn less fuel and emit fewer greenhouse gases. There is a strong business case for NextGen that many companies have already embraced. Several airlines are benefiting by using more flexible routes that save fuel. Savings are being achieved because of better data communications and excellent cooperation among international users. Planes can safely change paths in order to catch a good tail wind across the ocean. We are promoting new technologies to reduce fuel burn and fuel costs and to decrease our carbon footprint.

We need to find alternatives to petroleum-based fuels. For the past five years, the FAA in conjunction with industry, academia and other government agencies is performing research on alternative fuels. Sustainable alternative fuels offer benefits for both our environment and our economy. They can help stabilize supply and the cost volatility in the jet fuel market.

We are committed to managing aviation's growth while reducing the negative impacts of aviation noise and air emissions. Through increased efforts on the Continuous Lower Energy, Emissions, and Noise (CLEEN) initiative, FAA will develop and mature clean and quiet technologies and advance alternative fuels. The Commercial Aviation Alternative Fuel Initiative (CAAFI) is moving forward to qualify and approve new aviation alternative fuels for operational use.

The budget request supports identifying and exploring advances in communication, navigation and surveillance technology to advance aircraft arrival and departure, surface movements, and en route/oceanic procedures for reduced noise, fuel burn, and engine emissions. It also supports updating and enhancing the Voluntary Airport Low Emissions (VALE) Program so that airports located in non-attainment or maintenance areas for National Ambient Air Quality Standards will have continued opportunities to reduce air emissions.

In addition, we are working to mitigate noise impacts for thousands of people in 65 day/night sound level or DNL (the energy-averaged sound level metric used by the aviation industry to determine the impact of noise) areas through ongoing noise compatibility efforts, which include the purchase and relocation of residences and businesses, the soundproofing of residences and buildings used for educational or medical purposes, the purchase and installation of noise barriers or monitors, recommended land use planning, and public outreach.

Organizational Excellence

The 2013 budget request provides for a capable leadership and a dynamic, well-trained workforce that possess the vital resources and reliable data necessary to support the continued success of FAA's mission for safety and efficiency. It further includes enhanced cost control measures to ensure savings that can be effectively managed to fund mission critical initiatives.

One of the key challenges we face is building the workforce of the future to meet the transition of NextGen. Effecting this transition will involve a systematic approach to getting the right number of people with the right skills, experience and competencies in the right jobs at the right time.

We will continue to ensure adequate numbers of safety inspectors and air traffic controllers. Workforce planning for mission critical and key occupations will benefit our managers as they make staffing decisions to achieve program goals based on a rigorous analysis of their organization's activities, workforce and expected technological advances. The flying public will benefit from a better prepared and well-trained workforce.

The FAA is delivering programs that build leadership capabilities, support professional development and promote continuous learning at executive, manager and employee levels. The development of our executive corps is grounded in creating a culture of accountability and professionalism. Building stronger leadership within the agency helps us to achieve strategic goals and manage people and resources effectively while driving continuous improvement.

Part of our organizational excellence goal is to protect agency IT assets from cyber-attacks, to ensure alignment between IT investment and agency business needs, and to provide certain enterprise-wide shared services. The FAA's Cyber Security Management Center (CSMC) is a core component of our overall Information Security Services. The CSMC is tasked with protecting our information infrastructure using advanced cyber defense strategies. The CSMC works to enhance our architecture to include cyber security, to harden individual systems and networking elements, improve recover rate times, and enhance boundary protection by completing remediation of vulnerabilities, improved information sharing, and systemic monitoring of systems.

The budget request supports activities to remediate moderate vulnerabilities identified for our information systems that support Human Resources, Finance, Security/Safety, and Air Traffic services. In the last few years, we have focused on high risk vulnerabilities. Now the focus is on remediating the moderate vulnerabilities. The request will cover contracts that will conduct information system assessments, certifications, recertifications, and risk mitigation activities. The funding will allow FAA to handle risks to its information systems sooner, which will save out-year dollars and prevent higher and more costly system vulnerabilities and remediations.

The FY 2013 budget request supports continued efforts to manage our acquisitions responsibly so we deliver programs on time and on budget. In addition, we continue to implement Real Property Asset Management to ensure that surplus assets are disposed in a timely manner. Since the start of the initiative in 2006, FAA has disposed approximately 13,000 assets with a replacement value of $520 million. Savings resulting from the disposition of property have been applied towards future disposition efforts, as well as updates, upgrades, repairs, and renovation of current assets.

Conclusion

Despite a challenging economic environment, 730 million passengers flew on U.S. airlines in 2011. We anticipate continued growth. Economic indicators project that we are rapidly approaching a historic milestone of carrying one billion passengers on U.S. airlines annually in the next decade. To offer additional perspective, that increase represents an additional 300 million passengers per year, roughly equal to the entire population of the United States.

In this age of global competition, we have a clear opportunity to invest now to prepare our world class aviation system to meet the demands of that future. NextGen technologies offer our nation a worthy opportunity for investment in safety and innovation. Delaying infrastructure investment means the long term cost to our system, passengers and environment will far exceed the cost of a timely deployment today. NextGen technologies are an investment in aviation's continued viability, and will produce economic benefits for decades – far beyond their cost. Our nation and airline industry will yield immediate and measurable financial returns that will bolster America's future economic stability and continued growth, as we continue to meet the challenge of giving the world new ways to fly.

Our nation's continued economic recovery demands a cautious and well-considered fiscal policy. We have to invest carefully in America's future where we can be certain of reliable returns. Aviation is a growth industry worthy of that investment, representing a key element of our country's economy. The FAA is already delivering on the promise of tomorrow. We hope you will support our ongoing mission of safety and modernization as a national priority.

EXHIBIT I
ORGANIZATION CHART

Office of the Administrator and Deputy Administrator
FY 2012 22 FTE / 20 FTP
FY 2013 22 FTE / 20 FTP
Total FAA
FY 2012 46,254 FTE / 46,100 FTP
FY 2013 46,270 FTE / 45,995 FTP

Director for Audit & Evaluation
FY 2012 19 FTE / 19 FTP
FY 2013 19 FTE / 19 FTP

Director for the Joint Planning & Development Office
FY 2012 11 FTE / 11 FTP
FY 2013 11 FTE / 11 FTP

Air Traffic Organization
FY 2012 33,768 FTE / 33,566 FTP
FY 2013 33,753 FTE / 33,473 FTP

Assistant Administrator for Human Resource Management
FY 2012 620 FTE / 599 FTP
FY 2013 621 FTE / 601 FTP

Assistant Administrator for Civil Rights
FY 2012 79 FTE / 79 FTP
FY 2013 79 FTE / 79 FTP

Assistant Administrator for Communciations
FY 2012 34 FTE / 34 FTP
FY 2013 34 FTE / 34 FTP

Associate Administrator for Aviation Safety
FY 2012 7,637 FTE / 7,634 FTP
FY 2013 7,664 FTE / 7,634 FTP

Assistant Administrator for Government & Industry Affairs
FY 2012 11 FTE / 12 FTP
FY 2013 11 FTE / 12 FTP

Assistant Administrator for Security & Hazardous Material Safety
FY 2012 488 FTE / 504 FTP
FY 2013 493 FTE / 504 FTP

Associate Administrator for Commercial Space Transportation
FY 2012 73 FTE / 75 FTP
FY 2013 73 FTE / 75 FTP

Assistant Administrator for Finance and Management
FY 2012 1,504 FTE / 1,523 FTP
FY 2013 1,489 FTE / 1,509 FTP

Assistant Administrator for Policy, International Affairs & Environment
FY 2012 161 FTE / 179 FTP
FY 2013 161 FTE / 179 FTP

Associate Administrator for Airports
FY 2012 589 FTE / 602 FTP
FY 2013 602 FTE / 602 FTP

Assistant Administrator for Next Generation Air Transportation System
FY 2012 986 FTE / 981 FTP
FY 2013 986 FTE / 981 FTP

Office of Chief Counsel
FY 2012 252 FTE / 262 FTP
FY 2013 252 FTE / 262 FTP

EXHIBIT II-1

FY 2013 COMPARATIVE STATEMENT OF NEW BUDGET AUTHORITY
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	FY 2011 ACTUAL		FY 2012 ESTIMATE	FY 2013 REQUEST
Operations	$9,535,328	*	$9,653,395	$9,718,000
Rescission	($19,066)			
Subtotal	**$9,516,262**		**$9,653,395**	**$9,718,000**
Facilities and Equipment	$2,736,203		$2,730,731	$2,850,000
Rescission	($5,472)			
Subtotal	**$2,730,731**		**$2,730,731**	**$2,850,000**
Research, Engineering and Development	$170,000		$167,556	$180,000
Rescission	($340)			($26,184)
Subtotal	**$169,660**		**$167,556**	**$153,816**
Grants-in-Aid for Airports				
Contract Authority (AATF)	$3,515,000		$3,515,000	$2,424,000
Rescission	$0			
Subtotal	**$3,515,000**		**$3,515,000**	**$2,424,000**
Obligation Limitation [Non-Add]	[$3,515,000]		[$3,350,000]	[2,424,000]
Overflight Fees	$50,000		$50,000	$100,000
Overflight Fees (Transfer to EAS)	($50,000)		($50,000)	($100,000)
	---------------		---------------	---------------
TOTAL	**$15,931,653**		**$16,066,682**	**$15,145,816**
Appropriations	$15,956,531		$16,066,682	$15,172,000
Rescissions	($24,878)		$0	($26,184)
Immediate Transportation Investment				
NextGen			$1,000,000	
Grants-in-Aid for Airports			$2,000,000	

* Includes $2.3 million balance of budget authority transferred from the U.S. Department of State.

EXHIBIT II-2

FY 2013 TOTAL BUDGETARY RESOURCES BY APPROPRIATION ACCOUNT
FEDERAL AVIATION ADMINISTRATION

Appropriations, Obligation Limitations, and Exempt Obligations
($000)

ACCOUNT NAME	FY 2011 ACTUAL	FY 2012 ESTIMATE	FY 2013 REQUEST
Operations [1]	**$9,513,962**	**$9,653,395**	**$9,718,000**
Air Traffic Organization (ATO)	7,458,352	7,442,738	7,513,849
Aviation Safety (AVS)	1,250,514	1,252,991	1,255,000
Commercial Space Transportation (AST)	15,021	16,271	16,700
Finance & Management (AFN)	0	582,117	573,591
NextGen (ANG)	0	60,134	60,064
Human Resource Management (AHR)	99,005	98,858	98,743
Staff Offices	691,069	200,286	200,052
Facilities & Equipment [2]	**$2,730,731**	**$2,730,731**	**$2,850,000**
Engineering, Development, Test and Evaluation	522,802	435,600	522,830
Air Traffic Control Facilities and Equipment	1,351,186	1,406,731	1,467,770
Non-Air Traffic Control Facilities and Equipment	148,858	173,100	161,500
Facilities and Equipment Mission Support	233,834	240,300	217,900
Personnel and Related Expenses	474,050	475,000	480,000
Research, Engineering & Development	**$169,660**	**$167,556**	**$180,000**
Improve Aviation Safety	91,321	89,314	94,760
Improve Efficiency	37,798	34,174	45,144
Reduce Environmental Impacts	35,134	38,574	34,637
Mission Support	5,407	5,494	5,459
Grants-in-Aid for Airports	**$3,515,000**	**$3,350,000**	**$2,424,000**
Grants-in-Aid for Airports	3,378,106	3,198,750	2,276,700
Personnel & Related Expenses	93,422	101,000	103,000
Airport Technology Research	22,472	29,250	29,300
Small Community Air Service	6,000	6,000	0
Airport Cooperative Research Program	15,000	15,000	15,000
	---------------	---------------	---------------
TOTAL:	**$15,929,352**	**$15,901,682**	**$15,172,000**
Immediate Transportation Investment		**$3,000,000**	
NextGen		1,000,000	
Grants-in-Aid for Airports		2,000,000	

Note: Totals may not add due to rounding.

[1] Operations amounts for FY 2011 Enacted do not reflect the transfer of $5 million from Air Traffic Organization to Staff Offices.

[2] Facilities & Equipment amounts for FY 2011 Enacted reflect the decision to apply $39.9 million of one-year funding to ERAM project and travel costs. Of this amount, $34.9 million is applied to Air Traffic Control Facilities and Equipment (Activity 2) and $5.0 million to Personnel and Related Expenses (Activity 5).

EXHIBIT II-3
FY 2013 BUDGET REQUEST BY DOT STRATEGIC AND ORGANIZATIONAL GOALS
Federal Aviation Administration
($000)

ACCOUNT/Program	SAFETY	STATE OF GOOD REPAIR	ECONOMIC COMPETITIVENESS	LIVABLE COMMUNITIES	ENVIRONMENTAL SUSTAINABILITY	ORGANIZATIONAL EXCELLENCE	CORPORATE SERVICES	TOTAL
OPERATIONS								
Air Traffic Organization (ATO)	4,522,271		2,771,697			219,881		7,513,849
Aviation Safety (AVS)	1,255,000							1,255,000
Commercial Space Transportation (AST)	16,700							16,700
Finance and Management (AFN)			21,948		57,811	444,732	49,100	573,591
NextGen (ANG)			60,064					60,064
Human Resource Management (AHR)							98,743	98,743
Staff Offices								
Office of the Administrator (AOA)							4,130	4,130
Civil Rights (ACR)							10,639	10,639
Government and Industry Affairs (AGI)							1,570	1,570
Communications (AOC)	710					1,613	3,443	5,767
General Counsel (AGC)	23,780		6,971		2,665		13,535	46,950
Audit & Evaluations (AAE)							2,787	2,787
Aviation Policy, Planning, Environment and International (APL)	9,368		9,826		11,508		4,209	34,911
Security and Hazardous Materials Safety (ASH)	52,012					39,690	1,596	93,298
Subtotal - Staff Offices	85,870		16,797		14,172	41,303	41,909	200,052
Total - Operations	5,879,842	0	2,870,505	0	71,984	705,916	189,753	9,718,000
FACILITIES AND EQUIPMENT								
Activity 1. Engineering, Development, Test and Evaluation	20,780		460,645		9,500	31,905		522,830
Activity 2. Air Traffic Control Facilities and Equipment	151,908		1,134,206		26,000	155,656		1,467,770
Activity 3. Non-Air Traffic Control Facilities and Equipment	82,600		16,200		12,500	50,200		161,500
Activity 4. Facilities and Equipment Mission Support	2,428		70,000		17,500	127,972		217,900
Activity 5. Personnel and Related Expenses	65,265		334,016		4,949	75,771		480,000
Total - Facilities and Equiptment	322,981	0	2,015,067	0	70,449	441,504	0	2,850,000
RESEARCH, ENGINEERING AND DEVELOPMENT								
A11. Improve Aviation Safety	94,760							94,760
A12. Improve Efficiency			45,144					45,144
A13. Reduce Environmental Impacts					34,637			34,637
A14. Mission Support	3,260		1,850		349			5,460
Total - Research, Engineering and Development	98,020	0	46,994	0	34,986	0	0	180,000
GRANTS-IN-AID FOR AIRPORTS								
Grants-in-Aid for Airports	990,365	723,991	302,801		259,544			2,276,700
Personnel and Related Expenses	51,014	22,539	10,505		18,356	585		103,000
Airport Technology Research	14,516	13,610			1,174			29,300
Airport Cooperative Research	5,000		5,000		5,000			15,000
Small Community Air Service			0					0
Total - Grants-in-Aid for Airports	1,060,894	760,140	318,306	0	284,074	585	0	2,424,000
TOTAL REQUEST	7,361,737	760,140	5,250,873	0	461,493	1,148,005	189,753	15,172,000

EXHIBIT II-3a
FY 2013 BUDGET REQUEST BY DOT OUTCOMES
Federal Aviation Administration
($000)

DOT GOAL/Outcome	Program	FY 2013 Request
1. SAFETY		
i. Reduction in Transportation-Related Fatalities and Injuries	Ops - Air Traffic Organization (ATO)	4,522,271
	Ops - Aviation Safety (AVS)	1,255,000
	Ops - Commerical Space Transportation (AST)	16,700
	Ops - Communications (AOC)	710
	Ops - General Counsel (AGC)	23,780
	Ops - Aviation Policy, Planning, Environment and International (APL)	9,368
	Ops - Security and Hazardous Materials Safety (ASH)	52,012
	F&E - Activity 1: Engineering, Development, Test and Evaluation	20,780
	F&E - Activity 2: Air Traffic Control Facilities and Equipment	151,908
	F&E - Activity 3: Non-Air Traffic Control Facilities and Equipment	82,600
	F&E - Activity 4: Facilities and Equipment Mission Support	2,428
	F&E - Activity 5: Personnel and Related Expenses	65,265
	RE&D - A11: Improve Aviation Safety	94,760
	RE&D - A14: Mission Support	3,260
	AIP - Grants-in-Aid for Airports	990,365
	AIP - Personnel and Related Expenses	51,014
	AIP - Airport Technology Research	14,516
	AIP - Airport Cooperative Research	5,000
Subtotal - Fatalities and Injuries		**7,361,737**
ii. Improved Safety Experience	---	**0**
Total – Safety		**7,361,737**

DOT GOAL/Outcome	Program	FY 2013 Request
2. STATE OF GOOD REPAIR		
i. Maintain Percentage of Airport Runways in Good or Fair Condition	AIP - Grants-in-Aid for Airports	723,991
	AIP - Personnel and Related Expenses	22,539
	AIP - Airport Technology Research	13,610
Total – State of Good Repair		**760,140**
3. ECONOMIC COMPETITIVENESS		
i. Maximum Economic Returns on Transporation Policies and Investments	Ops - Air Traffic Organization (ATO)	2,641,156
	Ops - NextGen (ANG)	60,064
	Ops - General Counsel (AGC)	5,536
	Ops - Aviation Policy, Planning, Environment and International (APL)	3,956
	F&E - Activity 1: Engineering, Development, Test and Evaluation	434,445
	F&E - Activity 2: Air Traffic Control Facilities and Equipment	902,042
	F&E - Activity 3: Non-Air Traffic Control Facilities and Equipment	16,200
	F&E - Activity 5: Personnel and Related Expenses	320,735
Subtotal - Maximum Economic Returns		**4,384,135**
ii. Competitive Air Transportation System Responsive to Consumer Needs	Ops - Air Traffic Organization (ATO)	121,189
	Ops - Finance and Management (AFN)	21,948
	F&E - Activity 1: Engineering, Development, Test and Evaluation	26,200
	F&E - Activity 2: Air Traffic Control Facilities and Equipment	232,164
	F&E - Activity 4: Facilities and Equipment Mission Support	70,000
	F&E - Activity 5: Personnel and Related Expenses	13,280
	RE&D - A12: Economic Competitiveness	45,144
	RE&D - A14: Mission Support	1,850
	AIP - Grants-in-Aid for Airports	302,801
	AIP - Personnel and Related Expenses	10,505
	AIP - Airport Cooperative Research	5,000
Subtotal - Competitive Air Transportation System		**850,082**
iii. U.S. Transportation Interests Advanced Abroad	Ops - Air Traffic Organization (ATO)	9,351
	Ops - General Counsel (AGC)	1,435
	Ops - Aviation Policy, Planning, Environment and International (APL)	5,870
Subtotal - Advance U.S. Interests		**16,656**
Total – Economic Competitiveness		**5,250,873**

DOT GOAL/Outcome	Program	FY 2013 Request
4. LIVABLE COMMUNITIES		
i. Improved Networks and Improved Access	---	0
ii. Increased Access	---	0
iv. Improved Access for People with Disabilities and Older Adults	---	0
	---	0
Total – Livable Communities		**0**
5. ENVIRONMENTAL SUSTAINABILITY		
i. Reduced Carbon Emissions, Improved Energy Efficiency, and Reduced Dependence on Oil	Ops - General Counsel (AGC)	2,665
	Ops - Aviation Policy, Planning, Environment and International (APL)	9,356
	F&E - Activity 1: Engineering, Development, Test and Evaluation	9,500
	F&E - Activity 5: Personnel and Related Expenses	713
Subtotal – Emissions, Energy Efficiency and Oil		**22,234**
ii. Reduced Transportation-Related Pollution and Impacts on Ecosystems	Ops - Finance and Management (AFN)	57,811
	Ops - Aviation Policy, Planning, Environment and International (APL)	2,152
	F&E - Activity 2: Air Traffic Control Facilities and Equipment	26,000
	F&E - Activity 3: Non-Air Traffic Control Facilities and Equipment	12,500
	F&E - Activity 4: Facilities and Equipment Mission Support	17,500
	F&E - Activity 5: Personnel and Related Expenses	4,236
	RE&D - A13: Environmental Sustainability	34,637
	RE&D - A14: Mission Support	349
	AIP - Grants-in-Aid for Airports	259,544
	AIP - Personnel and Related Expenses	18,356
	AIP - Airport Technology Research	1,174
	AIP - Airport Cooperative Research	5,000
Subtotal – Reduced Pollution		**439,259**
iii. Environmentally Sustainable Practices in Transportation	---	**0**
iv. Environmentally Sustainable Practices in DOT Services and Facilities	---	**0**
Total – Environmental Sustainability		**461,493**

DOT GOAL/Outcome	Program	FY 2013 Request
6. ORGANIZATIONAL EXCELLENCE		
i. Other FAA Organizational Excellence Outcomes - Emergency Preparedness	Ops - Finance and Management (AFN)	18,498
	Ops - Security and Hazardous Materials Safety (ASH)	39,690
	F&E - Activity 3: Non-Air Traffic Control Facilities and Equipment	12,000
	F&E - Activity 5: Personnel and Related Expenses	285
Subtotal – Emergency Preparedness		**70,472**
ii. Other FAA Organizational Excellences Outcomes - Open Government	Ops - Air Traffic Organization (ATO)	11,144
	Ops - Finance and Management (AFN)	126,663
	Ops - Communications (AOC)	1,613
	F&E - Activity 3: Non-Air Traffic Control Facilities and Equipment	15,000
	F&E - Activity 5: Personnel and Related Expenses	1,444
	AIP - Personnel and Related Expenses	146
Subtotal – Open Government		**156,011**
iii. Other FAA Organizational Outcome - Improved Financial Performance	Ops - Air Traffic Organization (ATO)	208,737
	Ops - Finance and Management (AFN)	299,571
	Ops - Regions and Center Operations (ARC)	
	F&E - Activity 1: Engineering, Development, Test and Evaluation	31,905
	F&E - Activity 2: Air Traffic Control Facilities and Equipment	155,656
	F&E - Activity 3: Non-Air Traffic Control Facilities and Equipment	23,200
	F&E - Activity 4: Facilities and Equipment Mission Support	127,972
	F&E - Activity 5: Personnel and Related Expenses	74,042
	AIP - Personnel and Related Expenses	439
Subtotal - Improved Financial Performance		**921,522**
Total – Organizational Excellence		**1,148,005**
7.CORPORATE SERVICE FUNCTIONS DISTRIBUTED INDIRECTLY TO PROGRAMS		
	Ops - Finance and Management (AFN)	49,100
	Ops - Human Resource Management (AHR)	98,743
	Ops - Office of the Administrator (AOA)	4,130
	Ops - Civil Rights (ACR)	10,639
	Ops - Government and Industry Affairs (AGI)	1,570
	Ops - Communications (AOC)	3,443
	Ops - General Counsel (AGC)	13,535
	Ops - Audit & Evaluations (AAE)	2,787
	Ops - Aviation Policy, Planning, Environment and International (APL)	4,209
	Ops - Security and Hazardous Materials Safety (ASH)	1,596
Total – Corporate Services Functions		**189,753**
TOTAL FAA		**15,172,000**

EXHIBIT II-4

FY 2013 BUDGET AUTHORITY
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	Mandatory/ Discretionary	FY 2011 ACTUAL	FY 2012 ESTIMATE	FY 2013 REQUEST
Operations	**D**	**$9,516,262**	**$9,653,395**	**$9,718,000**
General		$4,966,380	$4,592,701	$2,997,000
AATF		$4,549,882	$5,060,694	$6,721,000
Facilities & Equipment		**$2,730,731**	**$2,730,731**	**$2,850,000**
AATF	**D**	$2,730,731	$2,730,731	$2,850,000
Research, Engineering & Development (AATF)	**D**	**$169,660**	**$167,556**	**$153,816**
Grants in Aid for Airports (AATF)		**$3,515,000**	**$3,515,000**	**$2,424,000**
Contract Authority (AATF)	**M**	$3,515,000	$3,515,000	$2,424,000
Aviation User Fees	**M**	**$50,000**	**$50,000**	**$100,000**
Aviation User Fees (transfer to EAS)	**M**	**($50,000)**	**($50,000)**	**($100,000)**
		---------------	---------------	---------------
TOTAL:		**$15,931,653**	**$16,066,682**	**$15,145,816**
[Mandatory]		$3,515,000	$3,515,000	$2,424,000
[Discretionary]		$12,416,653	$12,551,682	$12,721,816
[General]		$4,966,380	$4,592,701	$2,997,000
[AATF]		$10,965,273	$11,473,981	$12,148,816
Immediate Transportation Investment (GF)	**M**		**$3,000,000**	
NextGen			$1,000,000	
Grants-in-Aid for Airports			$2,000,000	

Note: Totals may not add due to rounding.

EXHIBIT II-5

FY 2013 OUTLAYS
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	FY 2011 ACTUAL	FY 2012 ESTMATE	FY 2013 REQUEST
Operations	**$9,410,563**	**$9,939,489**	**$10,012,798**
General	$4,860,681	$4,878,795	$3,291,798
AATF	$4,549,882	$5,060,694	$6,721,000
Facilities & Equipment	**$2,839,496**	**$2,857,816**	**$2,926,584**
General	**$88,874**	**$25,000**	**$9,000**
-Discretionary	$88,874	$25,000	$9,000
-Mandatory			
AATF	**$2,750,622**	**$2,832,816**	**$2,917,584**
-Discretionary	$2,731,655	$2,827,483	$2,917,584
-Mandatory	$18,967	$5,333	
Aviation Insurance Revolving Account (M)	**($222,867)**	**($188,000)**	**($194,000)**
Research, Engineering (TF) & Development	**$174,043**	**$187,885**	**$188,527**
Grants-in-Aid for Airports	**$3,380,752**	**$3,864,518**	**$3,597,943**
General			
-Discretionary	$164,343	$14,535	$0
-Mandatory			
AATF			
-Discretionary	$3,216,409	$3,849,983	$3,597,943
Franchise Fund	**$36,917**	**$43,000**	**$21,000**
TOTAL:	**$15,618,904**	**$16,704,709**	**$16,552,852**
[Mandatory]	($203,900)	($182,667)	($194,000)
[Discretionary]	$15,822,804	$16,887,376	$16,746,852
Immediate Transportation Investment			
NextGen		$400,000	$400,000
Grants-in-Aid for Airports		$360,000	$1,060,000

EXHIBIT II-6

SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
FEDERAL AVIATION ADMINISTRATION
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

OPERATIONS

	2012 Enacted	Baseline Changes: Annualization of 2012	Baseline Changes: 2013 Pay Raises	Baseline Changes: One More Compensible Day	Baseline Changes: GSA Rent	Baseline Changes: WCF Increase/ Decrease	Baseline Changes: Inflation/ Deflation	2013 Baseline Estimate	Program Increases/ Decreases	FY 2013 Request
PERSONNEL RESOURCES (FTE)										
Direct FTE	42,488	27							(24)	**42,491**
FINANCIAL RESOURCES										
ADMINISTRATIVE EXPENSES										
Salaries and Benefits	$6,825,065	$3,430	$25,188	$26,487				6,880,170	$69,533	$6,949,703
Travel	154,091							154,091	$26	$154,116
Transportation	24,919							24,919	($1,228)	$23,691
GSA Rent	116,157							116,157	($450)	$115,706
Rental Payments to Others	58,430							58,430	$1,607	$60,037
Communications, Rent & Utilities	272,710							272,710	($8,404)	$264,306
Printing	5,970							5,970	($1,570)	$4,400
Other Services:								0		$0
-WCF								0		$0
-Advisory and Assistance Services	536,406							536,406	($22,879)	$513,527
-Other	1,469,850							1,469,850	($26,881)	$1,442,969
Supplies	132,356							132,356	$308	$132,664
Equipment	51,201							51,201	($315)	$50,887
Lands and Structures	2,003							2,003	($137)	$1,866
Grants, Claims and Subsidies	1,870							1,870	($501)	$1,369
Insurance Claims and Indemnities	2,368							2,368	$393	$2,761
Admin Subtotal	**$9,653,395**	**$3,430**	**$25,188**	**$26,487**	**$0**	**$0**	**$0**	**$9,708,500**	**$9,500**	**$9,718,000**
PROGRAMS										
Air Traffic Organization (ATO)	$7,442,738		$20,296	$20,924				$7,483,958	$29,892	$7,513,850
Aviation Safety (AVS)	$1,252,991	$3,430	$3,415	$3,870				$1,263,706	($8,706)	$1,255,000
Commercial Space Transportation (AST)	$16,271		$41	$42				$16,354	$346	$16,700
Financial Services (AFN)	$582,117		$497	$671				$583,285	($9,694)	$573,591
NextGen (ANG)	$60,134		$97	$99				$60,330	($266)	$60,064
Human Resources (AHR)	$98,858		$272	$279				$99,409	($666)	$98,743
Staff Offices	$200,286		$570	$602				$201,458	($1,406)	$200,052
Programs Subtotal	**$9,653,395**	**$3,430**	**$25,188**	**$26,487**	**$0**	**$0**	**$0**	**$9,708,500**	**$9,500**	**$9,718,000**
GRAND TOTAL	**$9,653,395**	**$3,430**	**$25,188**	**$26,487**	**$0**	**$0**	**$0**	**$9,708,500**	**$9,500**	**$9,718,000**

EXHIBIT II-6

SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
FEDERAL AVIATION ADMINISTRATION
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

FACILITIES & EQUIPMENT

	2012 Enacted	Baseline Changes: Annualization of 2012 FTE	2013 Pay Raises	One Additional Compensable Day	GSA Rent	WCF Increase/ Decrease	Inflation/ Deflation	FY 2013 Baseline Estimate	Program Increases/ Decreases	FY 2013 Request
PERSONNEL RESOURCES (FTE)	2,914									
Direct FTE	2,907							2,907		2,907
Reimbursable FTE	7							7	0	7
FINANCIAL RESOURCES										
ADMINISTRATIVE EXPENSES										
Salaries and Benefits	$422,056		$1,580	$1,620				$425,256		$425,256
Travel	$36,842							$36,842	$1,800	$38,642
Transportation	$2,290							$2,290		$2,290
GSA Rent	$0							$0		$0
Rental Payments to Others	$30,030							$30,030		$30,030
Communications, Rent & Utilities	$36,012							$36,012	$2,621	$38,633
Printing	$282							$282		$282
Other Services:	$1,856,704							$1,856,704	$101,647	$1,958,351
-WCF	$0							$0		$0
-Advisory and Assistance Services	$0							$0		$0
-Other	$0							$0		$0
Supplies	$30,208							$30,208		$30,208
Equipment	$183,461							$183,461	$8,357	$191,818
Lands and Structures	$127,918							$127,918	$1,644	$129,562
Grants, Claims and Subsidies	$4,928							$4,928		$4,928
Insurance Claims and Indemnities	$0							$0		$0
Interest and Dividends	$0							$0		$0
Admin Subtotal	**$2,730,731**	**0**	**$1,580**	**$1,620**	**$0**	**$0**	**$0**	**$2,733,931**	**$116,069**	**$2,850,000**
PROGRAMS										
Engineering, Development, Test and Evaluation	$435,600							$435,600	$87,230	$522,830
Air Traffic Control Facilities and Equipment	$1,406,731							$1,406,731	$61,039	$1,467,770
Non-Air Traffic Control Facilities and Equipment	$173,100							$173,100	($11,600)	$161,500
Facilities and Equipment Mission Support	$240,300							$240,300	($22,400)	$217,900
Personnel & Related Expenses	$475,000		$1,580	$1,620				$478,200	$1,800	$480,000
Programs Subtotal	**$2,730,731**	**$0**	**$1,580**	**$1,620**	**$0**	**$0**	**$0**	**$2,733,931**	**$116,069**	**$2,850,000**
GRAND TOTAL	**$2,730,731**	**$0**	**$1,580**	**$1,620**	**$0**	**$0**	**$0**	**$2,733,931**	**$116,069**	**$2,850,000**

EXHIBIT II-6

SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
FEDERAL AVIATION ADMINISTRATION
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

RESEARCH, ENGINEERING, & DEVELOPMENT

	2012 Enacted	Annualization of 2012 FTE	2013 Pay Raises	One Additional Compensable Day	GSA Rent	WCF Increase/ Decrease	Inflation/ Deflation	FY 2013 Baseline Estimate	Program Increases/Decreases	FY 2013 Request
PERSONNEL RESOURCES (FTE)	270								0	270
Direct FTE	270								0	270
FINANCIAL RESOURCES (Use II-6 from previous year CJ)										
Salaries and Benefits	38,954		144	149				39,248		39,248
Benefits for Former Personnel	0							0		0
Travel	2,180						0	2,180		2,180
Transportation	47						0	47		47
GSA Rent	0						0	0		0
Rental Payments to Others	0						0	0		0
Communications, Rent & Utilities	17						0	17		17
Printing	15						0	15		15
Other Services:	0						0	0		0
-WCF	0						0	0		0
-Advisory and Assistance Services	0						0	0		0
-Other	109,687						0	109,687	12,150	121,837
Supplies	2,081						0	2,081		2,081
Equipment	1,463						0	1,463		1,463
Lands and Structures							0	0		0
Grants, Claims & Subsidies	13,112						0	13,112		13,112
Insurance Claims and Indemnities	0						0	0		0
Interest & Dividends	0						0	0		0
Admin Subtotal	**167,556**		**144**	**149**			**0**	**167,850**	**12,150**	**180,000**
PROGRAMS										
Improve Aviation Safety	$89,314		111	113			0	89,538	5,222	94,760
Improve Aviation Efficiency	$34,174		16	16			0	34,206	10,938	45,144
Reduce Environmental Impact	$38,574		10	10			0	38,594	-3,957	34,637
Mission Support	$5,494		9	9			0	5,512	-53	5,459
Programs Subtotal	**167,556**		**144**	**149**			**0**	**167,850**	**12,150**	**180,000**
GRAND TOTAL	**167,556**		**144**	**149**			**0**	**167,850**	**12,150**	**180,000**

EXHIBIT II-6

SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
FEDERAL AVIATION ADMINISTRATION
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

GRANTS-IN-AID FOR AIRPORTS

	2012 Enacted	Baseline Changes: Annualization of 2012 FTE	Baseline Changes: 2013 Pay Raises	Baseline Changes: One Additional Compensable Day	Baseline Changes: GSA Rent	Baseline Changes: WCF Increase/ Decrease	Baseline Changes: Inflation/ Deflation	FY 2013 Baseline Estimate	Program Increases/ Decreases	FY 2013 Request
PERSONNEL RESOURCES (FTE)	590	13						603	0	603
Direct FTE	589	13						602	0	602
Reimbursable FTE	1							1	0	1
FINANCIAL RESOURCES										
ADMINISTRATIVE EXPENSES										
Salaries and Benefits	$86,916	$1,985	$352	$334				$89,587	$868	$90,455
Benefits for Former Personnel	$0							$0		$0
Travel	$3,705							$3,705	($1,027)	$2,678
Transportation	$94							$94		$94
GSA Rent	$0							$0		$0
Rental Payments to Others	$582							$582		$582
Communications, Rent & Utilities	$324							$324		$324
Printing	$37							$37	($7)	$30
Other Services:	$0							$0		$0
-WCF	$0							$0		$0
-Advisory and Assistance Services	$24,492							$24,492	($500)	$23,992
-Other	$23,414							$23,414		$23,414
Supplies	$687							$687		$687
Equipment	$1,665							$1,665		$1,665
Lands and Structures	$102							$102		$102
Grants, Claims & Subsidies	$3,201,946							$3,201,946	($922,005)	$2,279,941
Insurance Claims and Indemnities	$0							$0		$0
Interest & Dividends	$36							$36		$36
Financial Transfers	$6,000							$6,000	($6,000)	$0
Admin Subtotal	**$3,350,000**	**$1,985**	**$352**	**$334**	**$0**	**$0**	**$0**	**$3,352,671**	**(928,671)**	**$2,424,000**
PROGRAMS										
Grants-in-aid for Airports	$3,198,750							$3,198,750	($922,050)	$2,276,700
Personnel and Related Expenses	$101,000	$1,911	$313	$321				$103,544	($544)	$103,000
Airport Technology Research	$29,250		$38	$12				$29,300		$29,300
Airport Cooperative Research	$15,000	$74	$1	$1				$15,076	($76)	$15,000
SCASDP (transfer to OST)	$6,000							$6,000	($6,000)	$0
Programs Subtotal	**$3,350,000**	**$1,985**	**$352**	**$334**	**$0**	**$0**	**$0**	**$3,352,671**	**($928,671)**	**$2,424,000**
GRAND TOTAL	**$3,350,000**	**$1,985**	**$352**	**$334**	**$0**	**$0**	**$0**	**$3,352,671**	**($928,671)**	**$2,424,000**

EXHIBIT II-7

WORKING CAPITAL FUND
FEDERAL AVIATION ADMINISTRATION
($000)

	FY 2012 ESTIMATE	FY 2013 REQUEST	CHANGE
DIRECT:			
Operations	**46,153**	**47,688**	**1,535**
Air Traffic Organization (ATO)	7,695	7,696	1
Aviation Safety (AVS)	2,493	2,618	125
Staff Offices	35,965	37,374	1,409
TOTAL	**46,153**	**47,688**	**1,535**

EXHIBIT II-8

FEDERAL AVIATION ADMINISTRATION
PERSONNEL RESOURCE -- SUMMARY
TOTAL FULL-TIME EQUIVALENTS

	FY2011 ACTUALS	FY 2012 ENACTED	FY 2013 REQUEST
DIRECT FUNDED BY APPROPRIATION			
Operations	42,538	42,488	42,491
Facilities & Equipment	2,907	2,907	2,907
Research, Engineering & Development	265	270	270
Grants-in-Aid for Airports	548	589	602
SUBTOTAL, DIRECT FUNDED	**46,258**	**46,254**	**46,270**
REIMBURSEMENTS / ALLOCATIONS			
Operations	80	110	110
Aviation Insurance Revolving Fund	5	4	5
Facilities & Equipment	7	7	7
Grants-in-Aid for Airports	1	1	1
Administrative Services Franchise Fund	1,676	1,676	1,676
SUBTOTAL, REIMBURSE. / ALLOC.	**1,769**	**1,798**	**1,799**
TOTAL FTEs	**48,027**	**48,052**	**48,069**

EXHIBIT II-9

FEDERAL AVIATION ADMINISTRATION
PERSONNEL RESOURCE -- SUMMARY
TOTAL FULL-TIME POSITIONS

	FY2011 ACTUALS	FY 2012 ENACTED	FY 2013 REQUEST
DIRECT FUNDED BY APPROPRIATION			
Operations	41,936	42,042	41,937
Facilities & Equipment	2,856	3,181	3,181
Research, Engineering & Development	249	276	276
Airports	527	602	602
SUBTOTAL, DIRECT FUNDED	**45,568**	**46,101**	**45,996**
REIMBURSEMENTS / ALLOCATIONS			
Operations	100	175	175
Aviation Insurance Revolving Fund	3	5	5
Facilities & Equipment	0	0	0
Grants-in-Aid for Airports	1	2	2
Administrative Services Franchise Fund	1,565	1,566	1,664
SUBTOTAL, REIMBURSE. / ALLOC.	**1,669**	**1,748**	**1,846**
TOTAL FTPs	**47,237**	**47,849**	**47,842**

EXHIBIT III-2
ANNUAL PERFORMANCE RESULTS AND TARGETS

The Federal Aviation Administration (FAA) integrates performance results into its budget request to ensure alignment with the Department of Transportation's Strategic Plan. FAA tracks the following DOT level performance measures to demonstrate program results:

DOT Goal: Safety
Outcome: Reduction in transportation-related injuries and fatalities.

PRIORITY GOAL- Mitigate aviation risk to the American public both in the air and on the ground by identifying and addressing aviation accident precursors by September 30, 2013.

PRIORITY GOAL-Key Indicator[1] Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over a 9-year (2010-2018). No more than 6.7 in FY 2016.	2009	2010	2011	2012	2013
Target	8.4	8.1	7.9	7.6	7.4
Actual	6.7	0.3[2]	0.0[3]	TBD	TBD

[1] This measure is a key indicator for a DOT High Priority Performance Goal.
[2] Preliminary estimate. Final data will be available in March 2012.
[3] Preliminary estimate. Final data will be available in March 2013.

PRIORITY GOAL-Key Indicator[1] Reduce general aviation fatal accident rate to no more than 1.02 fatal accidents per 100,000 flight hours by 2016.	2009	2010	2011	2012	2013
Target	1.11	1.10	1.08	1.07	1.06
Actual	1.17	1.10[2]	1.11[3]	TBD	TBD

[1] This measure is a key indicator for a DOT High Priority Performance Goal.
[2] Preliminary estimate. Final data will be available in March 2012.
[3] Preliminary estimate. Final data will be available in March 2013.

PRIORITY GOAL- Key Indicator[1] Reduce category A&B runway incursions in all airports to a rate of no more than 0.45 per million operations in 2012 and 2013.	2009	2010	2011	2012	2013
Target	N/A	N/A	N/A	0.45 per million	0.45 per million
Actual	N/A	N/A	.138	TBD	TBD

[1] This measure is a new measure and a key indicator for a DOT High Priority Performance Goal.

PRIORITY GOAL-Key Indicator[1] Implement 80% of approved interventions to mitigate the top 5 hazards associated with airborne losses of separation. [1 2]	2009	2010	2011	2012	2013
Target	N/A	N/A	N/A	N/A	80
Actual	N/A	N/A	N/A	N/A	TBD

[1] This measure is a key indicator for a DOT High Priority Performance Goal.
[2] This is a new measure in FY 2013.

Hazardous materials incidents involving death or major injury.[1]	2009	2010	2011	2012	2013
Target	36	22-36	22-34	22-34	21-33
Actual	29	23	27	TBD	TBD

[1] This PHMSA-led DOT measure is supported by the Federal Aviation Administration, Federal Motor Carrier Safety Administration, Federal Railroad Administration, and the US Coast Guard.

Number of accidents resulting in fatalities, injuries, or significant property damage to uninvolved public [1]	2009	2010	2011	2012	2013
Target	0	0	0	0	0
Actual	0	0	0	TBD	TBD

[1] FAA Destination 2025 target. Although not designated a DOT-level measure, Commercial Space Launch Accidents is included to emphasize FAA's commitment to promoting safety in the rapidly developing commercial space industry.

DOT Goal: State of Good Repair
Outcome: Maintain percentage of airport runways in good or fair condition.

Maintain runway pavement in good or fair condition for 93 percent of the paved runways in the National Plan of Integrated Airport Systems.	2009	2010	2011	2012	2013
Target	93.00%	93.00%	93.00%	93.00%	93.00%
Actual	97.00%	97.20%	97.40%	TBD	TBD

DOT Goal: Economic Competitiveness
Outcome: Maximum economic returns on transportation policies and investments.

PRIORITY GOAL[1] By September 30, 2013, achieve initial operating capability on ERAM at all 20 Continental United States En Route Centers.	2009	2010	2011	2012	2013
Target	N/A	N/A	8	5	7
Actual	N/A	N/A	5	TBD	TBD

[1] This is a DOT High Priority Performance Goal.

Achieve an average daily airport capacity for Core airports of 86,606 arrivals and departures per day by FY 2011 and maintain through FY 2016.	2009	2010	2011	2012	2013
Target	100,707	101,290[1]	86,606[2]	86,606	86,606
Actual	101,691	101,668	87,338	TBD	TBD

[1] In FY 2009, this target was revised from 102,648
[2] In FY 2011, this target was revised from 103,068

Sustain adjusted operational availability at 99.70 percent for the reportable facilities that support Core airports through FY 2016.	2009	2010	2011	2012	2013
Target	99.70%	99.70%	99.70%	99.70%	99.70%
Actual	99.78%	99.79%	99.72%	TBD	TBD

DOT Goal: Economic Competitiveness
Outcome: A competitive air transportation system responsive to consumer needs.

Achieve a NAS on-time arrival rate of 88.00 percent at Core airports and maintain through FY 2016.	2009	2010	2011	2012	2013
Target	88.00%	88.00%	88.00%	88.00%	88.00%
Actual	88.98%	90.55%[1]	90.41%	TBD	TBD

[1] Final result revised from preliminary estimate of 90.33%.

DOT Goal: Environmental Sustainability
Outcome: Reduced carbon emissions, improved energy efficiency and reduced dependence on oil.

Improve NAS energy efficiency (fuel burned per miles flown) by at least 2 percent annually.[1]	2009	2010	2011	2012	2013
Target	-9.00%	-10.00%	-12.00%	-14.00%	-16.00%
Actual	-14.03%	-15.25%	-14.50%	TBD	TBD

[1] Revised to reflect the change in measurement basis from three year moving average to yearly result, and change in baseline from calendar years 2000-2002 (three year average) to calendar year 2000 (FY 2001). Prior year targets and actuals have been recalculated from the historical time series data to show yearly performance instead of three year moving average.

DOT Goal: Environmental Sustainability
Outcome: Reduced transportation-related air, water and noise pollution and impacts on ecosystems.

The U.S. population exposed to significant aircraft noise around airports has been reduced to fewer than 300,000 persons.[1]	2009[1]	2010	2011	2012	2013
Target	436,000	419,000	402,000	386,000	371,000
Actual	296,527	323,039	307,420[1]	TBD	TBD

[1] In FY 2011, this measure was revised to reflect the number of people exposed. Prior year percentages have been converted.

OPERATIONS

(Including transfer of funds)

For necessary expenses of the Federal Aviation Administration, not otherwise provided for, including operations and research activities related to commercial space transportation, administrative expenses for research and development, establishment of air navigation facilities, the operation (including leasing) and maintenance of aircraft, subsidizing the cost of aeronautical charts and maps sold to the public, lease or purchase of passenger motor vehicles for replacement only, in addition to amounts made available by Public Law 108-176, $9,718,000,000, of which $6,721,000,000 shall be derived from the Airport and Airway Trust Fund: Provided, That not to exceed 2 percent of any budget activity, except for aviation safety budget activity, may be transferred to any budget activity under this heading: Provided further, That no transfer may increase or decrease any appropriation by more than 2 percent: Provided further, That funds may be used to enter into a grant agreement with a nonprofit standard-setting organization to assist in the development of aviation safety standards: Provided further, That none of the funds in this Act shall be available for new applicants for the second career training program: Provided further, That there may be credited to this appropriation as offsetting collections funds received from States, counties, municipalities, foreign authorities, other public authorities, and private sources, including funds from fees authorized under Chapter 453 of title 49, United States Code, other than those authorized by section 45301(a)(1) of that title, which shall be available for expenses incurred in the provision of agency services, including receipts for the maintenance and operation of air navigation facilities, and for issuance, renewal or modification of certificates, including airman, aircraft, and repair station certificates, or for tests related thereto, or for processing major repair or alteration forms.

Program and Financing (in millions of dollars)

Identification code: 69-1301-0-1-402		FY 2011 Actual	FY 2012 Enacted	FY 2013 Request
	Obligations by program activity:			
00.01	Air Traffic Organization (ATO)...	7,448	7,443	7,514
00.02	NextGen..	....	60	60
00.03	Finance & Management...	....	582	574
00.04	Regulation & Certification	1,257	1,253	1,255
00.05	Commercial Space	15	16	17
00.06	Staff Offices	834	299	298
08.01	Reimbursable program...	166	175	184
09.00	Total new obligations..	9,720	9,828	9,902
	Budget resources:			
10.00	Unobligated balance brought forward, Oct. 1.......................	68	65	66
10.11	Unobligated balance transferred from other acct. (69-0102).	4	....	....
10.11	Unobligated balance transferred from other acct. (19-0113).	3	....	....
10.21	Recoveries of prior year unpaid obligations...........................	8	....	....
10.50	Unobligated balance (total)..	83	65	66
	Budget authority:			
	Appropriations, discretionary:			
11.00	Appropriation	4,974	4,593	2,997
11.21	Transferred from other accounts (19-0113)...........................	2	....	....
11.30	Appropriations permanently reduced....................................	-10	....	....
11.60	Appropriation, discretionary (total)..	4,966	4,593	2,997
	Spending authority from offsetting collections:			
	Discretionary:			
17.00	Collected..	4,650	5,236	6,905
17.01	Change in uncollected payments, federal sources.................	100	....	....
17.50	Spending auth from offsetting collections, disc (total)..........	4,750	5,236	6,905
19.00	Budget authority (total)..	9,716	9,829	9,902
19.30	Total budgetary resources available......................................	9,799	9,894	9,968
	Memorandum (non-add) entries:			
19.40	Unobligated balance expiring..	-14	....	....
19.41	Unexpired unobligated balance, end of year..........................	65	66	66
	Change in obligated balance:			
	Obligated balance, start of year (net):			
30.00	Unpaid obligations, brought forward, Oct. 1 (gross)..............	1,636	1,684	1,397
30.10	Uncollected pymts, Fed sources, brought forward, Oct. 1......	-221	-195	-195
30.20	Obligated balance, start of year (net)...................................	1,415	1,489	1,202
30.30	Obligations incurred, unexpired accounts.............................	9,720	9,828	9,902
30.31	Obligations incurred, expired accounts.................................	104	....	....
30.40	Outlays (gross)...	-9,625	-10,115	-10,197
30.50	Change in uncollected pymts, Fed sources, expired.............	-100	....	....
30.51	Change in uncollected pymts, Fed sources, unexpired..........	126	....	....
30.80	Recoveries of prior year unpaid obligations, unexpired.........	-8	....	....
30.81	Recoveries of prior year unpaid obligations, expired............	-143	....	....
	Obligated balance, end of year (net):			
30.90	Unpaid obligations, end of year (gross)................................	1,684	1,397	1,102
30.91	Uncollected pymts, Fed sources, end of year........................	-195	-195	-195
31.00	Obligated balance, end of year (net)....................................	1,489	1,202	907
	Budget authority and outlays, net:			
	Discretionary:			
40.00	Budget authority, gross...	9,716	9,829	9,902
	Outlays, gross:			
40.10	Outlays from new discretionary authority.............................	8,295	8,671	8,736
40.11	Outlays from discretionary balances.....................................	1,330	1,444	1,461

Identification code: 69-1301-0-1-402		FY 2011 Actual	FY 2012 Enacted	FY 2013 Request
40.20	Outlays, gross (total)..	9,625	10,115	10,197
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
40.30	Federal sources	-4,742	-5,186	-6,855
40.33	Non-Federal sources..	-22	-50	-50
40.40	Offsets against gross budget authority and outlays (total).....	-4,764	-5,236	-6905
	Additional offsets against gross budget authority only:			
40.50	Change in uncollected pymts, Federal sources, unexpired...	-100	....	....
40.52	Offsetting collections credited to expired accounts................	114	....	....
40.60	Additional offsets against budget authority only (total).........	14	....	....
40.70	Budget authority, net (discretionary)......................................	4,966	4,593	2,997
40.80	Outlays, net (discretionary)...	4,861	4,879	3,292
41.80	Budget authority, net (total)...	4,966	4,593	2,997
41.90	Outlays, net (total)...	4,861	4,879	3,292

For 2013, the Budget requests $9,718 million for FAA operations. These funds will be used to continue to promote aviation safety and efficiency. The Budget provides funding for the Air Traffic Organization (ATO) which is responsible for managing the air traffic control system. As a performance-based organization, the ATO is designed to provide cost-effective, efficient, and, above all, safe air traffic services. The Budget also funds the Aviation Safety Organization (AVS) which ensures the safe operation of the airlines and certifies new aviation products. In addition, the request also funds regulation of the commercial space transportation industry, as well as FAA policy oversight and overall management functions.

Object Classification (in millions of dollars)

Identification code: 69-1301-0-1-402		FY 2011 Actual	FY 2012 Enacted	FY 2013 Request
	Direct obligations:			
	Personnel compensation:			
11.1	Full-time permanent..	4,563	4,743	4,786
11.3	Other than full-time permanent	42	42	42
11.5	Other personnel compensation	369	371	370
11.9	Total personnel compensation	4,974	5,156	5,192
12.1	Civilian personnel benefits...	1,675	1,726	1,750
13.0	Benefits for former personnel	2	2	2
21.0	Travel and transportation of persons...................................	151	154	154
22.0	Transportation of things..	27	25	24
23.1	Rental payments to GSA...	116	116	116
23.2	Rental payments to others	58	58	60
23.3	Communications, utilities, and miscellaneous charges	275	261	264
24.0	Printing and reproduction...	10	6	4
25.1	Advisory and assistance services...	528	541	514
25.2	Other services	1,538	1,420	1,443
26.0	Supplies and materials	139	134	133
31.0	Equipment..	58	51	51
32.0	Land and structures	1	1	2
41.0	Grants, subsidies, and contributions....................................	1	1	2
42.0	Insurance claims and indemnities	1	1	1
99.0	Direct obligations..	9,554	9,653	9,718
99.0	Reimbursable obligations...	166	175	184
99.9	Total new obligations..	9,720	9,828	9,902

Employment Summary

Identification code: 69-1301-0-1-402	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request
10.01 Direct civilian full-time equivalent employment....................	42,538	42,488	42,491
20.01 Reimbursable civilian full-time equivalent employment........	80	110	110

EXHIBIT III-1

OPERATIONS APPROPRIATION
Summary by Program Activity
Appropriations, Obligations Limitations, and Exempt Obligations
($000)

	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Total	**$9,513,962**	**$9,653,395**	**$9,718,000**	**+$64,605**
Air Traffic Organization (ATO)	7,458,352	7,442,738	7,513,850	+71,111
Aviation Safety (AVS)	1,250,514	1,252,991	1,255,000	+2,009
Commercial Space (AST)	15,021	16,271	16,700	+429
Finance and Management (AFN)		582,117	573,591	-8,526
NextGen(ANG)		60,134	60,064	-70
Human Resources Management (AHR)	99,005	98,858	98,743	-115
Staff Offices	691,069	200,286	200,053	-234
FTEs				
Direct Funded	42,538	42,488	42,491	+3
Reimbursable, allocated, other	80	110	110	0

Totals may vary slightly due to rounding

Program and Performance Statement

This account provides funds for the operation, maintenance, communications, and logistical support of the air traffic control and air navigation systems. It also covers administrative and managerial costs for the FAA's regulatory, international, medical, engineering and development programs as well as policy oversight and overall management functions. The operations appropriation includes the following major activities:

- Operation on a 24-hour daily basis of a national air traffic system;
- Establishment and maintenance of a national system of aids to navigation;
- Establishment and surveillance of civil air regulations to assure safety in aviation;
- Development of standards, rules and regulations governing the physical fitness of airmen as well as the administration of an aviation medical research program;
- Regulation of the commercial space transportation industry;
- Administration of acquisition programs; and
- Headquarters, administration and other staff offices.

Exhibit III-1A

OPERATIONS APPROPRIATION
Summary Analysis of Change from FY 2012 to FY 2013
Appropriations, Obligations Limitations, and Exempt Obligations
($000)

Item	Change from FY 2012 to FY 2013 ($)	Change from FY 2012 to FY 2013 (FTE)
FY 2012 Enacted	**$9,653,395**	**42,488**
Adjustments to Base	**+$55,105**	**+3**
Annualization of FY 2012 FTE	+3,430	+27
One Additional Compensable Day	+26,487	
Pay Inflation	+25,188	
New or Expanded Programs	**+$9,500**	
Contract Pay Raises	+67,087	
Operational Safety Oversight	+846	
Spaceport Grants	-500	
Performance Based Navigation (PBN)	+10,000	
Contract Towers	-2,000	
Cost Efficiencies	-65,933	
Technical Adjustment for Staffing	0	
eLMS Staffing Increase		+1
Workforce Attrition		-35
Staffing Adjustments		+10
FY 2013 Request	**$9,718,000**	**42,491**

OPERATIONS APPROPRIATION

Operations Summary
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$9,653,395**	**42,042**	**918**	**42,488**
Unavoidable Adjustments	**+$55,105**			**+27**
FTE Annualization	+3,430			+27
Pay Inflation	+25,188			
One Additional Compensable Day	+26,487			
Uncontrollable Adjustments	**+$67,087**	**+7**		**+11**
Contract Pay Raises	+67,087			
Staffing Adjustment		+5		+10
AHR eLMS Staffing		+2		+1
Discretionary Adjustments	**-$57,587**	**-112**		**-35**
Operational Safety Oversight	+846			
Spaceport Grants	-500			
Performance Based Navigation (PBN)	10,000			
Contract Towers	-2,000			
Administrative Efficiencies	-65,933			
Workforce Attrition		-112		-35
Base Transfers				
Hangar 6				
FY 2013 Request	**$9,718,000**	**41,937**	**918**	**42,491**

OPERATIONS APPROPRIATION

Base Transfer Summary
($000)

Title	From	To	PC&B	Other Objects	Total	FTE	EOY
Hangar 6	AFN	ATO	$2,506	$5,343	$7,849	20	19

Operations Appropriation
Staffing Summary
FY 2011 – FY 2013

			type	FY 2011 Actual	FY 2012 Enacted	FY2013 Request
Air Traffic Organization		ATO	FTP	31,918	31,291	31,198
			OTFTP	585	686	687
			FTE	32,341	31,751	31,736
Associate Administrator for Aviation Safety		AVS	FTP	7,338	7,455	7,455
			OTFTP	131	128	128
			FTE	7,445	7,470	7,497
Associate Administrator for Commercial Space Transportation		AST	FTP	68	75	75
			OTFTP	1	1	1
			FTE	70	73	73
Assistant Administrator for Finance and Management	Financial Services	ABA	FTP	152	235	235
			OTFTP	5		
			FTE	150	242	242
	Acquisition and Business Services	ACQ	FTP		256	256
			OTFTP		1	1
			FTE		256	256
	Information Services	AIO	FTP	101	114	119
			OTFTP	8	6	6
			FTE	111	117	122
	Regions and Center Operations	ARC	FTP	748	722	703
			OTFTP	7	29	28
			FTE	765	707	687
Assistant Administrator for Next Generation Air Transportation System		ANG	FTP		202	202
			OTFTP		10	10
			FTE		202	202
Assistant Administrator for Human Resource Management		AHR	FTP	586	599	601
			OTFTP	31	32	32
			FTE	616	620	621
Staff Offices	Office of the Administrator and Deputy	AOA	FTP	19	20	20
			OTFTP	3	4	4
			FTE	22	22	22
	Assistant Administrator for Audit and Evaluation	AAE	FTP		19	19
			FTE		19	19
	Assistant Administrator for Civil Rights	ACR	FTP	79	79	79
			OTFTP	2	4	4
			FTE	81	79	79
	Asst. Administrator for Government & Industry Affairs	AGI	FTP	9	12	12
			OTFTP	1	0	0
			FTE	11	11	11
	Assistant Administrator for Communications	AOC	FTP	33	34	34
			OTFTP	1	1	1
			FTE	34	34	34
	Office of Chief Counsel	AGC	FTP	258	262	262
			OTFTP	10	9	9
			FTE	265	252	252
	Asst. Administrator for Policy, Int'l Affairs and Environment	APL	FTP	143	163	163
			OTFTP	8	7	7
			FTE	146	145	145
	Asst. Administrator for Security & Haz. Materials Safety	ASH	FTP	484	504	504
			FTE	481	488	493
Total			FTP	41,936	42,042	41,937
			OTFTP	793	918	918
			FTE	42,538	42,488	42,491

FY 2011 – FY 2013 Resource Summary

			FY 2011 Actual	FY 2012 Enacted	FY 2013 Request
ATO		pcb	5,277,965,844	5,378,533,507	5,488,512,157
		o/o	2,170,267,329	2,064,204,493	2,025,337,843
ATO Total			**$7,448,233,173**	**$7,442,738,000**	**$7,513,850,000**
AVS		pcb	999,728,444	1,006,327,000	1,013,627,000
		o/o	257,104,433	246,664,000	241,373,000
AVS Total			**1,256,832,877**	**1,252,991,000**	**1,255,000,000**
AST		pcb	10,924,697	10,905,532	11,400,000
		o/o	4,035,794	5,365,468	5,300,000
AST Total			**14,960,491**	**16,271,000**	**16,700,000**
AFN	ABA	pcb	23,912,659	35,951,695	36,883,573
		o/o	90,975,482	109,374,437	108,273,545
	ABA Total		**114,888,141**	**145,326,132**	**145,157,118**
	ACQ	pcb		30,950,617	31,596,430
		o/o		14,996,694	14,297,444
	ACQ Total			**45,947,311**	**45,893,874**
	AIO	pcb	18,533,560	20,603,938	20,852,143
		o/o	30,293,286	31,869,327	31,560,095
	AIO Total		**48,826,846**	**52,473,265**	**52,412,238**
	ARC	pcb	95,066,011	87,050,263	89,378,540
		o/o	244,697,473	251,320,029	240,749,230
	ARC Total		**339,763,484**	**338,370,292**	**330,127,770**
AFN Total			**503,478,471**	**582,117,000**	**573,591,000**
ANG		pcb		25,838,600	26,477,600
		o/o		34,295,400	33,586,400
ANG Total				**60,134,000**	**60,064,000**
AHR		pcb	72,665,062	72,440,188	73,081,389
		o/o	26,499,820	26,417,812	25,661,611
AHR Total			**99,164,883**	**98,858,000**	**98,743,000**
Staff Offices	AOA	pcb	3,150,296	3,201,123	3,047,687
		o/o	862,262	934,311	1,082,313
	AOA Total		**4,012,557**	**4,135,434**	**4,130,000**
	AAE	pcb		2,438,000	2,459,000
		o/o		352,000	328,000
	AAE Total			**2,790,000**	**2,787,000**
	ACR	pcb	9,610,647	9,389,633	9,529,353
		o/o	1,290,551	1,260,873	1,109,647
	ACR Total		**10,901,198**	**10,650,506**	**10,639,000**
	AGI	pcb	1,491,901	1,475,592	1,487,195
		o/o	69,666	96,800	82,805
	AGI Total		**1,561,567**	**1,572,392**	**1,570,000**
	AOC	pcb	5,996,180	5,713,142	5,750,205
		o/o	778,889	61,230	16,795
	AOC Total		**6,775,069**	**5,774,372**	**5,767,000**
	AGC	pcb	40,806,530	40,729,133	40,884,102
		o/o	7,321,804	6,275,898	6,065,898
	AGC Total		**48,128,334**	**47,005,031**	**46,950,000**
	APL	pcb	25,176,245	25,958,347	26,186,989
		o/o	10,133,487	8,993,684	8,724,011
	APL Total		**35,309,732**	**34,952,031**	**34,911,000**
	ASH	pcb	65,123,208	67,558,847	68,550,242
		o/o	21,777,649	25,847,387	24,747,758
	ASH Total		**86,900,857**	**93,406,234**	**93,298,000**
Grand Total			**$9,516,259,207**	**$9,653,395,000**	**$9,718,000,000**

Air Traffic Organization (ATO)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$7,442,738**	**31,291**	**686**	**31,751**
Unavoidable Adjustments	**+$41,222**			
FTE Annualization				
Pay Inflation	+20,297			
One Additional Compensable Day	+20,925			
Uncontrollable Adjustments	**+$63,668**	**-112**		**-35**
Contract Pay Raises	+63,668			
Staffing Adjustment				
Workforce Attrition		-112		-35
AHR eLMS Staffing				
Discretionary Adjustments	**-$41,628**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)	+10,000			
Administrative Efficiencies	-49,628			
Contract Towers	-2,000			
Base Transfers	**+$7,849**	**+19**	**+1**	**+20**
Hangar 6	+7,849	+19	+1	+20
FY 2013 Request	**$7,513,850**	**31,198**	**687**	**31,736**

Executive Summary: Air Traffic Organization (ATO)

1. What Is The Request And What Will We Get For The Funds?

The request of $7,513,850,000 and 31,198 FTP / 31,736 FTE allows FAA to maintain our position as the global leader in delivering the world's safest, most secure air traffic services. The request provides for a discretionary increase of $10,000,000 for Performance-Based Navigation, an uncontrollable adjustment of $63,668,000 for contract pay raises associated with three collective bargaining units: National Air Traffic Controllers Association (NATCA) controllers ($58,000,000), Support Staff Specialists ($5,000,000) and NATCA Multi-unit employees ($668,000), $20,297,000 for the government-wide pay raise and $20,924,000 for one additional compensable workday. This request includes an internal FAA transfer of programs and staffing to the Program Management Office (PMO) from the En Route and Oceanic Services, Terminal Services, Technical Operations, and System Operations service units. The request also includes a base transfer of $7,849,000 from the Office of the Assistant Administrator for Finance and Management (AFN) to the Associate Administrator for Air Traffic (ATO) for Hangar 6. This request assumes workforce attrition in the air traffic controller workforce, -$49,628,000 in administrative cost efficiencies, and -$2,000,000 in cost savings in the Contract Towers program.

On September 19, 2011, Congress approved the reprogramming request that we submitted to change our reporting structure and implement other organizational changes. This was a critical step in our moving forward with several of our Foundation for Success initiatives. This reprogramming created a new organization, Assistant Administrator for Finance and Management. Within this new organization, two offices in the Air Traffic Organization were impacted by this reprogramming, Finance and Acquisition and Business Services. It also allowed FAA to create an Assistant Administrator for NextGen (formerly located within the Air Traffic Organization). This new office reports directly to the Deputy Administrator. Finally, the reprogramming approved the creation of a Program Management Office in the Air Traffic Organization. This office will focus on managing our major acquisition programs effectively, including NextGen acquisitions.

The ATO has also merged the Safety Service unit with the Technical Training Service Unit. ATO's Safety and Technical Training's mission is to support ATO leadership and operations with robust safety and quality management systems for use by well-trained, highly competent employees equipped with the necessary technical and safety risk management skills they need to accomplish the ATO mission. Also, Management Services is the ATO's new service unit evolving from Strategy and Performance. The ATO is a performance-based organization, and Management Services makes sure that performance stays on track by providing the framework to integrate the ATO's plans, programs and activities.

Program Activity ($000)	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Total	**$7,448,233**	**$7,442,738**	**$7,513,850**	**+$71,111**
En Route & Oceanic	1,929,188	1,807,850	1,831,756	+23,906
Terminal	2,171,931	2,185,955	2,211,472	+25,517
Technical Operations	2,031,626	1,684,245	1,700,536	+16,291
System Operations	321,260	279,578	281,946	+2,368
Safety and Technical Training	260,094	252,291	254,020	+1,729
Mission Support Services	275,860	278,361	279,339	+978
Program Management[1]		631,752	631,752	---
Management Services	166,112	322,706	323,029	+323
NextGen & Operations Planning[2]	61,313			
Finance	195,302			
Acquisition & Business Services	35,547			

[1] Established in FY 2012
[2] NextGen and Operations Planning, Finance and Acquisition and Business Services were realigned out of ATO in FY 2012.

2. What Is The Program?

The ATO is a Performance-Based Organization providing safe, secure, and cost-effective air traffic control services to commercial and private aviation and the military. We are more than 30,000 professional employees committed to providing safe and efficient air traffic control services. Many of our employees, including more than 15,000 air traffic controllers, 5,000 air traffic supervisors and air traffic managers, 1,100 engineers, and 6,100 maintenance technicians, directly serve our customers. Our remaining employees work in a wide variety of professions to sustain the smooth operations of the ATO. They research, plan, and build air traffic control equipment and programs; manage payroll and benefits programs; provide procurement service for both ATO and FAA at large; maintain productive relationships with the aviation industry and the general public; and ensure that the environment and ATO employees are protected. The ATO supports the Department of Transportation's (DOT) strategic goals and outcomes Safety: "Reduction in transportation related fatalities and injuries" and Economic Competitiveness: Maximum economic returns in transportation policies and investments." The ATO also supports the DOT's Priority Goal: "Reduction of Total Runway Incursions."

3. Why Is This Particular Program Necessary?

ATO provides air traffic services for the nation and is fully committed to the agency's mission. We handle 70,000 flights per day and transport 730 million passengers per year, a vital part of the nation's economy. Recent data for 2009 shows that civil aviation accounted for over $1.3 trillion in total economic activity, supporting 5.2 percent of U.S. Gross Domestic Product. Earning over $394 billion a year, 10 million people are employed in aviation-related fields.

Safety is ATO's highest priority. While the system is already exceedingly safe, we are making it safer by moving to a proactive safety culture in which every individual in ATO is committed to assessing and mitigating risks. While safety is paramount, we are also taking steps to enable growth and changes in aviation. Despite recent declines in operations over the past 3 years, certain parts of the system remain congested. The high cost of fuel is a concern for airspace users, including the airlines.

4. How Do You Know The Program Works?

ATO sets annual performance goals in safety, economic competitiveness, finance, international leadership, and organizational excellence. In safety, we track the commercial fatal accident rate, general aviation fatal accidents, rate of runway incursions, and operational errors. For economic competitiveness, we track average daily airport capacity, on-time arrivals, and adjusted operational availability. In the area of finance, we measure program performance, using schedule and budget metrics. In international leadership, we target a number of countries for expanded use of NextGen systems and technologies. For organizational excellence, we maintain targets on the number of air traffic controllers on-board as well as new hires.

Over the past 10 years, ATO has made extensive progress in all areas. The safety of American aviation is unparalleled. Since 2001, we have coordinated more than 120 million successful flights on commercial aircraft, transporting over 7 billion passengers safely to their destinations. This outstanding record is attributable to our efforts at reducing fatal accident rates, deploying systems and procedures to reduce serious runway incursions, and conducting training programs aimed at reducing operational errors. We have institutionalized acquisition best practices and workforce planning development, key elements to FAA's success by being removed from the Government Accountability Office's High Risk List for Acquisitions in FY 2009. We provide direct assistance to over 100 countries around the world to help improve their aviation systems, and have entered into numerous bilateral agreements to extend global connectivity. Domestically, we continue to "staff-to-traffic," meeting the aggressive hiring targets identified in our annual, Congressionally-mandated Air Traffic Controller Workforce Plan. Overall, we achieved 27 of our 29 performance targets in FY 2011.

5. Why Do We Want / Need To Fund The Program At The Request Level?

Nearly 75 percent of ATO's Operations budget is for payroll. Our non-pay costs are primarily for fixed operating expenses such as rent, telecommunications, and other operating costs. We also pay semi-fixed prices for contract towers, contract weather services, training for controllers, and flight services for general aviation.

ATO operates the most complex and technically advanced air traffic control system in the world. In FY 2013, an operating budget of $7,513,850,000 is required to sustain and improve effective and efficient air traffic control throughout U.S. airspace. Since our inception, we have been effective in restructuring and re-engineering our operational and administrative functions, and have achieved more than $2.3 billion in cost savings and cost avoidance.

Detailed Justification for Vice President En Route and Oceanic, AJE-0

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – En Route and Oceanic Services – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
En Route and Oceanic Services	$1,929,188	$1,807,850	$1,831,756	+$23,906

The FY 2013 budget request for En Route and Oceanic Services is $1,831,756,000 and 8,571 FTP / 8,742 FTE. The request provides for an uncontrollable adjustment of $31,197,000 for contract pay raises associated with three collective bargaining units: National Air Traffic Controllers Association (NATCA) controllers ($28,420,000), Support Specialists ($2,450,000) and NATCA Multi-unit employees ($327,320), $6,669,000 for the government-wide pay raise and $6,893,000 for one additional compensable workday. This request includes an internal FAA transfer of programs and staffing to the Program Management Office (PMO) from En Route and Oceanic Services. This request also assumes workforce attrition in the air traffic controller workforce. Increases included in this request are offset by a reduction of $195,012,000 and 407 FTP / FTE to the PMO.

Key outputs expected to be achieved in the budget year with the requested resources:

- Maintain daily operation of the 21 ARTCCs and two Center Radar Approach (CERAPs) facilities.
- Select the required number of potential candidates to meet our hiring goal for air traffic controllers in accordance with the Air Traffic Controller Workforce Plan.

Key outcomes expected to be achieved in the budget year with the requested resources:

- Achieve an average daily airport capacity for the Nation's Core Airports of 103,068 arrivals and departures per day by FY 2011 and maintain that level through FY 2013.
- Achieve a National Airspace System (NAS) on-time arrival rate of 88 percent at the Nation's Core Airports and maintain that level through FY 2013. FY 2013 Target: 88 percent.
- Decrease the rate of commercial air carrier fatalities per 100 million passengers on-board aircraft by 50 percent by 2025. FY 2013 Target is 7.7.

2. What Is This Program?

The En Route and Oceanic Services program supports the Department of Transportation's (DOT) Strategic Plan's Safety Goal to reduce transportation related injuries and fatalities. We measure our progress in achieving aviation safety by tracking the following performance targets, as well as accomplishing the identified related initiatives.

- Reduce the rate of fatalities per 100 million passengers on-board by 50 percent by FY 2025. FY 2013 Target: 7.7.
  - Support development of a system that integrates recorded radar and other similar data feeds to provide a common platform for the detection and reporting of suspected loss of standard separation events.
- Achieve the System loss of standard separation Index target to be established for FY 2013.
  - Improve situational awareness for pilots and controllers in the NAS by providing them with additional information concerning potential conflicts and offering possible resolutions.
- Complete the incorporation of Aerospace Performance Factor methodologies in all ARTCC facilities by the end of FY 2013.
  - Enhance database source inputs and transition to a dashboard graphical user interface.

- Maintain and continuously improve the En Route and Oceanic Services Safety Management System (SMS) for the delivery of safe air traffic services.
  - Execute the requirements of the En Route Continuous Improvement Plan, conduct internal audits, and provide safety-related training.

This program also supports the DOT's Strategic Plan's Economic Competitiveness Goal of achieving maximum economic returns on transportation policies and investments outcomes. Our performance is tracked by the following metrics, supported by achievement of related initiatives.

- Achieve an average daily airport capacity for the Nation's Core Airports of 103,068 arrivals and departures in FY 2013 and maintain a NAS on-time arrival rate of 88 percent at the Nation's Core Airports.
  - Continue strategic investment in the current NAS infrastructure to sustain NAS services and reduce operational risk while providing a foundation to increase capacity in a safe and efficient manner for all users.
- Increase the percentage of oceanic airspace using reduced separation standards to 100 percent from previous fiscal year baselines.

En Route and Oceanic Services support the FAA Mission and U.S. Transportation interests in advancing aviation in the U.S. and beyond. One of the activities we will assist in is to:

- Ensure harmonization of service improvements through collaboration with international and industry service providers by active participation and leadership in regional International Civil Aviation Organization (ICAO) and other inter-organizational workgroups and decision making processes.

We provide air traffic control operations from 23 service delivery points in the U.S., Puerto Rico, and Guam; and we control more than 29 million square miles of airspace over the continental U.S. and the Atlantic and Pacific Oceans. Every day we ensure that thousands of positively controlled aircraft at high altitudes en route from one terminal area to another are directed to the safest, most efficient path onto their destinations.

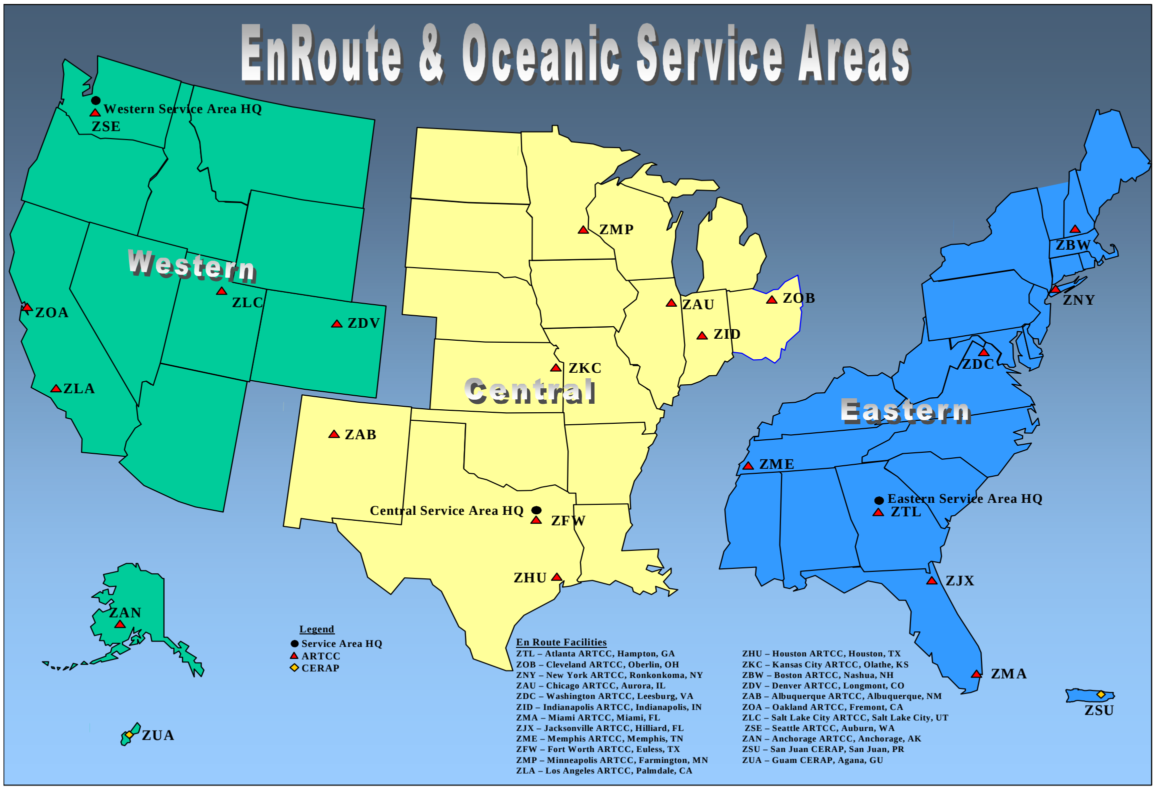
Through innovative training techniques and efficient database tracking, we are also ensuring that a consistent progression of air traffic controllers is available to staff our facilities now and in the future. We have deployed high fidelity simulation systems to provide realistic training that reduces the time it takes a student to achieve technical proficiency and professional controller status.

Our partners and stakeholders include:

- Department of Defense (DoD)
- Department of Homeland Security (DHS)
- National Aeronautics and Space Administration (NASA)
- Joint Planning and Development Office (JPDO)
- Academia
- Airlines and other aircraft operators
- Radio Technical Commission for Aeronautics (RTCA)
- National Air Traffic Controllers Association (NATCA)
- Professional Airways Safety Specialists (PASS)
- National Transportation Safety Board (NTSB)
- International Civil Aviation Organization (ICAO)
- EUROCONTROL and other Air Navigation Service Providers
- MITRE's Center for Advanced Aviation System Development (CAASD)
- Single European SKT ATM Research (SESAR) program

The core activities in FY 2013 will maintain air traffic control (ATC) operations to ensure the safe and efficient transport of aircraft and passengers.

In FY 2013, we will continue to improve the safety, capacity, and efficiency of the NAS. We will strengthen our efforts to reduce the number of operational errors in the en route environment. In the Oceanic airspace, we plan to reduce separation minima, thereby improving NAS on-time arrival percentages and increasing fuel efficiency.



We have an important support role for initiatives related to the measurement and analysis of safety performance, global interoperability, reduction in transportation-related injuries and fatalities, and economic competitiveness. Our efforts support an air transportation system responsive to consumer needs and a well-trained controller workforce able to meet increased traffic demand.

By the end of FY 2012, the accomplishments for En Route and Oceanic include:

- Complete implementation of the Traffic Analysis and Review Program (TARP) in the En Route environment.
- Continue reporting loss of standard separation.
- On-going improvement and use of the SMS within En Route for the delivery of safe air traffic services. Building on prior SMS activities, we will develop an En Route and Oceanic Continuous Improvement Plan, conduct internal audits, and provide safety-related training.
- Improve global interoperability in the Oceanic and Offshore domains by initiating development of operational prototyping of Pre-Departure Oceanic Trajectory Management 4D (OTM4D).
- Continue efforts in support of Next Generation Air Transportation System (NextGen) that include technical development activities for Collaborative Pre-Departure OTM4D and a 5-Year En Route and Oceanic Research and Development Plan for NextGen Mid-term and beyond.
- Continue efforts to ensure global harmonization of service improvements through collaboration with international and industry service providers by active participation and leadership in regional ICAO and inter-organizational workgroups and decision making processes.

By the end of FY 2013, anticipated accomplishments for En Route and Oceanic include:

- Reporting loss of standard separation will continue in FY 2013 and the out years.

- On-going improvement and use of the SMS within En Route for the delivery of safe air traffic services. Building on prior SMS activities, we will develop an En Route and Oceanic Continuous Improvement Plan, conduct internal audits, and provide safety-related training.
- Improve global interoperability in the Oceanic and Offshore domains by continuing development of operational prototyping of OTM4D.
- Continue efforts to ensure global harmonization of service improvements through collaboration with international and industry service providers by active participation and leadership in regional ICAO and inter-organizational workgroups and decision making processes.

3. Why Is This Particular Program Necessary?

FAA's ATO handles 70,000 flights per day and helps transport over 730 million passengers per year, contributing to 5.2 percent of total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

The En Route and Oceanic Services Unit will provide ATC operations to 23 service delivery points in the U.S., Puerto Rico, and Guam. This service unit will continue to provide its owners, customers, and system operators the highest degree of safety and service in the most efficient manner.

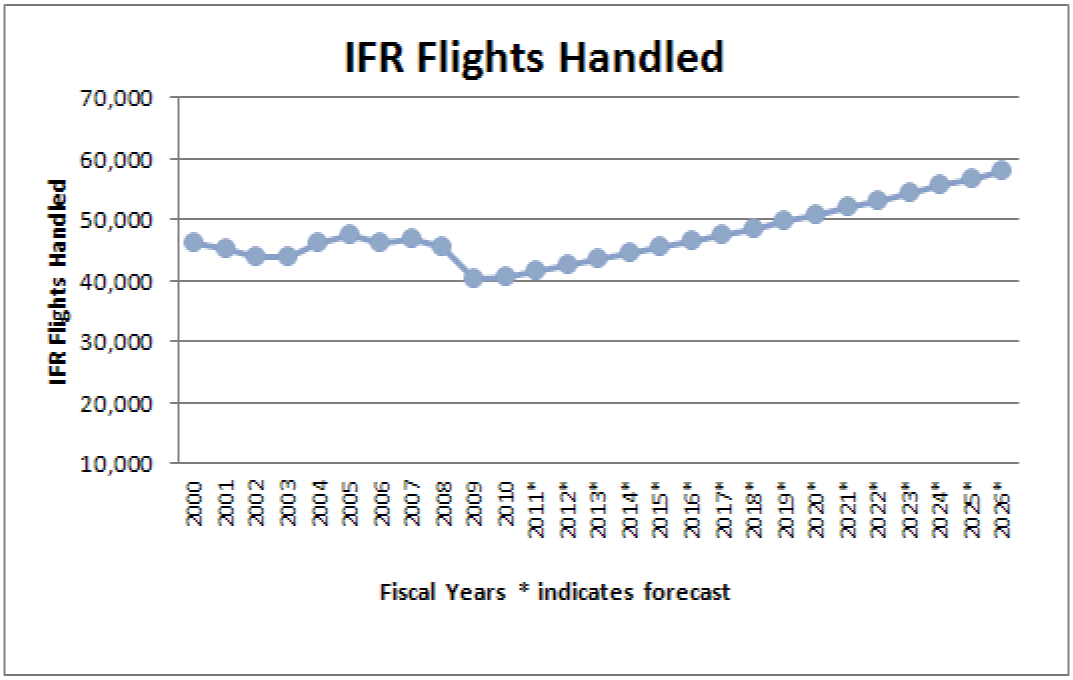
We will ensure the service unit meets the future capacity demands by ensuring the provision of safe and efficient air traffic control services throughout the En Route portion of the NAS through targeted increases. The benefits and outcomes expected to be achieved with the funds provided in this budget request are:

- Achieve an average daily airport capacity for the Nation's Core Airports of 103,068 arrivals and departures per day by 2011 and maintain that level through 2013.
- Maintain a NAS on-time arrival rate of 88 percent at the Nation's Core Airports.
- Continue to decrease the number of operational errors.
- Maintain the En Route fiscal year end actual on-board acquisition position count at or within 5 percent of the fiscal year requirement published in the Acquisition Workforce Plan.
- Sustain adjusted operational availability of En Route equipment at 99.7 for the reportable facilities that support the Nation's Core Airports.
- Reduce the rate commercial air carrier fatalities per 100 million passengers on-board aircraft by 50 percent by 2025. FY 2013 Target is 7.7.
- Improve situational awareness for pilots and controllers in the NAS by providing them with additional information concerning potential conflicts and offering possible resolutions.

4. How Do You Know The Program Works?

ATO sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule, and performance.

The chart below depicts the number of Instrument Flight Rules (IFR) flights handled and IFR flight hours. The number of IFR flights handled is calculated by multiplying the number of IFR departures (an en route IFR flight which originates in the center's area and enters that center's airspace) by two, then adding the number of en route IFR flyovers (an IFR flight that originates outside the center's area and passes through the area without landing).



In FY 2013, we will continue to increase safety efforts as well as increase capacity and efficiency of the NAS. We will continue to support achieving an average daily airport capacity for the Nation's Core Airports of 103,068 arrivals and departures per day in FY 2013 and a NAS on-time arrival rate of 88.0 percent at the Nation's Core Airports. In addition, we will continue efforts to decrease the number of operational errors in the En Route environment. In the Oceanic airspace, our plan is to reduce separation to improve the percentage of NAS on-time arrivals and increase fuel efficiency.

We have an important support role for initiatives related to the measurement and analysis of safety performance; global interoperability; reduction in transportation-related injuries; fatalities; and economic competitiveness. En Route's efforts support an air transportation system responsive to consumer needs and helps maintain a well-trained controller workforce.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

In support of Safety, Economic Competitiveness, and Organizational Excellence goals, En Route and Oceanic Services oversee air traffic control operations for aircraft operating under instrument flight rules between airport terminal areas. This is performed by air traffic controllers located in 21 ARTCC and two CERAPs facilities.

Funding En Route and Oceanic Services at the requested level will impact the service unit's ability to continue to meet future capacity demands of ensuring the provision of safe and efficient air traffic control services throughout the En Route portion of the NAS. These controllers keep track of the progress of all instrument flights within the center's airspace, which typically extends over a number of states and covers more than 100,000 square miles. Terminal ATC specialists at FAA towers transfer control of aircraft on instrument flights to our en route controllers when aircraft leave the terminal's airspace. The en route controllers transfer control of aircraft back to terminal ATC specialist as they return to a terminal's airspace.

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Detailed Justification for Vice President Terminal, AJT-0

1. What Is The Request and What Will We Get For the Funds?

FY 2013 – Terminal Services – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Terminal Services	$2,171,931	$2,185,955	$2,211,472	$25,517

The FY 2013 budget request for Terminal Services is $2,211,472,000 and 11,174 FTP / 11,454 FTE. The request provides for an uncontrollable adjustment of $32,471,680 for contract pay raises associated with three collective bargaining units: National Air Traffic Controllers Association (NATCA) controllers ($29,580,000), Staff Support Specialists ($2,550,000) and NATCA Multi-unit employees ($341,680), $7,411,000 for the government-wide pay raise, and $7,655,000 for one additional compensable workday. This request includes an internal FAA transfer of programs and staffing to the Program Management Services (PMO) from Terminal Services. This request also assumes workforce attrition in the air traffic controller workforce. Increases included in this request are offset by a reduction of $59,291,000 and 173 FTP / FTE to the PMO.

The FY 2013 request will fund the following outputs and outcomes:

Safety

- Maintain the rate of serious runway incursions (Category A and B) at or below 20 per 1,000 events by improving training, procedures, evaluation, analysis and testing, and by designing, developing, and implementing an improved runway incursion analysis capability.
- Reduce risks in-flight by limiting the rate of the most serious losses of standard separation to 20 or fewer for every thousand (.02) losses of standard separation within the National Airspace System (NAS) by developing a system that integrates remotely retrievable radar and other NAS data feeds to provide a common platform for the detection and reporting of suspected losses of separation in the En Route, Terminal, and surface environments by the end of FY 2014.
- Continue implementation of the Safety Management System (SMS) to ensure that the safety culture in the Terminal Service Unit continues by conducting four Safety Risk Management Training Conferences, three SMS Audits, and verifying mitigations have been implemented for Safety Risk Management Documents with high risk hazards.
- Support the design, development, and implementation of an improved runway incursion analysis capability by developing a Runway Safety Council (RSC) Implementation Plan. This plan will determine root causal factors of pilot deviations, operational errors, and vehicle/pilot deviations and identify intervention strategies to eliminate and/or mitigate the root causal factors leading up to the incident while also providing a strategy for implementation of the recommendations.
- Provide the day-to-day management oversight and support for all terminal contract tower facilities and for contract weather services within Terminals three service areas to ensure safe and efficient operations.

Economic Competitiveness:

- Reduce means and variances of average time it takes to go from one core airport to another affecting at least 90 percent of passengers by supporting research to improve safety and increase throughput using wake turbulence monitoring, operational procedures, and controller tools.
- Meet 90 percent of all Next Generation Air Transportation System (NextGen) acquisition milestones on schedule and at or below original budget while continuing to expand FAA's NextGen Implementation Plan to incorporate critical path decisions and milestones necessary to accomplish the mid-term commitments.

- Provide the oversight, management, and support necessary to enable safe increases in capacity and efficiency through changes in airspace, improved procedures, and insertion of new technology into the operation. This includes providing complete analysis/report of NextGen arrival procedures initiatives and establishing a more effective separation standard for Instrument Flight Rule (IFR) operations between the final approach fix and runway threshold.
- Lead the evaluation and expansion of the use of Converging Runway Display Aids (CRDAs) at airports with intersecting runways.

Organizational Excellence:

- Maintain the air traffic controller workforce within 2 percent, above or below, the projected annual totals in the Air Traffic Controller Workforce Plan.
- Support efforts to obtain an unqualified audit opinion on the agency's financial statements (Clean Audit with no material weaknesses) by providing the financial support functions necessary to deliver safe, efficient, and cost effective terminal air traffic control (ATC) services including Fund Account Management, Investment Analysis Support, Cost Management Initiatives Support, Cost and Performance Auditing, and Terminal Services Financial Systems and Reporting.
- Support the Small Business Goal and Corporate Citizenship by encouraging awarding at least 25 percent of the total direct procurement dollars to small businesses, thereby promoting small business development and good corporate citizenship.

2. What Is This Program?

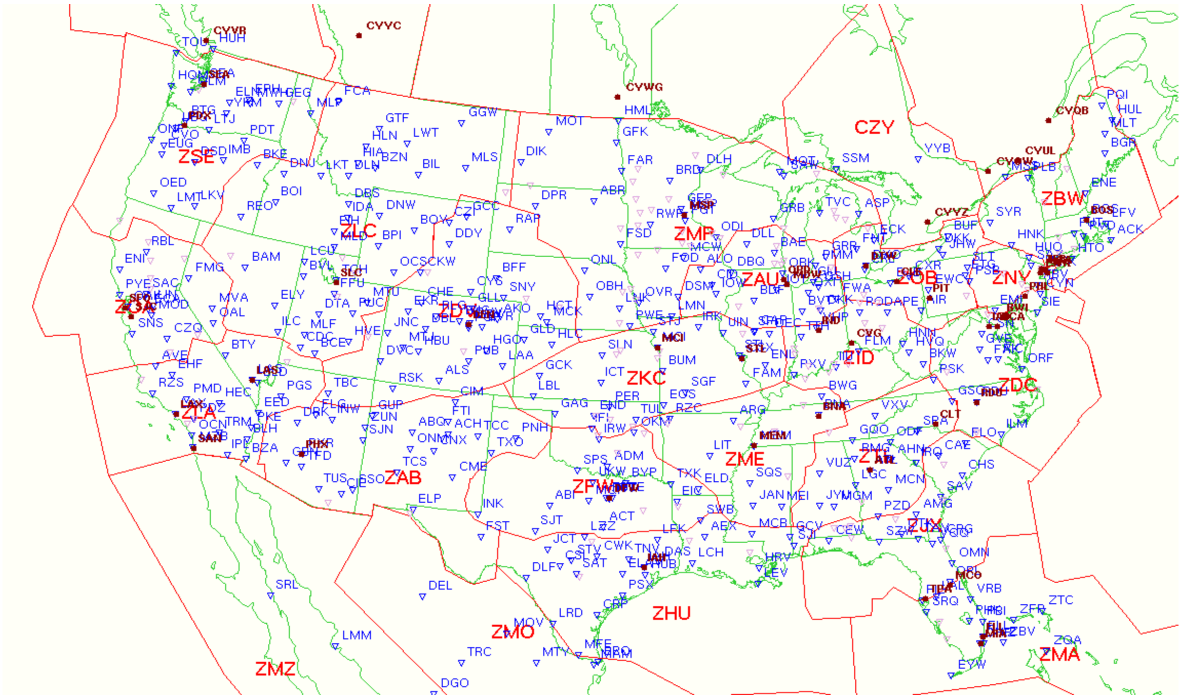
The Terminal Services Unit provides daily terminal ATC services, develops ATC capabilities, monitors operational performance, manages programs in support of these services, and serves as a liaison to customers, airports, and service area operations personnel.

Terminal ATC services include both airport surface operations and terminal area operations. Airport surface operations are conducted by controllers at 510 federal and contract towers located at the Nation's Airports. Terminal area operations are conducted by controllers at 162 TRACON facilities, which routinely handle aircraft within 40 or more miles of an airport.

As the FAA continues to explore ways to reduce costs and maximize efficiency, the Administration proposes changes to the Federal Contract Tower program. Under the cost share program, towers with societal benefits of less than half of the total cost of operating the tower will pay no more than 50 percent of those costs. FAA will use newly-available, site-specific cost information to update benefit-cost ratios and determine local share. As a result, FAA estimates $2.0 million in savings.

The Contract Weather Program provides quality weather monitoring, augmentation, and backup of automated weather systems (Automated Surface Observing System and Automated Weather Observation System), and ensures timely reporting and dissemination of rapidly changing weather conditions. The program provides technical oversight for 146 facilities, 28 contracts (and 15 vendors), and employs over 950 contract weather observers.

Terminal is divided into three geographical service areas (Eastern, Central, and Western) to better manage the delivery of terminal ATC services. The primary function of each service area is to oversee ATC operations within its geographical area, and to ensure that quality standards established for Safety, Capacity, and Organizational Excellence are met.



The FAA's Strategic Plan contains long-term performance goals. The targets and timeframes in the FAA's Strategic Plan are consistent with Department of Transportation's (DOT) goals established for FAA. We support the following DOT and FAA Goals and Performance Measures:

- DOT's Safety Goal and supporting performance measure to reduce the transportation and related injuries and fatalities through its support to achieve the annual FAA's Targets for Commercial Air Carrier Fatality Rate, General Aviation Fatal Accident Rate, and Total Runway Incursions.
- DOT's Economic Competitiveness Goal and supporting performance measure to maximize economic returns on transportation policies and investments through its support to achieve FAA's annual targets for average daily airport capacity at the Nation's Core Airports and adjusted operational availability.
- DOT's Economic Competitiveness Goal and supporting performance measure to be a competitive air transportation system responsive to consumers through its support to achieve FAA's annual targets for annual service volume and NAS on-time arrivals.
- DOT's Economic Competitiveness Goal and supporting performance measure U.S. transportation interests advanced in targeted markets around the world through its support to achieve FAA's annual targets for NextGen technologies.

We directly support FAA's operational functions, which in turn support the flying public. Our services are delivered directly to the consumers of aviation services via interaction with pilots. Program resources are being used directly and effectively to meet the program's purpose, as evidenced by the fact that more than 90 percent of the funding used by the program directly supports terminal air traffic control services.

Our partners and stakeholders include:

- Other ATO Business Units, Service Units, and Offices
- Other FAA Offices and Lines of Business
- Department of Defense (DOD)
- Department of Homeland Security (DHS)
- National Aeronautics and Space Administration (NASA)
- Joint Planning and Development Office (JPDO)
- Academia
- Aviation industry
- Aviation community
- State and municipal governments

- Radio Technical Commission for Aeronautics (RTCA)
- National Transportation Safety Board (NTSB)
- Air Line Pilots Association (ALPA)
- International Civil Aviation Organization (ICAO)
- EUROCONTROL

By the end of FY 2012, the accomplishments for Terminal include:

- Continue reporting loss of standard separation.
- Support Root Cause Analysis Team (RCAT) in examining data from FAA investigations and attempt to determine root causal factors for the incident.
- Conduct research to improve safety and increase throughput using wake turbulence monitoring, operational procedures, and controller tools.
- Conduct annual review process for all sites to assess benefits for CRDA use.
- Using the cross-organizational Airport Obstructions Standards Committee (AOSC) to develop recommended standards and action plans for runway procedures and other initiatives identified by the AOSC Steering Committee, while maintaining an optimum balance among safety, capacity, and efficiency considerations.
- Establish Facility Hiring Plan requirements and select potential candidates for placement into terminal facilities in accordance with the ATC Workforce Hiring Plan.

By the end of FY 2013, the anticipated accomplishments for Terminal include:

- Conduct research to improve safety and increase throughput using wake turbulence monitoring, operational procedures, and controller tools.
- Perform analyses to determine the safety of providing simultaneous parallel approaches with the use of NextGen displays.
- Analyze each facility that has widely space parallel approaches to determine if benefits can be derived from use of color displays to identify parallel operations in lieu of existing final monitor positions. Review and validate analysis and implementation strategy of color use for parallel operations.
- Conduct annual review process for all sites to assess benefits for CRDA use.
- Support the RCAT in examining data from FAA investigations related to Pilot Deviations, loss of standard separation, and Vehicle/Pilot Deviations in order to determine root causal factors for the incident.
- Support Tower Flight Data Management (TFDM) system engineering activities to finalize requirements and continue prototyping activities.
- Establish a more effective separation standard for Instrument Flight Rule (IFR) operations between the final approach fix and runway threshold.
- Deconflict congested airports in and out of closely located airports to provide greater efficiencies including assessing year end performance goals for the areas of New York, New Jersey, Philadelphia, and Chicago.
- Review the analysis conducted for airspace redesign efforts for the airports at Denver, Dallas-Fort Worth, Charlotte Douglas, and Chicago Midway to itemize benefits for redesign milestones.
- Review and validate the analysis being conducted in 2012 to determine the feasibility of reducing the separation for dependent operations from 4,300 feet to 3,000 feet on closely spaced parallels.
- Ensure terminal facilities can maximize airspace design for arrivals and departures by completing a study to assess the viability of reducing the separation minima from obstructions including assessing any reductions of separation minima for obstruction and terrain that is based upon new radar capabilities or NextGen technologies for terminal approach controls including validation of analyses for operations near obstructions and near terrain.
- Establish Facility Hiring Plan requirements and select potential candidates for placement into terminal facilities in accordance with the ATC Workforce Hiring Plan.

3. Why is this Particular Program Necessary?

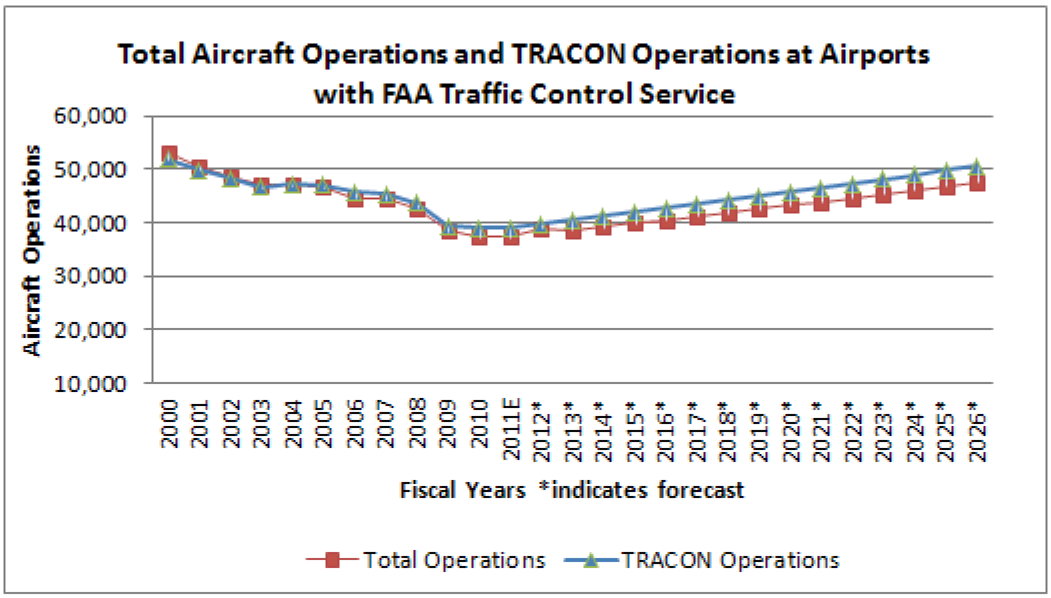
FAA's ATO handles 70,000 flights per day and helps transport over 730 million passengers per year, contributing to 5.2 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

Terminal Services is also unique in that it is not redundant or duplicative of any other Federal, state, local, or private effort. There is no overlap between FAA's management of the NAS and any other entity. Public Law (49 U.S.C.A. § 106) charges FAA with "controlling the use of the navigable airspace of the United States by regulating both civil and military operations in that airspace in the interest of safety and efficiency." While other entities provide air traffic control services (e.g., Department of Defense and Contract Towers), they do so only under FAA's authority and oversight. These arrangements are documented through agreements, Executive Orders, and Executive Policy. The specific responsibility to operate the NAS is carried out through the ATO, with Terminal managing airport and arrival/departure operations near the airport. Any activities involving other parties are coordinated and carried out under the auspices of FAA and governed by advisory circulars for establishment of airport services. We coordinate air traffic services with the other ATO operating units (i.e., En Route and Oceanic Services, System Operations Services, and Technical Operations Services).

4. How Do You Know The Program Works?

ATO sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, as well as hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule and performance.

The chart below shows the total aircraft operations at airports with FAA traffic control services.



The Terminal Services Unit is effective in achieving its annual performance goal for runway incursions. This goal is tracked at all airports for which Terminal is responsible. We have also achieved the annual performance goals for NAS on-time arrival and average daily airport capacity, which are tracked at the Nation's Core Airports and seven metropolitan areas. The Terminal program also tracks efficiency measures: unit cost, productivity, and staffing ratio.

The program has specific long-term performance measures, tied to specific programs/projects, which support the accomplishment of long-term DOT and FAA goals. Of the DOT performance goals, four serve as the long-term performance measures for the Terminal program (two Safety goals – "reducing the commercial air carrier and general aviation fatal accident rates"; two Reduced Congestion goals – "increase reliability/on-time performance of scheduled carriers" and "increase capacity for the Nation's Core Airports to meet projected demand/reduce congestion)".

The two Reduced Congestion goals," increase reliability/on-time performance of scheduled carriers" and "increase capacity", are direct indicators of Terminal's program performance for capacity and efficiency and are tracked against the Nation's Core Airports. Terminal manages one supplemental safety measure that is tracked against the 264 FAA operated towers and 248 Federal Contract Towers for which Terminal is responsible for "reducing the rate of runway incursions". This supplemental safety goal is Terminal's leading indicator of safety performance. The four specific long-term performance measures are used by Terminal to measure progress towards the four DOT performance measures mentioned above.

The following actions reflect our recent accomplishments:

- Achieved the FY 2010 Targets to Reduce Total Runway Incursions and to reduce the Rate of Category A and B (most serious) Runway Incursions.
- Met the hiring, training, and staffing targets established in FY 2010 for the Terminal Services Air Traffic Control Workforce.
- Continued the delivery of Contract Air Traffic Control Tower Operations at 248 Airports and Contract Weather Services at 147 Airports.
- Achieved the Terminal Services Unit Cost performance target for labor cost per forecast operation in FY 2010.
- Safely moved 787 million passengers (per Bureau of Transportation Statistics website) through 572 airports in CY 2010.
- Conducted various Safety Management System Courses at 15 locations across the United States.

External audits and reviews of the Terminal Program have been undertaken by the GAO and the DOT OIG. These reviews and audits provide oversight from external bodies that produce findings and recommendations regarding the program's performance. For example, the recent GAO Audit (GAO-06-378) acknowledged that, "The FAA has made available much of the information that Congress needs to carry out its oversight function. For example, the FAA has a Strategic Plan with long-term, outcome oriented goals and objectives. Its Annual Performance and Accountability Report includes the agency's progress in achieving its goals, and allows Congress to monitor performance trends." In another example, GAO Report 05-485T stated that "The ATO is taking a number of positive steps to address the legacy cost, schedule, and performance problems that have affected the ATC modernization program for the past two decades." This is demonstrated by the removal of FAA investment programs from the GAO's High Risk List.

Independent internal audits are also performed on a recurring basis by FAA's Office of Safety to ensure the operational services units are complying with established policies, orders, directives, and guidance. These periodic assessments are conducted on a site-by-site basis to ensure adherence at all levels of the organization. Once a year, at a minimum, internal reviews are conducted for each FAA-staffed facility. Facility evaluations of FAA's federal contract staffed towers are conducted biennially. The review criteria are defined in FAA's Air Traffic Control Quality Assurance and Air Traffic Facility Evaluation orders.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The Terminal Services Unit is responsible for directing the movement of aircraft on and in the vicinity of airports, usually within a radius of 5 to 35 miles, using visual or instrument flight rules. This organization provides separation between landing and departing aircraft, transfer control of aircraft on instrument flight to en route controllers when aircraft leave the terminal airspace, and receive control of aircraft coming into the terminal's airspace from controllers at air route traffic control centers.

The Federal Government continues to explore ways to reduce costs and maximize efficiency. The proposed policy change to the Federal Contract Tower program is estimated to generate cost savings. While pursuing costs savings, Terminal Services endeavors to maintain its same standards for safety.

FY 2013 funding levels will support 11,089 Terminal FTPs whose primary function is to ensure the safe and efficient flow of air traffic operations while in the Terminal environment. Overall this funding will ensure the safe and efficient delivery of Terminal Air Traffic Control Services by meeting or exceeding FAA Safety Goals to reduce the number and rate of Category A and B (most serious) Runway Incursions and satisfy the DOT Strategic Plan's goals to achieve the specified average daily airport capacity at the Nation's Core Airports and the NAS on-time arrival rate.

Detailed Justification for – Vice President Technical Operations, AJW-0

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Technical Operations Services – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Technical Operations Services	$2,031,626	$1,684,245	$1,700,536	+$16,291

The FY 2013 budget request for Technical Operations Services is $1,700,536,000 and 7,999 FTP / 8,050 FTE. This includes increases of $3,975,000 for the government-wide pay raise and $4,077,000 for one additional compensable workday. This request includes a base transfer of $7,849,000 and 19 FTP / 20 FTE from the Office of the Assistant Administrator of Finance and Management to the Associate Administrator for Air Traffic for Hangar 6 located at Ronal Reagan Washington National Airport. This request also includes an internal FAA transfer of programs and staffing to Program Management Services (PMO) from Technical Operations Services. Increases included in this request are offset by a reduction of $334,093 and 45 FTP / FTE to the PMO.

Funding the FY 2013 request at this level will allow Technical Operations to achieve these initiatives:

- Evaluate and deploy runway status lights at Airport Movement Area Safety System (AMASS) and Airport Surface Detection Equipment – Model X (ASDE-X) airports.
- Continue development and implementation of policies/procedures and technology, coupled with strategic investment in the current NAS infrastructure, to grow NAS capacity and improve services safely and efficiently.
- Develop and implement National Airspace System (NAS) technology, policies, and procedures. Invest in the current NAS infrastructure to sustain services, increase capacity, and enhance safety.
- Increase capacity by modifying and/or augmenting procedures, implementing new technology, and increasing service efficiency for all users.
- Sustain increased capacity by modifying and/or augmenting procedures, implementing new technology, and increasing service efficiency for all users.
- Follow policies and procedures to monitor, control, maintain, and restore NAS equipment.
- Provide technical support to the Integrated Display System (IDS4) Replacement Program in site planning and coordination for systems installations.
- Provide technical assistance to initiate two construction awards and continue with multiple Phase IV and V activities.
- Provide economies of scale with national contracts that will include small business provisions. FAA security requirements, as well as those recommendations from the Inter-Agency Security Councils, will be incorporated into the draft Statement of Work released in advance of the procurement so that the requirements are widely known and more companies will have an opportunity to prepare for the competitive procurement.
- Conduct accurate inventory of the real property assets for ATO facilities.
- Implement an efficient and effective cyber security program by protecting FAA-sensitive and individual privacy information from unauthorized disclosure.
- Improve the functionality of Computer Aided Engineering Design (CAEG) software and investigate methods for reducing CAEG operating costs.
- Perform Configuration Management for the Air Traffic Control (ATC) Facilities Directorate.
- Support Real Property Asset Management Inventory by utilizing efficient methodologies to determine existence and condition of real property. Methodology will utilize reliable data, replacement and repair request data, statistical sampling, and limited physical testing.
- Develop and manage an ATC facilities evolution plan that maps future and planned future sustainment of infrastructure to the evolving NAS.
- Standardize requirements and performance standards across all facilities to improve the quality and effectiveness of the guard services.

- Maintain and sustain the Weather and Radar Processor (WARP) service in accordance with the program specification and requirements.
- Award contract to vendor/vendors for Low-Level Wind Shear Alert System (LLWAS) spares.

Key outputs expected to be achieved in the budget year with the requested resources:

- Provide Ground- and Space-Based Navigation systems for commercial and private aviation pilots by maintaining the existing ground-based equipment.
- Ensure that the Runway Template Action Plan (RTAP) schedules, milestones, and completion dates for commissioning new Next Generation Air Transportation System (NextGen) runway/extensions are met.
- Provide Environmental and Occupational Safety & Health (EOSH) training and personal protective clothing and equipment to personnel, obtain regulatory permits, e.g. (air, water, fuel storage tanks (FST)) to ensure operation of FST, conduct compliance inspections, materials testing and pollution prevention to support NAS operations.
- Sustain operational availability of all facilities at 99 percent by sustaining power systems; evaluating system operations; and implementing deficit solutions to increase operational readiness. In addition, complete scheduled activities of preventive maintenance, equipment modifications, service certifications, and restoration activities.
- Implement key work plans in support of delivering the NextGen mid-term operational vision for flexible terminals and airports.
- Improved professionalism in the facility security officers through the use of standardization and oversight that ensure that qualification and certification requirements are being met.

Key outcomes expected to be achieved in the budget year with the requested resources:

- Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over a 9-year period (2010-2018). No more than 6.2 in 2018.
- Reduce the general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.
- Decrease in the number of site physical security discrepancies, including guard services that would lead to an increase in the number of accreditations.
- Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the Nation's Core Airports through FY 2013.
- Reduce the U. S. population exposed to significant aircraft noise around airports to less than 300,000 persons.
- Continue small business involvement through the National Guard Services Contract.
- Achieve zero cyber-security events that disable or significantly degrade FAA services.
- Achieve a 90 percent success rate in the areas of financial management and human resources management.
- Achieve financial economies of scale with large guard service contracts that provide services for numerous sites.
- Enforce standardization of requirements for guard services which will improve the quality and performance of facility guards.

2. What Is This Program?

The purpose of the Technical Operations Service Unit is to:

- Improve situational awareness for pilots, controllers and airfield operators by providing them with additional information concerning potential conflicts and offering possible resolutions;
- Increase NAS capacity for all users through changes in procedures and/or technology;
- Maintain NAS services for all users by strategically investing in the current infrastructure; and
- Ensure efficient delivery of all NAS services for all stakeholders by effectively managing the Technical Operations Services Unit.

Technical Operations supports the delivery of safe and efficient flight services to customers through responsive and cost effective maintenance of the NAS facilities, systems, and equipment. The work consists of:

- System design, development, acquisition, installation, maintenance, restoration, modification, and certification;
- Commissioning and periodic flight inspection;
- Facilities maintenance;
- Engineering and assignment of aeronautical frequency spectrum;
- Safety integration; and
- Information and physical security management; and
- Administrative and business support functions.

The Technical Operations Services Unit supports the DOT Strategic Plan's Economic Competitiveness goal to maximize economic returns on transportation policies and investments through its support to achieve FAA's annual targets for average daily airport capacity at the Nation's Core Airports and adjusted operational availability.

Our core work is performed by the System Support Centers and Flight Inspection Field Offices. These professionals focus daily on optimizing NAS performance through prioritization of response based on factors such as importance of the airport or ATC facility that is directly or indirectly affected by the equipment or service outage. This core work includes certification, logging, maintenance, modifications, and technical documentation.

Strategic efforts and related program management is primarily provided by headquarters organizations. Technical Operations strategic activities supporting the FAA goals include NextGen development and implementation. Funding the Wide Area Augmentation System (WAAS) approaches contributes toward this effort.

The Technical Operations Service Unit is made up of the following directorates:

Safety and Operations Support provides technical support to the ATO's service units, through a strategy of focused engineering, policy, data, and in-service management by providing the support structure, methodology, tools, procedures, performance monitoring and assurance, necessary for the proper operation and maintenance of the NAS.

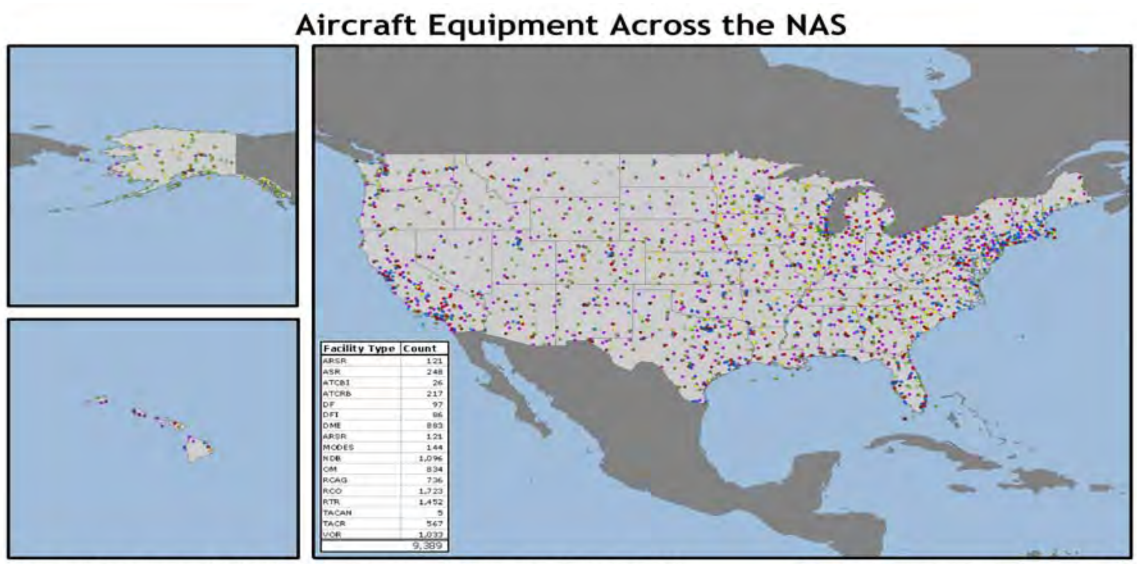
The ATC Facilities Office provides safe and effective lifecycle management of the NAS and facilities infrastructure. They also provide policy and guidance, programming, requirements, engineering, integration and implementation support, service life extension, and maintenance support.

The Aviation System Standards Office's mission is to ensure the evaluation and certification of airspace systems, procedures, and equipment for customers worldwide. The organization operates aircraft for the purpose of flight inspection.

Spectrum Engineering Services obtains, assigns, and protects radio frequencies for the FAA's communication, navigation, and surveillance programs. This includes resolving Radio Frequency Interference (RFI) events that affect the NAS as well as developing and coordinating the civil aviation radio frequency standards and protection criteria to support future NAS systems.

The Air Traffic Control Facilities Directorate's, Facilities Security Risk Management Office provides guard services for Security Level (S/L) 3 and 4 facilities. This designation is given to facilities because of the size and scope of the operation and criticality of the mission they are assigned to perform. Additionally, FAA Order 1600.69B change 1 identifies the need for guards and the functions they are expected to perform at S/L 3 and 4 facilities in the FAA Guard Staffing Standard. In light of the constantly changing threat to Government facilities, it is imperative that the guard services at high visibility installations be trained to provide the most cost effective protection to the facilities and its employees. The development of an FAA Headquarters administered national contract for guard services will ensure the standardization of requirements for all guards.

The Telecommunications Services Group (TSG) also manages the Network Enterprise Management Centers in Atlanta and Salt Lake City.



These graphics represent 9,389 of 64,312 facilities and equipment maintained by the FAA.

Produced by FAA Aeronautical Information Management (AJR-32)
May 25, 2006

Our partners and stakeholders include:

- Commercial Aviation Safety Team (CAST)
- International Civil Aviation Organization (ICAO)
- International Telecommunication Union – Radio Communications (ITU-R)
- National Telecommunication and Information Administration (NTIA)
- Department of Defense (DOD)
- Federal Communications Commission (FCC)
- Joint Planning and Development Office (JPDO)
- National Transportation Safety Board (NTSB)
- Department of Homeland Security (DHS)
- Radio Technical Commission for Aeronautics
- The Airline community
- RTCA, Inc.
- Academia
- FAA lines of business (other ATO Service Units, AVS, ARC, ARP, ASH)
- Industry and state/local governments
- Inter-Agency Security Council

By the end of FY 2012, accomplishments for Technical Operations include:

- Increasing capacity by modifying and/or augmenting procedures, implementing new technology and increasing service efficiency for all users, including new runway commissioning.
- Conduct accurate inventory of the real property assets for ATO facilities.
- Implement an efficient and effective cyber security program.
- Prevent unauthorized disclosure of FAA-sensitive and individual privacy information.
- Award three Headquarters contracts, one per Service Area, for security officer services at 72 sites where existing security officer services are provided by local guard service contracts. This will achieve economies of scale and standardization.

By the end of FY 2013, anticipated accomplishments for Technical Operations include:

- Increase capacity by modifying and/or augmenting procedures, implementing new technology and increasing service efficiency for all users, including new runway commissioning.
- Conduct accurate inventory of the real property assets for ATO facilities.
- Implement an efficient and effective cyber security program.
- Prevent unauthorized disclosure of FAA-sensitive and individual privacy information.

- Complete 106 engine generator sustainment projects.

3. Why Is This Particular Program Necessary?

FAA's ATO handles 70,000 flights per day and helps transport over 730 million passengers per year, contributing to 5.2 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

The safety of air travelers and the ability to get them to their destination on-time is dependent on the availability of navigational and communications equipment and redundant back-up systems. The availability of the equipment necessary to provide service directly affects the performance of the NAS. Loss of radar or communications equipment will affect the speed and number of aircraft that can be handled. The ability of the NAS to continually provide guidance is crucial and affects both safety and capacity.

The target performance level is met by adherence to FAA maintenance policies and procedures for NAS monitoring, control, maintenance, and restoration. This strict adherence optimizes service availability for the Nation's Core Airports. Most of the unscheduled downtime for the fiscal year was due to equipment and power outages.

The goal for Adjusted Operational Availability is expected to remain at 99.7 percent. ATO analyzes various performance data to increase or maintain targeted level of performance and determine metric goal in order to provide appropriate Safety and Economic Competitiveness outcomes for the flying public.

Complementing the safety of air travelers is the security of the FAA facilities and employees whose job it is to ensure the safe and efficient control of flight operations. The provisioning of high quality, professional guard services at staffed FAA facilities ensures that the work of controlling flight operations can proceed without interruption.

4. How Do You Know The Program Works?

ATO sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule and performance.

The NAS is an inherently complex system, with multiple levels of redundancy to assure availability of key services. We have adjusted response time at low-level facilities to ensure service is restored first to the most critical facilities. The Technical Operations Services Unit has established the following target for this performance goal: "Sustain Adjusted Operational Availability at 99 percent for reportable facilities that support the NAS."

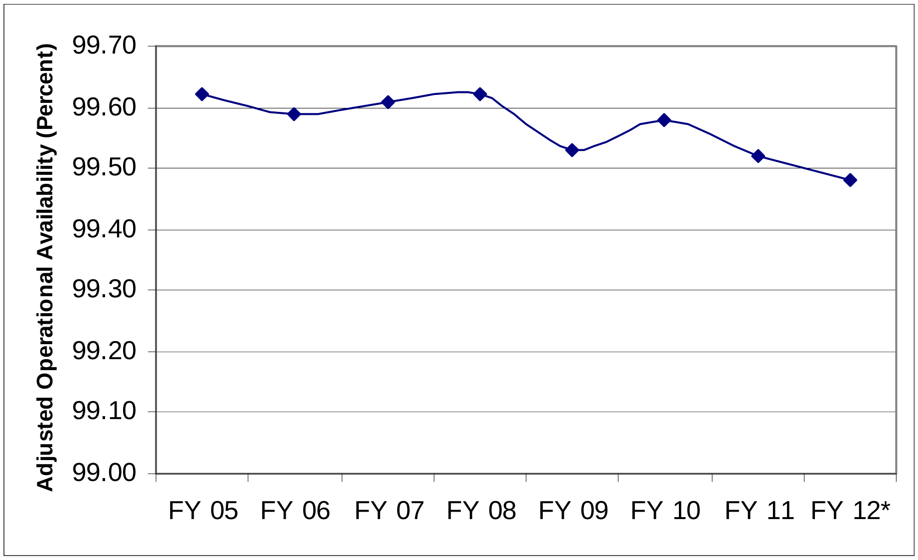


Figure 7: Adjusted Operational Availability of NAS Capabilities
Note: *FY 12 data thru 11/30/11 (November data is preliminary)

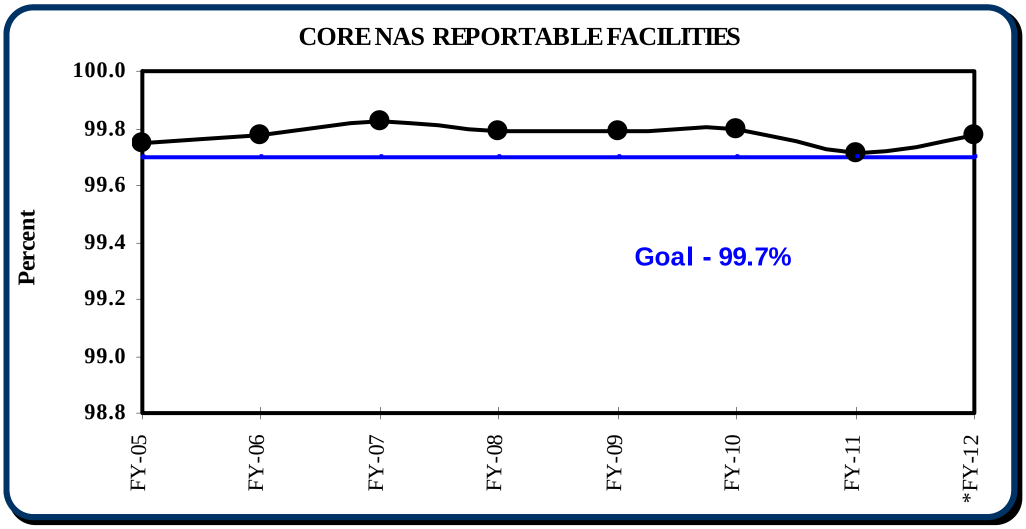
Systems Maintenance Field Maintenance Performance Indicators

Fiscal Year	Number of Facilities**	Adjusted Operational Availability	Reliability
2005	22,792	99.62%	99.90%
2006	22,860	99.59%	99.85%
2007	22,637	99.62%	99.84%
2008	22,611	99.62%	99.84%
2009	22,804	99.53%	99.85%
2010	22,419	99.58%	99.85%
2011	22,451	99.52%	99.85%
2012*	22,233	99.48%	99.85%

*FY 2012 data thru 11/30/11 (November data is preliminary)
**Operational facilities deemed reportable in FAA Order 6040.15, "National Airspace Performance Reporting System."

Adjusted Availability for Nation's Core Airport
(Reportable Facilities)
FY 2012 Goal (Maintain adjusted availability of Nation's Core Airports NAS reportable facilities at 99.70%)

Target: 99.70%
FYTD: 99.77%
Oct 11: 99.74%
Nov 11: 99.81%
Nov 10: 99.77%



Preliminary numbers show, for the month of November 2011, we are above the goal for adjusted operational availability. Compared to October 2011, the adjusted operational availability for the Nation's Core Airports (reportable facilities) increased by 0.064 percent with an approximate decrease of 400 hours in unscheduled downtime. Compared to November 2010, the adjusted operational availability for the Nation's Core Airports (reportable facilities) increased by 0.033 percent with an approximate decrease of 600 hours in unscheduled downtime.

Note: Data Source – NAS Performance Analysis System (NASPAS) ***(The NASPAS database is validated continuously)***
Official data through October 2011; Preliminary data – November 2011

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Technical Operations ensures that thousands of systems, facilities, and pieces of equipment are operationally ready to manage our nation's air traffic control system. Without system specialists and management teams working to complete preventive maintenance and repair down equipment, unscheduled outages can result in delays in the system, negatively impacting the flying public.

Another component of the Technical Operations organization that serves as a vital link in delivering air traffic control services is Aviation System Standards' flight inspection operations. Technical Operations employees conduct airborne inspection of electronic signals from ground-based NAVAIDS to support aircraft departure, en route, and arrival procedures. This group evaluates flight procedures for accuracy, human factors fly-ability, and obstacle clearance. Without this "check," the NAS would not be as safe as it is today.

Technical Operations manages their operations by measuring performance of the NAS based on what systems or services are available for air traffic control operations (Adjusted Operational Availability). However, this metric directly impacts FAA's airport capacity metric (Average Daily Airport Capacity) as noted above, as well as our safety reduction goals (Commercial and General Aviation Fatal Accident Rates). Technical Operations ensures that terminal and en route controllers have all critical parts of the NAS infrastructure available for the safety and efficient delivery of air traffic services.

Technical Operations manages and protects all civil aviation radio frequencies used by NAS communication, navigation, and surveillance systems. We resolve RFI that disrupt NAS operations and promote U.S. radio frequency spectrum positions and initiatives in the International Telecommunications Union Radio communication study groups and related World Radio communication Conference activities. The management of radio frequency spectrum resources is vital to efficient operation of the NAS.

The provisioning of guards at Security Level 3 and 4 facilities fills a critical role in the safe operation of the NAS. If one of these facilities is adversely affected by an intrusion or other disruptive event, the ability to safely control flight operations may be in jeopardy. The use of a highly trained, professional security force will act as a deterrent to those who would attempt to disrupt the operation of the NAS.

Detailed Justification for Vice President System Operations, AJR-0

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – System Operations Services – Budget Request
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
System Operations Services	$321,260	$279,578	$281,946	+$2,368

The FY 2013 budget request for System Operations Services is $281,946,000 and 417 FTP / 409 FTE. This includes increases of $281,000 for the government-wide pay raise and $288,000 for one additional compensable workday. This request also includes an internal FAA transfer of programs and staffing to Program Management Services (PMO) from System Operations Services. Increases included in this request are offset by a reduction of $43,356,000 and 43 FTP / FTE to the PMO.

Funding the FY 2013 request at this level will allow System Operations to maintain the NAS by accomplishing the following:

- The Air Traffic Control Systems Command Center (ATCSCC) Directorate will continue to coordinate traffic flow to assure efficient movement of air traffic.
- The ATCSCC will continue to use the Integrated Collaborative Routing (ICR) process during weather events. The ATCSCC will enhance, expand, and train employees on the ICR process for use during the severe weather season.
- The ATCSCC will also continue to develop the Collaborative Decision Making (CDM) process model and share airport surface data with stakeholders. The ATCSCC will develop an airport CDM process model at a target airport in the National Airspace System (NAS).
- The System Operations Security Directorate will continue to use Air Traffic Management (ATM) related capabilities to directly protect the NAS from attack or exploitation by terrorists and other hostile actors in partnership with the Department of Defense (DOD), Department of Homeland Security (DHS), and other key stakeholders.
- The System Operations Security Directorate will continue to use ATM related capabilities to mitigate the impact of security threats and Government responses to those threat on the safety and efficiency of the NAS.
- The System Operations Security Directorate will continue to lead the Air Traffic Organization's (ATO) crisis management efforts to sustain the continuity of NAS operations and to support National Response Framework driven disaster response efforts in the face of critical events such as catastrophic hurricanes or large scale terrorist attacks.
- The Flight Services Directorate will continue to provide flight services in the contiguous (CONUS) U.S. via the Automated Flight Service Stations (AFSS) contract. FAA will continue to provide Flight Services in Alaska.
- The Flight Services Directorate will continue to manage the AFSS contract to provide quality flight services to the CONUS, Puerto Rico, and Hawaii. Flight Services will work with the Programs Directorate to continue to modernize Flight Services through the Flight Services Automation Modernization program in order to standardize and improve service delivery to pilots.
- The Security Directorate will continue to collaborate with DHS, DOD, and other security stakeholders to protect the country and its interests from threats involving the air domain.
- The Safety Directorate, System Operations Safety Management (SOSM), oversees Safety Management System activities within the System Operations Service Unit. The SOSM directorate will work with System Operations Service unit personnel to ensure the appropriate application of Safety Risk Management (SRM) and Safety Assurance policies and procedures in accordance with Safety Management System (SMS) requirements and applicable FAA safety guidance and directives. SRM will be applied to all service unit proposed changes to the NAS.

- The Planning Directorate will lead the process for strategic and business planning and integration of the ATO Business Plan with the FAA Strategic Plan. Lead the Budget and Performance Integration Initiative including oversight of performance measures to be used by ATO service units.

Key outputs expected to be achieved in budget year with the requested resources:

- The ATCSCC will continue to coordinate traffic flow to assure efficient movement of air traffic. The ATCSCC uses the following targets to measure its performance:
  - Average Daily Airport Capacity (Nation's Core Airports) – Achieve an average daily airport capacity for the Nation's Core Airports of 86,606 arrival and departures per day by FY 2011 and maintain that level through FY 2013.
  - Average Daily Airport Capacity (metropolitan areas) – achieve an average daily airport capacity for the seven metropolitan areas of 39,484 arrivals and departures per day by FY 2009 and maintain that level through FY 2013.
- Flight Services will continue to manage the AFSS contract to provide quality flight services to the CONUS, Puerto Rico, and Hawaii. Flight Services will work with the Program Directorate to continue to modernize Flight Services through the Future Flight Services Program (FFSP) program in order to standardize and improve service delivery to pilots.
- The Safety Directorate will provide oversight and guidance for the conduct of SRM activities within System Operations. We will track all SRM activities and report to management on NAS changes requiring SRMD or a SRMDM. The Directorate will communicate safety information to inform workforce of the progress towards safety culture through newsletters, lessons learned, and reports. The SOSM will ensure that ATO safety performance is improved as we evolve the NAS to NextGen. The SOSM will develop relevant safety metrics and on-going measurement processes which measure System Operations/Mission Support Service Unit's progress in applying SRM methods. The Directorate will review, accept, disseminate, track, and respond to all external safety activities within the allocated timeframe. The SOSM Quality Management System will be maintained according to ISO 9001:2008 standards through internal and external audits. The System Operations Security Directorate's efforts, which include the management by Air Traffic Security Coordinators (ATSC) of the Domestic Events Network, the primary tool used by Federal and State level and private industry stakeholders to operationally coordinate responses to live airborne threats will continue to enable the Government to rapidly detect potential airborne threats, discriminating possible hostile actors from legitimate air traffic.
- System Operation Security's specialized ATM-related measures (e.g., security driven Temporary Flight Restrictions) will continue to protect sensitive activities such as Presidential movements, sensitive locations, and sensitive events from aviation-related threats while minimizing safety and efficiency effects on civil aviation.
- The System Operations Security Directorate's crisis management efforts will continue to strengthen the preparedness and consequence management capabilities used to sustain NAS operations and to support disaster response air missions in the face of critical events, including natural disasters and large scale terrorist attacks.

2. What Is This Program?

This program supports the DOT's goals of Safety: Reduction in transportation-related fatalities and injuries and Economic Competitiveness: Maximum economic returns on transportation policies and investments.

The System Operations Service Unit consists of several directorates that perform essential functions in the daily operation of the NAS. These directorates are:

- Air Traffic Control System Command Center (ATCSCC) Directorate;
- Flight Services Directorate;
- Safety Directorate;
- Security Directorate; and
- Planning Directorate.

The System Operations Service Unit directorates perform essential functions in the daily operation of the NAS. The ATCSCC coordinates air traffic flow. System demand frequently exceeds system capacity due to weather, airport delays, special use restrictions, and security restrictions. The ATCSCC regulates the flow of air traffic to minimize delays and congestion while maximizing the overall operation of the NAS. Traffic Management Specialists adjust traffic demands to meet system capacity.

The Flight Services Directorate collects and disseminates aeronautical and meteorological information, providing customized pre-flight and in-flight briefings to the domestic and international general aviation (GA) communities, as well as to military, air carriers, and federal and local law enforcement. In FY 2006, Lockheed Martin began providing flight services under the AFSS contract to the continental U.S., Hawaii, and Puerto Rico. FAA expects to achieve $1.9 billion in total savings and cost avoidance (capital and labor) over the 13 years of this program.

In Alaska, three AFSS and 14 satellite Flight Service Stations (FSS) remain government-operated. The legacy automation systems in Alaska were replaced by the Operational and Supportability Implementation System (OASIS) in FY 2007 to mitigate information security and data integrity issues. OASIS will continue in Alaska through 2014. OASIS will provide a bridge to the FFSP, which is planned to include the next flight services automation system. FFSP is nearing completion of the concept and requirements definition phase of the Acquisition Management System (AMS). The Direct User Access Terminal (DUATS) service is an internet capability that provides flight planning and weather briefings to authorized users on a 24/7 basis.

The Safety Directorate provides oversight and guidance for the conduct of SRM activities within System Operations. The directorate ensures that all System Operations-initiated Safety Risk Management Documents (SRMD) and Safety Risk Management Memos (SRMDM) are in accordance with the FAA SMS Manual, correctly reflecting proposed changes to the NAS. The directorate assesses safety risks associated with proposed changes to the NAS.

The Security Directorate orchestrates the ATO's efforts to use its air navigation services capabilities, particularly ATM, to protect the U.S. and its interests from national defense, homeland security, and law enforcement related threats and natural hazards involving the air domain. This directorate also leads ATO's efforts to mitigate the impact of those threats, hazards, and Government responses on the safety and efficiency of the NAS. System Operations Security comprises a small headquarters command and support component and ATSC watch-standing teams and operations liaisons at key air defense and homeland security nodes, including a national watch cell at FAA headquarters in Washington, DC; the Freedom Center in Herndon, Virginia; the North American Aerospace Defense Command (NORAD) facilities in Colorado Springs, CO, Tyndall Air Force Base, FL, Rome, NY, McChord Air Force Base, WA; and the Air Marine Operations Center in Riverside, CA. The Directorate also participates in various international forums, including International Civil Aviation Organization (ICAO) working groups, to advance ATM Security and Civil-Military cooperation on ATM related matters globally.

The Planning Directorate will improve FAA operations by implementing the Budget Planning Integration process. The Planning Directorate is coordinating the process to integrate budget formulation with the planning process. The integration will link the FAA budget to FAA planning targets.

System Operations coordinates with representatives from all groups when building new products or establishing policies and procedures.

Our partners and stakeholders include:

- Airline Operations Centers for the Commercial Airlines
- GA Community
- Department Of Homeland Security, including the Transportation Security Administration, U.S. Secret Service, Customs and Border Protection, U.S. Coast Guard, and Federal Emergency Management Agency
- Port Authority of New York
- Metropolitan Airport Authority of Washington
- Aircraft Owners and Pilots Association
- National Business Aviation Association
- Air Transport Association
- Department of Defense/Military services, including all services and many of the combatant commands
- Department of Justice, to include the Federal Bureau of Investigation

By the end of FY 2012, the accomplishments for System Operations include:

Safety:

- Implement SMS for the FAA. Manage and oversee implementation of FAA Order 1100.61, Air Traffic Safety Oversight and ATO Order JO 1000.37, Air Traffic Organization Safety Management System to ensure compliance with Safety Standards and Safety Management System.
- Manage the AFSS contract to provide quality flight services to the contiguous U.S., Puerto Rico, and Hawaii.
- Sustain Flight Services and continue preparation for modernizing Alaska Flight Service in order to identify efficiencies and improvements in the service delivery. Provide support to other service units and Federal agencies.
- Enhance system security through collaboration with the DOD and DHS, providing air traffic operations-related support to National defense and homeland security missions. Collaborate with DHS and other security stakeholders to protect National special security events. Coordinate with Department of State and other stakeholders on special air traffic secure routing of flights by countries of special security interest to the U.S. in order to mitigate potential security threats.

Economic Competitiveness:

- Use CDM to enhance traffic management tools, net-centric information sharing vehicles and processes to yield the most effective NAS decisions through the CDM process.
- Achieve a NAS on-time arrival rate of 88 percent at the Nation's Core Airports and maintain through FY 2013.

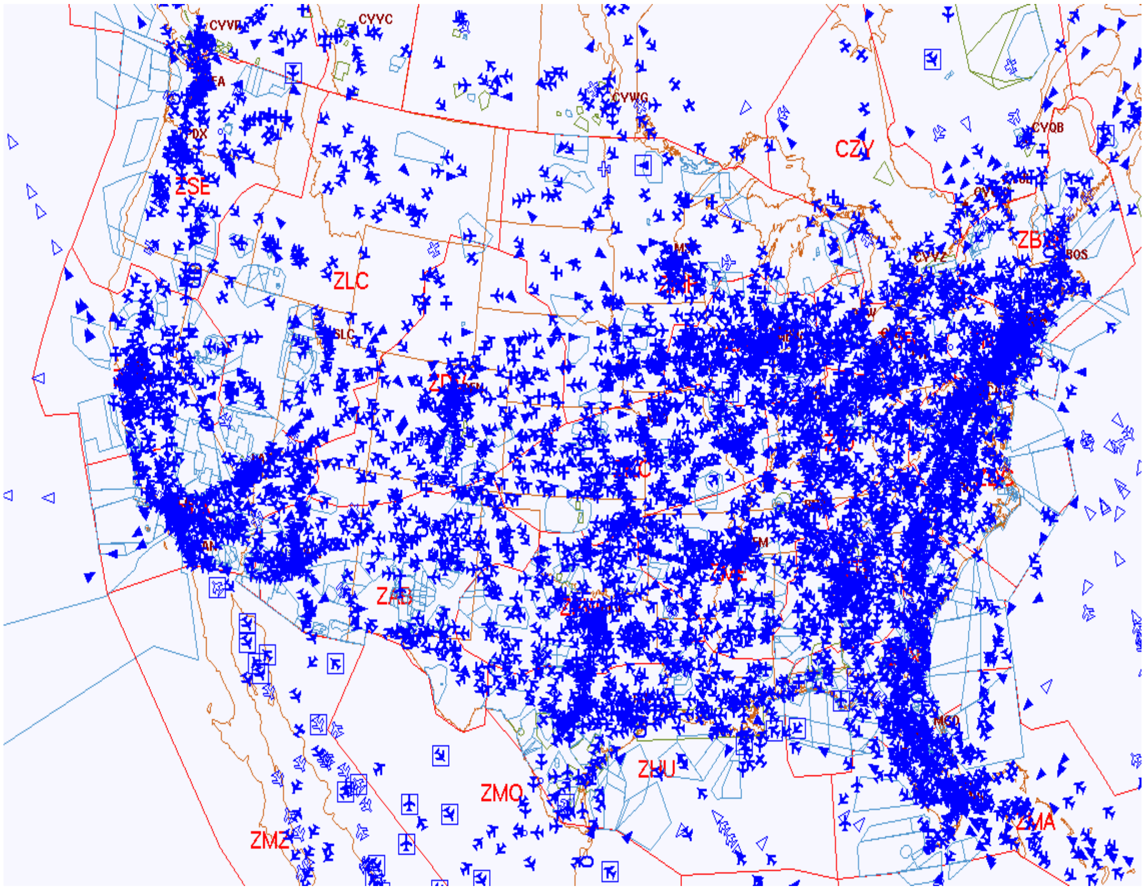
By the end of FY 2013, the anticipated accomplishments for Systems Operations include:

Safety:

- Continue to manage the AFSS contract to provide quality flight services to the continental U.S., Puerto Rico, and Hawaii.
- Provide high quality flight services to our customers in Alaska.
- Promote a positive safety culture by ensuring that our service complies with FAA Order 1100.161 and ATO Order JO 1000.37. We will educate all employees in all aspects of safety management.

Economic Competitiveness:

- Achieve an average daily airport capacity for the Nation's Core Airports of 86,606 arrivals and departures by FY 2011 and maintain that level through FY 2013. Achieve an average daily airport capacity for the seven metropolitan areas of 39,484 arrivals and departures per day by FY 2009, and maintain that level through FY 2013.
- Achieve a NAS on-time arrival rate of 88 percent at the Nation's Core Airports and maintain that level through FY 2013. Provide daily improvements to traffic flow by routing around obstacles such as weather, congested airports, and equipment outages. Short-term benefits realized include reduced congestion and delays, making the flying experience more desirable for the general public.
- Manage the AFSS contract to provide quality flight services to the contiguous U.S., Puerto Rico, and Hawaii.



3. Why Is This Particular Program Necessary?

FAA's ATO handles 70,000 flights per day and helps transport over 730 million passengers per year, contributing to 5.2 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

The Systems Operations Service Unit provides services that are critical in the operation of the NAS:

- ATCSCC personnel optimize the capacity of the NAS. The ATCSCC coordinates streams of aircraft over and around obstacles and provides a constant flow of aeronautical data to controllers, while also coordinating their actions and recommendations with the airline home offices.
- The System Operations Security Directorate mitigates the impact of aviation-related threats to national defense, homeland security, natural disasters, and disruptions to air commerce and the associated response measures (i.e., airport terminal shutdowns) on the safety and efficiency of the country's aviation system. We use a broad range of air traffic management tools (e.g., temporary flight restrictions) to carry out this mission using air traffic controllers that are dedicated to security functions to help quickly resolve potential airborne and other threats involving the NAS.
- The System Operations Security Directorate is instrumental in working with DHS, DOD and other partners as well as the private sector, to enable security solutions that meet the country's national defense, homeland security, law enforcement, and emergency operations demands while mitigating undesirable impacts on the safety and efficiency of the NAS and air commerce. The Directorate also serves as a key actor in working with ICAO and other international partners to ensure that ATM-related capabilities are used by foreign Civil Aviation Authorities (CAA)/Air Navigation Services Providers (ANSP) in a manner that the aforementioned objectives globally, particularly including airspace affecting the NAS and airspace in which U.S. operators and residents regularly fly.

- Flight Services collects and disseminates aeronautical and meteorological information, providing customized pre-flight and in-flight services to the domestic and international general aviation communities, as well as to military, air carriers, and Federal and local law enforcement. These services are provided to pilots by telephone, radio, the Internet, and face-to-face meetings.

4. How Do You Know The Program Works?

ATO sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule, and performance.

Systems Operations' management of air traffic was reviewed by the DOT Inspector General (IG) and found to be effective. As described in DOT IG Report Progress and Remaining Challenges in Reducing Flight Delays and Improving Airline Customer Service, May 20, 2009, Project ID: CC-2009-067 (http://www.oig.dot.gov/library-item/4965), the Systems Operations Service's processes are effective in reducing air traffic delays. The report concluded that delays in 2008 were down from 2007 and that current delay statistics and customer service trends looked favorable. We continue to focus on the issue of delays at the New York/New Jersey/Philadelphia airports described in the report.

The need for some of the processes and measures used by System Operations were initially identified in DOT IG Report: Actions to Improve the Performance of the National Aviation System, May 3, 2001, Project ID: CC-2001-171 (http://www.oig.dot.gov/library-item/4098). FAA established the ATCSCC to coordinate air traffic issues with centers, terminal facilities, and commercial Airline Operations Centers. On a daily basis, the ATCSCC coordinates operational problems caused by equipment outages, weather, or VIP movement. As recommended in the report, we established extensive data collection to track the cause of delays at the Nation's Core Airports.

Another operational area of System Operations, the management of flight services, has also been reviewed and found to be effective by DOT IG. The System Operations AFSS contract was reviewed in DOT IG Report Interim Report on Controls Over the Federal Aviation Administration's Conversion of Flight Service Stations to Contract Operations**,** Report Number: AV-2007-048, May 18, 2007 (http://www.oig.dot.gov/library-item/4500). The report found that the transition from FSS to contract operations was effective. The System Operations Service Unit has implemented effective controls over the transition of FSS to contract operations.

System Operations develops annual targets to measure how effectively the service unit manages traffic flow capacity. The service unit collects and reviews data to determine whether performance targets are being met. Cost targets for the AFSS contract are used as performance metrics for Flight Services.

- System Operations achieved an average daily airport capacity for the seven major metropolitan areas of 39,484 arrivals and departures per day by FY 2009 and intends to maintain that level through FY 2013.
- System Operations will achieve an average daily airport capacity for the Nation's Core Airports of 103,068 arrivals and departures per day by FY 2011 and maintain that level through FY 2013. To date, System Operations has achieved an average capacity of 101,517 flights per day. The average number of flights will rise as we enter the summer season.
- The Flight Services AFSS contract is on schedule to reach its expected savings and cost avoidance of $1.9 billion in capital and labor over the 13-year period of the contract. Additionally, the AFSS contract reduced leased space for automated flight service stations from approximately 510,000 square feet to approximately 150,000 square feet.

We continue to meet annual capacity targets for air traffic management, showing the System Operation Service Unit's emphasis on measuring the effectiveness of operations. The service unit's Flight Services Directorate continues to provide pre-flight and post-flight services while meeting budget estimates for the AFSS contract, showing awareness of cost management. Likewise, the service unit's Safety Directorate has met the guidelines recognized in private industry for quality control, by achieving certification with the International Organization for Standardization (ISO) 9001:2008 Certificate of Conformance. The Directorate adopted and integrated the Quality Management System into their SMS, assuring documented, repeatable, and standardized processes to manage safety risk.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The ATCSCC Directorate optimizes the capacity of the NAS by coordinating the daily air traffic flow, assuring on-time departures and arrivals for the flying public. ATCSCC Traffic Management Specialists plan and regulate the flow of air traffic to minimize delays and congestions while maximizing the overall operation of the NAS. When significant events, such as adverse weather, equipment outages, runway closures, and national emergencies impact an airport or portion of airspace, the Traffic Management Specialists adjust traffic demands to meet system capacity. The output of the ATCSCC is maximum airport capacity and minimum flight delay.

The Flight Services Directorate provides flight planning, advisory, operations, and search and rescue coordination services in the continental U.S., Puerto Rico, Alaska, and Hawaii. AFSS primarily provides weather and aeronautical briefings and flight planning services to pilots. Flight Services also coordinates visual flight rules search and rescue services, provide orientation service to lost or disoriented aircraft, maintain continuous weather broadcasts on selected Navigational Aids, and issue Notice to Airmen (NOTAM). While flight service functions in Alaska are provided by Government personnel, flight service functions in the lower 48 states are provided through a contract with Lockheed Martin managed by the Flight Services Program Operations Directorate. Without the requested level of funding, flight services provided by the Flight Services Program Operations Directorate (i.e., flight planning services, NOTAM data, search and rescue, and weather and aeronautical briefings to pilots) would be reduced and safety impacted.

The System Operations Security directorate orchestrates air navigation services related operational efforts, particularly ATM focused activities, that provide an integral part of the Government's ability to protect the U.S. and its interests from air domain related threats and natural hazards in the national defense, homeland security, law enforcement, and emergency operations arenas. This Directorate is also the critical tool used to mitigate the immediate impact of security threats, natural disasters, and Government responses to threats on the safety and efficiency of the NAS. Without the requested level of funding, the Government's capabilities in these mission areas will be degraded, including a decreased ability to quickly identify and effectively counter air borne threats while minimizing impacts on legitimate air traffic; a reduced ability to support life-saving and other critical flight operations during disasters; and a diminished ability to protect high value targets such as Presidential movements and the Nation's Capital from terrorists and other hostile actors exploiting the NAS as a means of attack.

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Detailed Justification for Vice President Safety and Technical Training, AJI-0

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Safety and Technical Training Services – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Safety and Technical Training Services	$260,094	$252,291	$254,020	+$1,729

The Safety and Technical Training Services is requesting $254,020,000 and 524 FTP / 514 FTE in Operations to meet its mission in FY 2013. This increase will provide for $286,000 for the government-wide pay raise and $294,000 for one additional compensable workday.

Key outcomes expected to be achieved in the budget year with the requested resources:

- Improve workforce knowledge and skills;
- Provide enough competent individuals to meet the needs of the operation;
- Reduce training development, management, and maintenance costs;
- Work in partnership with the Office of Safety;
- Expand technology for training development and delivery;
- Reduce travel costs related to training for field personnel;
- Improve training life-cycle management;
- Transition from information-based training to performance-based training;
- Better understanding of what factors contributed to loss of standard separation and mitigation strategies to prevent future loss incidents;
- Reduction of total runway incursions and total A&B (most serious) Runway Incursions;
- Safety Management System (SMS) Continuous Improvement Plan that continues to evolve as recommended improvements are collected;
- Risk-based modeling tool to validate Next Generation Air Transportation System (NextGen) Solutions Sets;
- Safety culture that promotes a non-punitive, voluntary reporting environment;
- Establishment of a performance band where trends can be observed and managed;
- Better trained workforce;
- Assurance that new and maintained systems in the National Airspace System (NAS) have been analyzed for risk;
- Safer, more efficient air navigational services in the U.S. and internationally;
- Improve Air Traffic Organization's (ATO) employee safety;
- Improve safety of the flying public; and
- Encourage employees at all levels to report risk without blame or shame.

Key outputs expected to be achieved in budget year with the requested resources:

- Update systems required to design, develop, and manage training/proficiency;
- Comprehensive job task analysis for controllers and technicians aligned with operational performance needs to ensure validity of learning objectives, assessments, and curriculum footprint;
- Standardized training content across the NAS;
- Maximum training content reusability enabling content for flexible publishing (e.g., web, instructor-led, mobile, student guides, instructor guides, books, etc.);
- Improve the ATO's integrated safety management system by enhancing safety risk analytics;
- Improve policy, processes, and tools to ensure safety in our operations and our employees;
- Continue to manage risk, assure quality standards, instill open disclosure, and educate and promote continuous improvement;
- Conduct and analyze data to identify and correct risks before they become hazards;

- Conduct analysis and disseminate findings of Risk Analysis Events (loss of less than 66 percent required radar separation) on a quarterly basis;
- Continue to reduce Runway Incursions;
- Review any proposed adjustments to the SMS Continuous Improvement Plan implemented in FY 2011;
- Implement programs to improve employee safety culture and to measure workforce actions based on employee performance of Occupational Safety Health policy, practices, and training;
- Continue conducting initial, recurrent, and refresher Crew Resource Management (CRM) and SMS workshops;
- Develop safety guidance and safety standards for the integration of Safety Risk Management (SRM) into NextGen Solution Set planning and implementation;
- Develop the Safety Analysis System that will integrate and fuse ATC safety data sources, current and future, to support the safety data analysis for prognostic safety risk management; and
- Coordinate ATO Safety international activities to ensure global harmonization of safety management in the provision of air navigation services.

2. What Is This Program?

Safety and Technical Training supports the Department of Transportation's (DOT) Workplace of Choice goal and Safety goal of reducing transportation-related injuries and fatalities and is also the lead for two of FAA's Priority Goals – Reduction of Runway Incursions and Hazards Mitigation.

Technical Training provides and maintains a world class level of air traffic workforce competency and performance by providing the right training to the right people at the right time. As we leverage people, processes, tools, and technology to optimize operational performance, we also measure our success through robust and concrete data.

Technical Training serves as the primary organization to develop and deliver technical training programs for a workforce of over 15,100 air traffic controllers (ATC), more than 6,100 Airway Transportation Systems Specialist (ATSS), and 1,800 engineers to effectively accomplish the FAA mission. Our goal is to deliver state-of-the-art training solutions to meet our ever-changing employee demographics and operational requirements both today, and throughout the transition to the NextGen.

Technical Training continues to identify and implement ways to transform how the FAA develops its technical workforce. This transformation requires FAA to take advantage of the latest techniques and technology as well as the resources of both government and industry to become more efficient and effective in training. Through the Air Traffic Control Optimum Training Solution (ATCOTS) contract, FAA provides a single performance-based contract that uses quality processes, methodologies, and cost-reduction strategies for air traffic controller training leading to certification. The contract provides a seamless, streamlined approach to training, supporting all aspects of the curriculum from new hires entering the FAA Academy through proficiency training for Certified Professional Controllers (CPCs).

Utilizing the ATCOTS and Keybridge (ATSS support) contracts, with close supervision and guidance from FAA, we are undertaking major course redesign work, augmenting field training, and providing a high-level of service and customer support to our facilities.

Established in 2004, ATO Safety strives to improve safety by ensuring that all ATO service units fully integrate safety responsibilities into their services. Our programs are designed to foster a culture of safety at FAA through employee education and the open disclosure of safety issues and concerns. Employees are educated in the areas of risk management/mitigation and the assurance of quality standards. We promote open disclosure by supporting those employees who report safety concerns and encouraging managers to look at "why" events occur as to rather than "who" made the mistakes. ATO Safety supports employee well-being, specifically in the areas of employee safety and fatigue risk mitigation. We work with service units to lead efforts to manage risks, assure quality standards, instill an open culture of disclosure, educate employees, and promote continuous improvement. Our goal is to achieve the lowest possible accident rate and constantly improve safety. To do this, we are making improvements to the NAS as we transition to NextGen. Armed with both qualitative and quantitative data, we systematically identify and address risks in our aviation system. The data collected through our voluntary safety reporting program, the Air Traffic Safety Action Program (ATSAP) enables us to implement a number of safety improvements. As we transition to NextGen, we will be examining the human factors and implement more safety enhancements. We have been able to enhance the air traffic system safety by gathering additional information about accidents and incidents within the NAS. To gather more data, we are making program, metric, and cultural changes within the air navigation service provider arm of FAA, focusing our activities on three themes: 1) collecting more safety data; 2) aligning our approach to safety with our international counterparts; and 3) ensuring the safe transition to NextGen.

Our program conducts the following activities on an on-going basis:

- Improving measurement and analysis of safety performance;
- Reducing total runway incursions;
- Reducing risks in flight by focusing on the most serious losses of standard separation;
- Implementing SMS policy in all FAA organizations;
- Implementing a non-punitive safety reporting system throughout the ATO;
- Improving and leveraging employee safety performance activities within the ATO;
- Identifying and prioritizing operational risks due to fatigue and human factors;
- Communicating and disseminating safety information to further strengthen the ATO safety culture;
- Designing, developing, and establishing policies, plans, processes, and training requirements to implement NextGen SMS requirements; and
- Promoting international activities with the International Civil Aviation Organization (ICAO), Civil Air Navigation Service Organization (CANSO), EUROCONTROL, and other international bodies.

With our people, our processes, and our tools we are increasingly integrating reactive and proactive actions to materially enhance our ability to manage risk and significantly improve the safety and efficiency of the NAS.

Our partners and stakeholders include:

- Other ATO Business Units, Service Units, and Offices
- Other FAA Offices and Lines of Business (LOBs)
- Employee unions
- Chief Learning Officer (CLO)
- Information Technology Executive Board (ITEB)
- Learning Enterprise Architecture (LEA) Steering Committee
- Learning Development Council
- eLearning Training Architecture Group (eLTAG)
- AVS Training Council
- ATO Training Council
- FAA CIO Council
- Office of Inspector General (OIG)
- Office of Management and Budget (OMB)
- Office of the Secretary of Transportation (OST)
- General Accountability Office (GAO)
- Congress
- Aircraft Owners and Pilots Association (AOPA)
- American Association of Airport Executives (AAAE)
- Civil Air Navigation Services Organization (CANSO)
- Air Line Pilots Association (ALPA)
- International Civil Aviation Organization (ICAO)
- National Business Aviation Association (NBAA)

As a cost savings initiative in FY 2010, ATO Safety consolidated seven major contracts into one support contract, the Electronic Federal Aviation Administration Accelerated and Simplified Tasks (eFAST). eFAST provides a broad range of comprehensive professional, technical, and support services including, but not limited to, air transportation support and engineering services. All ATO Safety programs are funded under this contract vehicle. The program areas that have largest costs are Runway Safety, Safety Programs, Safety Analysis and Data Systems, and Comptroller, Planning and Administration.

For Runway Safety, support is required for analysis of runway incursions to identify root causes; implement risk mitigation strategies to reduce the number and severity of runway incursions; and assist in developing, coordinating, and initiating improvements to runway safety. For Safety Programs, support is also required for identifying and reporting trends affecting risks and service quality to ensure employee safety; assisting in managing policy development; assisting in improving employee safety across the ATO; improving fatigue risks through reduction strategies; and implementing a safety culture transformation process to enhance all safety programs, leading to improved safety performance. Within the Safety Analysis and Data System, contract support is required in collecting, analyzing, and reporting aviation and management data to ensure safety and efficiency throughout the NAS; in developing safety performance metrics for future system; in providing data, trend analyses and reports to support NAS risk identification and mitigation in ATO; and in developing requirements and designing systems to implement safety tools for ATO Safety and the ATO.

By the end of FY 2012, the accomplishments for Safety and Technical Training include:

- Achieve at least 650 new hire air traffic controller training completions.
- Develop specific guidance and standards for ATO technical training.
- Complete the full implementation and integration of the Learning Content Management System (LCMS).
- Provide a map of technology options to competencies, skills, and objectives.
- Develop requirements for 100 percent of approved and validated technical training requirements.
- Improving our comprehensive event reporting (new Air Traffic Occurrence Reporting Order, JO 7210.632), as well as our risk reduction (new Quality Assurance (QA) Order, JO 7210.633) and investigation (new Quality Control (QC) Order, JO 7210.634) processes to help us measure the effectiveness of our SMS.
- Deploying better technology and reporting systems. Our current safety performance metrics do not distinguish between improved reporting and a degradation of safety. To address that, the Traffic Analysis Review Program (TARP) and the Comprehensive Electronic Data Analysis and Reporting (CEDAR) capabilities will enable us to develop a more comprehensive system of safety performance measures and risk evaluation.
- Deploying one of the best analytical tools (TARP) to not only measure compliance with safety standards but to also enable digital analysis of radar data throughout the NAS. This sophisticated tool will enable management at all levels to identify safety issues, determine the likelihood of occurrence, target correction, and establish monitoring systems to evaluate the effectiveness of mitigations implemented.
- Continuing to target efforts to significantly remove risk from the NAS with new risk analysis processes, new safety performance metrics (i.e., System Risk Event Rate (SRER), Performance Data Analysis and Reporting System (PDARS)) and tools (i.e., Risk Analysis Process (RAP), Event Review Committee (ERC), Corrective Action Requests (CAR), and Partnership for Safety (PFS)).
- Ensuring integration of safety initiatives at all levels of the ATO.
- Enhancing coordination of safety initiatives with interagency and industry stakeholders.
- Promoting safety programs through effective communications.
- Implementing Just Culture principles that address human behavior and the tools to improve such behaviors.
- Limiting the rate of serious losses of standard separation.
- Expanding runway safety to include runway excursions and runway confusion.
- Obtaining an ISO 9001-2008 certificate and implementing a Quality Management System to support improved product, services, and continuous improvement.

By the end of FY 2013, anticipated accomplishments for Safety and Technical Training include:

- Achieve at least 650 training completions of new hires (Developmentals) to become Certified Professional Controllers (CPC)
- Implement Virtual Classroom Training (VCT) in partnership with the FAA Academy.
- Implement simulation standards for training in the field.
- Make adaptive learning available for 50 percent of technical operations courses.
- Implement ATO instructional design and development guidance/standards.
- Implement guidance on the standardization of all facility training.
- Integrating SMS and Risk Management philosophies, processes, and tools throughout the ATO.
- Reducing the total number of runway incursions, specifically the number of Category A&B (most serious) Runway Incursions.
- Maintaining a National Runway Safety Plan.

- Conducting analysis and disseminate findings on loss of standard separation and provide recommended mitigations to identified causal factors.
- Maintaining and analyzing the System Risk Event Rate to reduce risks in-flight by limiting the rate of most serious losses of standard separation.
- Completing initial ATSAP training to all new air traffic control personnel.
- Continuing to implement voluntary safety reporting programs (VSRPs) of safety-related events and issues from controllers and other employees providing air traffic services.
- Expanding ATO knowledge of safety events through confidential reporting and requests.
- Improving safety performance capabilities and analysis of events through TARP and PDARS.
- Improving safety performance measures and risk evaluation using CEDAR.
- Supporting an FAA-sponsored International Regional Runway Safety Workshop.
- Supporting harmonization of International Runway Safety process and procedures based on research and analysis of emerging technologies.
- Supporting an FAA-sponsored International Runway Safety Summit.
- Continuing to identify operational fatigue risks and develop and recommend fatigue risk mitigations.
- Increasing awareness throughout the ATO on fatigue risks and mitigation approaches.
- Implementing policies, plans, processes, and training requirements to implement NextGen Integrated SRM requirements for the ATO.
- Providing tools used to identify safety issues, principles, and methods to improve team and individual performance via CRM.

3. Why Is This Particular Program Necessary?

FAA's ATO handles 70,000 flights per day and helps transport over 730 million passengers per year, contributing to 5.2 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

The Safety and Technical Training Services is the only organization within FAA that provides the technical training to ATCs, Airway Transportation System Specialists ATSS, and engineers required to perform their duties to the prescribed standards in a safe and efficient manner. Safety and Technical Training provides technical training solutions, applications and infrastructure development, and implementation. This training enables the technical workforce to effectively perform their duties and provide for the safe operation of the NAS.

We are expanding our technological base to meet the growing needs of FAA. Innovative training technology solutions will provide an effective method for improving technical training programs, incorporating existing and emerging learning technologies, and identifying future training technology options.

We ensure the technical competency (knowledge and skills) of the workforce, and ensure that we create enough of the right workers to meet operational needs. We also tightly manage costs (expenditures and productivity), and manage partner and stakeholder relationships to support the mission of the ATO.

Safety and Technical Training ensures the safety and success of the ATO by managing risks, assuring quality standards, instilling an open culture of disclosure, educating employees, and promoting continuous improvement. We identify and mitigate aircraft collision risks during the delivery of air traffic separation services. We are the focal point for auditing safety, quality assurance, and risk identification in the ATO, and reporting findings to improve safety performance. Our office integrates the functions of data and information from investigations, evaluations, independent assessment, safety risk management, runway safety, and operational services in order to identify collision risks, influence their resolution, and provide information on assessments of operational and safety performance within the NAS. The risk associated with runway incursions, loss incidents, failure to report incidents, lack of training, fatigue, human factors, and lack of communication make it imperative we maintain a proactive approach for preventing serious incidents.

The benefits of our program will be manifested in risk reductions. Through risk mitigation, risk management, SMS, and the voluntary reporting system, we will help the FAA accomplish its commitment to the flying public to provide the safest aviation system in the world. The work of ATO Safety benefits the

DOT goal of Safety, and will assist in preventing the loss of human life. Additionally, the benefits will result in a reduction of near misses, collisions, and associated costs.

4. How Do You Know The Program Works?

ATO sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a robust set of metrics. The success of a particular program is determined by assessing its cost, schedule, and performance.

The success of Technical Training is determined by comparing performance to targets in four metrics groupings which are aligned with the mission.

The structure of Safety and Technical Training is designed to enhance organizational performance. Safety and Technical Training is expanding an evaluation and reporting toolset (i.e., monthly metrics reporting and drill down data) to measure organizational training performance.

We have completed certification of nearly 3,600 new professional controllers in a time frame that meets agency Flight Plan goals and with a failure rate that meets acceptable parameters. The FAA Academy offers initial training and contract instructor-led training while on-the-job training (OJT) is offered at FAA facilities. In the past, typical training time for en route and terminal controllers has ranged from 3 to 5 years. However, by adopting improved training and scheduling processes and increasing the use of simulators, we are successfully training controllers within 2 to 4 years. Over the past 3 years, we have achieved all of our FAA strategic plan goals and we anticipate meeting our FY 2013 goals as well.

In the last 12 months, we have made tremendous progress. Some of our accomplishments include:

- Training over 1,200 controllers at a higher success rate of completion over a shorter period of time.
- Adding five new Air Traffic Collegiate Training Initiative (AT-CTI) program schools, including three in the western United States.
- Evaluating all 37 of the Technical Operations CTI schools and reviewing their curriculum to ensure they meet FAA requirements for participation.
- Implementing resource allocation and surveillance tools to control expenditures and optimize budgeting for air traffic controller training.
- Completing the redesign of the En Route initial training course at the Academy to incorporate training on the new En Route Automation Modernization (ERAM) system.
- Designing and delivering a new TRACON supplemental workshop at the Academy to better prepare new terminal controller developmentals.
- Incorporating additional Tower Simulation Systems into training programs at field locations and the Academy.
- Fully training the technician workforce responsible for maintaining NextGen deployment of ADS-B at Houston Center and the Louisville Air Traffic Control Tower.
- Establishing training partnerships with ATO business units, including the bargaining units, to enhance communications on training initiatives throughout the training community.

Safety and Technical Training continues to provide the flying public with the safest aviation system, by continuing to focus on safety culture, outreach, awareness, improved procedures and infrastructure, and technology. Additionally, it ensures all technical employees in every FAA facility are educationally equipped to perform their duties in the NAS. We have become more efficient not only within our office, but our outreach activities and technological advances have also helped improve the way FAA conducts safety as a whole. Further, new groups have been established to help improve technical training programs by exploring new emerging learning technologies, provide future training technology options, and revise existing courses and development.

We have made the NAS safer as follows:

- As of the latest reportable fiscal year, Category A&B Runway Incursions were well below the 0.450 target with a total of 0.117.

- In FY 2008, we established a goal to reduce the total number of runway incursions from 1,009 in FY 2008 to no more than 909 in FY 2013. In FY 2010 there were 966 total runway incursions, 13 fewer than the goal for that year. Factors such as technology, airport signage and markings, air traffic control, and cockpit procedures are constantly changing and introducing new opportunities that challenge the situational awareness of pilots, air traffic controllers, and vehicle operators.
- Airport Surface Detection Equipment (ASDE-X) systems are currently installed at 34 of the 35 designated airports.
- Evaluation systems are operational at four airports (Boston, Dallas-Ft. Worth, Los Angeles, and San Diego) and production system installation began in 2011.
- We reach out to thousands of pilots, airport vehicle drivers, and air traffic controllers every year while conducting/participating in at least 22 of the following: Pilot Seminars, Flight Instructor Refresher Courses (FIRC), Commercial Flight Instructor (CFI)/Designated Pilot Examiner (DPE) refresher courses, Airport Safety Meetings (ASM), Air Traffic Control (ATC) Safety Awareness Initiatives, and major industry conferences or fly-in events.
- We have established a process for conducting risk analysis of losses of radar separation in the NAS, allowing FAA to identify risks in the system and implement mitigations. We have identified several suspected risk trends for mitigation to date.
- We have established three new Quality Assurance (QA) staff offices in each of the ATO Service Areas that will be responsible for conducting risk analysis and event categorization in response to DOT commitments.
- Additionally, Technical Training has undergone an organizational re-alignment to meet the growing training needs of the FAA's technical employees to further enhance the safety of the NAS.
- We are working with Flight Standards to improve the quality of the guidance, training, checking, and compliance and enforcement to improve runway safety.

We have established and met many highly visible performance measures. Our goals are set in support of the DOT Strategic Plan goal of Safety. We have implemented a National Runway Safety Plan, successfully installed Runway Status Lights (RWSL) and ASDE-X systems, and tested low-cost ground surveillance systems at numerous airports. In support of runway incursion reduction, we conducted the first FAA-sponsored International Runway Safety Summit, which was attended by more than 500 people from 17 nations. We have developed and implemented a system to accurately measure reported/detected loss incidents and recommended mitigations to identified causal factors. We are also developing and implementing System Risk Event Rate to improve the measurement and analysis of safety performance by conducting analysis and disseminating findings on loss trends in causal factors and operational environments.

As part of the Administrator's Call-to-Action, we have completed national implementation of the ATSAP, completed initial training to all new ATSS personnel, and completed initial ATSAP training to all new ATC personnel. We have used our expertise in technology to upgrade the TARP "TARP High & Wide" TRIDE Arrival to function on an unmonitored, round-the-clock basis, with centralized reporting, making suspected loss of separation alerts automatically distributed to appropriate staff via the CEDAR platform. Additionally, through our technology, we continue to refine and implement enhanced safety metrics for runway safety and losses of IFR within the international aviation community.

The Safety and Technical Training program is effective and has contributed to numerous improvements across the NAS, as documented in the following examples:

- Establishment of the FAA Safety Risk Management Tracking System that tracks and monitors mitigation of hazards. The system allows us to share data throughout the FAA, thereby eliminating duplication of effort.
- Incorporation of our safety-related data requirements into the ATO Business Intelligence software, "Business Objects," to perform trend analysis, report back to the field, assist in the development of metrics, and verify safety concerns. This had reduced the time needed to gather, analyze, and report safety information.
- Contributed to the building of trust, understanding, and cooperation at the front-line level of FAA through CRM training at 33 facilities in FY 2010 and a total of 94 facilities through January 2011.
- Heightened awareness and understanding of employee safety by policy dissemination, training, and audits.

- We have trained senior leadership, General Counsel's Office representatives, a facility management team, all ATSAP ERC members, the System Operations Flight Services Safety Summit on Just Culture; briefed SMS classes, Supervisor's Committee (SUPCOM) classes, FAA Managers Association on safety culture leadership classes, and new employees on safety culture, creating a demand throughout the agency for more training to achieve a positive safety culture. The ultimate outcome of this training is the organizational change needed to create an "informed culture" where risks are identified early and accidents and incidents are prevented.
- We presented the ATO Fatigue Risk Management program to the Aerospace Medical Association, a gathering of clinical health care directors, physicians, scientists, and nurses from the armed services, civil and military aviation, and industry, which care for the total civilian flying population on a daily basis. Many in attendance benefited from the increased awareness and understanding of fatigue risk.

Continuous Safety Improvement

In an effort to maintain and improve safety performance, ATO Safety realigned its resources and talent to support new priority programs. We estimate improved efficiencies in the following areas based on the realignment:

- Programs to increase safety culture and engage the workforce in developing and suggesting safety improvement;
- Better analyses to support QA/Quality Control – our critical function of measuring and trending safety performance;
- Consolidation of SMS promotion and SRM into Operational Services;
- Reduced risk of runway incursions through partnerships between FAA and stakeholders, enhanced root cause analysis of incidents, investing and implementing new technologies, and seeking international harmonization of standards for NextGen transformation;
- Increased ability to ensure internal/external coordination and effective SMS integration and review of safety products; and
- Studies in human error and establishing improvements to identify causes and contributing factors of errors.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Safety and Technical Training creates individual and organizational competency for our technical workforce at the lowest cost and with a focus on people. We achieve competency by providing the right training content to the right people at the right time. Attaining and maintaining the technical competence of the FAA's technical workforce (a critical aspect of the NAS) requires an appropriate amount of training resources and support.

Funding of Safety and Technical Training programs at the requested level will provide the necessary resources to ensure that air traffic facilities are safely staffed with the optimum number of competent qualified individuals. Air traffic controllers, ATSS, and NAS engineers begin their technical training at the FAA Academy in Oklahoma City, OK, and become certified at their facilities. This training is designed, developed, and delivered by a combination of government employees and contractors. Large contracts, such as the ATCOTS and Keybridge, support technical training efforts both at the Academy and in the field.

Safety and Technical Training is leading efforts to modernize and reduce costs for FAA's training delivery methods from instructor-led classroom training, new emerging Mobile Learning technologies to high fidelity simulation. The FAA's goal is to ensure the agency has the flexibility to match the number of controllers needed at each facility with traffic volume and workload; therefore training is essential if FAA is to maintain the air traffic controller workforce within 2 percent of the projected annual totals in the Air Traffic Controller Workforce Plan.

Through the application of newer adult learning principles and advanced learning technologies, the FAA could save millions of dollars on its technical training efforts. For example, the incorporation of web-based learning technology would reduce instructor support required, allow students better methods of retaining knowledge, and shorten training time. However, this requires a vast information technology network of integrated learning centers throughout the Nation's air traffic facilities. Use of low and medium fidelity simulations would also reduce instructor headcount and provide opportunities for students to accomplish the repetition required for learning crucial technical skills on their own and at a faster pace.

Funding of Safety and Technical Training programs impacts the development and implementation of NextGen. Controllers and technicians need significant training to operate and maintain NextGen systems. Safety and Technical Training is working in partnership with the NextGen program office to ensure that training is an integral part of the transformation of the NAS and in the development and implementation of NextGen systems.

Our involvement includes:

- Participating in the identification, development, and installation of needed infrastructure and software for training tools at the facility level;
- Determining how new capabilities will affect air traffic controllers' and technicians' workload;
- Coordinating demonstration activities to ensure the training capability meets its intended benefits; and
- Participating in changes to orders and policies that affect training requirements.

Safety and Technical Training manage and execute their core business operations by evaluating a variety of measures to assess individual and organizational competency, cost, and people. We are continuing to develop systems to track and measure our progress. Individual competency measures assess knowledge and skills of both students and qualified technical workforce. Organizational competency measures evaluate the volume and speed that we train our workforce to certification. Both of these competency measures and cost would be positively impacted through fully funding FAA technical training initiatives. Our ability to provide training to the technical workforce is essential to succession planning as well as the safe and effective operation of the NAS.

Safety and Technical Training is delegated the primary responsibility for safety assurance within the ATO to ensure that all ATO service units integrate safety responsibilities into their provision of service. Safety and Technical Training also works with operational service units to lead ATO efforts to manage risks, assure quality standards, instill an open culture of disclosure, educate employees, and promote continuous improvement. Responsible for identifying and mitigating aircraft collision risks during the delivery of air traffic separation services, ATO Safety is the focal point for:

- Applying the ATO's SMS principles.
- Auditing safety, quality assurance and quality control in the ATO, and reporting findings to improve safety performance.
- Integrating the functions and information of risk reduction, investigations, evaluations, independent safety assessments, safety risk management, runway safety, and operational services, in order to identify collision risks and influence their resolution.
- Providing information on assessments of operational and safety performance within the NAS.
- Working with the Associate Administrator for Aviation Safety and other external entities undertaking special projects in support of increasing the safety of the NAS.

Safety and Technical Training strives to achieve the lowest possible accident rate and constantly improve safety by ensuring that all ATO service units integrate safety responsibilities into their provision of service as improvements are made to the NAS as we transition to NextGen. Our programs are designed to foster a culture of safety at the FAA through employee education and by encouraging open disclosure of safety issues and concerns. Employees are educated in the areas of risk management/mitigation and the assurance of quality standards.

As we transition to NextGen, Safety and Technical Training will continue to provide both qualitative and quantitative data that systematically identifies and addresses risks in our aviation system. We also play a major role in supporting enhancement of the air traffic system safety by gathering additional information about accidents and incidents within the NAS. To gain more data, we are making program, metric, and cultural changes within the air navigation service provider arm of the FAA, focusing our activities on three themes:

- Collecting more safety data;
- Aligning our approach to safety with our international counterparts; and

- Ensuring the safe transition to NextGen.

The data collected through our voluntary safety reporting program, ATSAP, enables us to implement a number of safety improvements and provide a better understanding of what factors contributed to loss of standard separation and mitigation strategies to prevent future incidents. As we transition to NextGen, Safety and Technical Training will be examining the human factors, and expect to see and implement more safety enhancements. We will be able to enhance the air traffic system safety by gathering additional information about accidents and incidents within the NAS.

Safety and Technical Training directly supports the DOT's Safety goal of reducing transportation-related injuries and fatalities and Workplace of Choice. This organization is the lead for DOT's Priority Performance Goal – Reduction of Runway Incursions. We have and will continue to provide the flying public with the safest aviation system ever. We strive to continue focusing on safety culture, outreach, awareness, improved procedures and infrastructure, Technical Training, and new, emerging technology for Mobile Learning. We have become more efficient not only within our office, but our outreach activities and technological advances have also helped to improve the way FAA conducts training and safety as a whole.

Detailed Justification for the Vice President for Mission Support Services, AJV-0

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Mission Support Services – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Mission Support Services	$275,860	$278,361	$279,339	$978

The FY 2013 budget request for Mission Support Services is $279,339,000 and 1,307 FTP / 1,337 FTE. Mission Support Services is comprised of the three service centers (Eastern, Central, and Western), Airspace Services, Aeronautical Information Management, Aeronautical Products, Litigation, Comptroller and Planning Services, and Administration. This increase includes $10,000,000 for the acceleration of Performance-Based Navigation (PBN), $671,000 for the government-wide pay raise and $688,000 for one additional compensable workday.

Funding the FY 2013 request at this level will allow Mission Support Services to support the FAA's transformation of the National Airspace System (NAS) under the Next Generation Air Transportation System (NextGen) by accomplishing the following objectives:

- Continue to develop and implement integrated procedures for PBN, incorporating airspace redesign, and environmental analysis, with the goal of meeting Radio Technical Commission for Aeronautics (RTCA) Taskforce 5 recommendations and expediting Optimization of Airspace and Procedures for Metroplexes (OAPM) NextGen capabilities.
- Begin implementation of the Navigation Procedures Implementation Plan (NAV Lean) to streamline and accelerate the internal processes necessary to implement Instrument Flight Procedures (IFP) requests.
- Conduct design and modeling for Stage 3 of the New York/New Jersey/Philadelphia (NY/NJ/PHL) Airspace Redesign Project and implement initial portions of Stage 3 of the Chicago Airspace Project, changing westbound departure routes.
- Implement PBN by continuously developing and implementing Area Navigation (RNAV) Q, Tango (T) and TK routes, Standard Instrument Departures (SIDs), and Standard Terminal Arrivals (STARs), and Area Navigation (RNAV)/Required Navigation Performance (RNP) instrument approach procedures.
- Continue to develop policies and procedures to assist in the integration of Unmanned Aircraft Systems (UAS) into the NAS.
- Complete the Aeronautical Information Data Store Enhancements to improve the accuracy and timeliness of information on Special Activity Airspace and Airport data. Complete the Aeronautical Information Exchange Model (AIXM) for Special Activity Airspace management of digital information for efficiency of air traffic management and scheduling automation as part of the NextGen technologies.
- Demonstrate capture and dissemination capabilities for digital aeronautical information, which will result in relevant information being converged into the common operating picture of the NAS.
- Complete deployment of the Notices to Airmen (NOTAM) Manager of NOTAM, Aeronautical Information Management Modernization, to public use airports.

Key outputs and outcomes expected to be achieved in the budget year with the requested resources:

- Achieve an average daily airport capacity for the seven metropolitan areas of 39,484 arrivals and departures by FY 2009 and maintain through FY 2013.
- Finalize stakeholder scope agreements for all new Operational Initiatives.
- Sustain adjusted operational availability of select terminal equipment at 99.7 percent for reportable facilities. Provide technical and scheduling support for air traffic control towers and terminal radar approach control sustainment and/or modernization and for initiation of two construction awards.
- Modernize Aeronautical Information Management (AIM) services to deliver accurate and timely digital aeronautical information, products and services to customers, including NOTAM, improved information

on restricted and regulated airspace, and special activity airspace information collection and management capabilities.

- Implement Simultaneous Non-Interfering (SNI) operations to deconflict flight paths within terminal airspace between arriving helicopters and fixed-wing aircraft.
- Provide guidance, oversight, and coordination in the development and implementation of RNAV helicopter routes.
- Reduce the number of aviation related accidents through collection, dissemination, and aggressive management of NAS Information.
- Reduce risks in-flight by limiting that rate of the most serious losses of standard separation to 20 or fewer for every thousand (.02) loss of standard separation within the NAS.
- Respond to inquiries and establish data trends to target areas for process quality and quantity improvement and improve lines of communications between Service Center points of contact and headquarters.
- Support the Directors of Operations through the application of the Safety Risk Management (SRM) Program, conducting management evaluations, and serving as the service area coordinator for Unsatisfactory Condition Report (UCR) tracking.
- Support service unit initiatives to sustain and improve the NAS by implementing the Corporate Work Plan and related service center tools.

2. What Is This Program?

Mission Support Services is comprised of a number of subordinate directorates (Airspace Services, Aeronautical Information Management, Aeronautical Products, Litigation, Comptroller and Planning Services, and Administration) that provide shared services which promote standardization of processes, efficiency and effectiveness while achieving results for the following service units: En Route and Oceanic, Technical Operations, Terminal, and System Operations. This includes FAA headquarters programs for air traffic rules, policies, and standards for airspace structure, design and allocation; obstruction evaluation; air traffic environmental policy; expediting the implementation of optimized airspace and procedures; the management of UAS operating authorizations; the design and implementation of RNAV/RNP procedures; air traffic procedures development; instrument flight procedures production/charting; support for litigation and enforcement activities; and aeronautical information management.

Mission Support Services is also responsible for three Service Centers located in Atlanta, Dallas, and Seattle that provide support to the Directors of Operation in matters concerning airspace and procedures, quality assurance, equipment installation, hiring and training. Each service center is comprised of five groups: Administrative Services, Business Services, Planning and Requirements, Operations Support, and Quality Control. The shared services model brings people together with similar expertise, allows sharing of ideas and resources, fosters collaboration to improve processes, and enhances communication among service units.

Our partners and stakeholders include:

- Department of Defense (DOD)
- Department of Homeland Security (DHS)
- National Aeronautics and Space Administration (NASA)
- Joint Planning and Development Office (JPDO)
- Aviation industry
- Aviation community
- State and municipal governments
- National Transportation Safety Board (NTSB)
- International Civil Aviation Organization (ICAO)
- EUROCONTROL

In FY 2012, the Mission Support Services Unit began integrated airspace design and associated activities, including traffic flow analysis and facilitated design and procedures optimization commonly referred to Optimization of Airspace in the Metroplex (OAPM). This effort will lay the framework for accelerating future PBN initiatives, taking a systems approach for airspace design and procedure implementation.

Airspace and procedure integration provides an important systems view that: utilizes additional transition access/egress points not tied to ground-based navigation aids; considers concurrent development and implementation of arrivals and departures, ensuring an integrated approach to procedural optimization; decouples operations between primary and secondary/satellite airports serviced by complex terminal airspace; and develops high altitude routes through congested airspace better connecting major metropolitan areas.

Implementation of PBN based routes and procedures will continue to address the RTCA Taskforce 5 recommendations, maximizing benefits, and accelerating NextGen concepts at other locations within the NAS as well.

The FAA will also focus on tools acceleration to include additional applications of existing specialized tools and improved obstacle evaluations. Training development efforts will focus on Flight Standards and air traffic control (ATC) workforce training on the application of new routes and procedures.

AIM is developing an integrated aeronautical information management system by creating mechanisms for aeronautical exchange between providers, stewards and distributors within the aviation authority and external aviation data users. Our FY 2012 and near-term efforts will deliver global digital aeronautical information and manage the information for increased capacity, efficiency, and predictability in the airspace, routes, and airports of the NAS.

Aeronautical information services must evolve at an accelerated pace to meet air transportation demands to capture and disseminate digital aeronautical information. The AIM Modernization Program has been created to advance the collection and dissemination of aeronautical information through the development of near real-time processing and data exchange methods.

At the end of December 2011, the new NOTAM manager was activated in 42 Core and Metroplex Airports, which has significantly improved the accuracy and timeliness of the information on temporary changes to the airspace, such as hazards, restrictions, and obstructions, for pilots and air traffic control. Enhancements have been implemented for the Centralized Altitude Reservations Function for military airspace scheduling.

The Common Status and Structure Data Program has been initiated as a NextGen program to provide the integration of comprehensive flight planning and pilot briefing services, on-demand NAS operational performance information and integrated airspace management for shared situational awareness and trajectory based operations. The initial Common Status and Structure Data services are being demonstrated with digital airport data in 2012. As NextGen programs, AIM Segment 2 will automate the coordination of Special Activity Airspace and airport data, and AIM Segment 3 will provide for collection of digital aeronautical information to be converged into a common operating picture of the NAS.

The Weather Camera Program in Alaska provides near real-time camera images, updated every 10 minutes to pilots for situational awareness, pre-flight planning, and en route weather briefings for reduction of weather related accidents. In 2012, 24 additional weather cameras will be installed and services made available to the public.

By the end of FY 2012, the accomplishments for Mission Support Services will include the following:

- Complete NOTAM Search ATC (baseline) Safety Case for the NAS.
- Demonstrate the capability for collection of all Core Airports.
- Provide initial development and implementation of flight plan update and graphics enhancement for new ICAO flight plan requirements.
- Deliver the replacement Central Altitude Reservation Function (CARF) system.
- Ensure the FAA participates in at least 75 percent of the International Civil Aviation Organization (ICAO) Aeronautical Information Service (AIS) to AIM working group meetings.
- Demonstrate the initial Common Status and Structure Data services with digital airport data.
- Deliver screening information request (SIR) for AIM Segment 2 development contract for final investment decision.
- Conduct design and modeling for Stage 3 of the NY/NJ/PHL Airspace Redesign Project.
- Continue design of Q-routes between Metroplex areas.

- Assess new Westgate routes for New York metro area implemented as part of the NY/NJ/PHL Airspace Redesign.
- Complete installation and make services available to the public for 24 additional weather camera sites.
- The Terminal Procedures Publications Group will develop and publish 500 WAAS LPV/LP procedures.
- Provide technical and scheduling support for Airport Traffic Control Tower (ATCT)/Terminal Radar Approach Control (TRACON) sustainment and/or modernization.
- Develop Surface Errors Reduction plans.
- Develop Certificate of Waiver or Authorization (COA) compliance policy for UAS flight in the NAS.

By the end of FY 2013, the anticipated accomplishments for Mission Support Services will include the following:

- Coordinate required ATO support to the New York Area Program Integration Office for ATO Matrix team representation. Assist development of stakeholder scope agreements and further develop the Delay Reduction Plan.
- Meet 90 percent of the NextGen critical milestones for implementation of near- and mid-term capabilities on schedule and on budget.
- Capitalize new assets within 65 days of being placed in service 95 percent of the time and support a review and validation of certain FAA capitalized personal property assets.
- Support ATO service units managing hiring plans, personnel and position movements, strategic planning and analysis of staffing requirements, objectives, and programs.
- Meet technical and administrative discipline needs with customer-defined learning plans.
- Use trending data to target areas for process, quality, and quantity improvement.
- Support service unit initiatives to sustain and improve the NAS by implementing projects as scheduled via the Corporate Work Plan and related service center tools.
- Formalize a proactive approach to system safety for all NAS changes, ensuring the mitigation and acceptance of identified hazards and unacceptable risks prior to making changes.

Safety:

- Provide third parties with the ability to design, flight check, and implement RNP approach procedures with FAA providing safety oversight.
- Provide operational access to Unmanned Aircraft System (UAS) in the current NAS structure by processing COAs.
- Develop Aeronautical Information Data Store enhancements for Special Activity Airspace management and airport data.
- Complete AIXM enhancements for special activity airspace management and airport data.
- Demonstrate limited Airports Data Management capabilities.
- Demonstrate limited Special Activity Airspace schedule collection capability.
- Complete installation and make operational an additional 25 weather camera sites for a total of 215 sites in Alaska.
- Complete deployment of the NOTAM Manager to public use airports at 90 percent.
- Produce digital NOTAMs at a production grade on a monthly percentage of greater than 90 percent.
- Complete development and deliver operational system of NOTAM Search ATC.
- Achieve and implement International Standards Organization (ISO) for digital NOTAM services.
- Continue implementation of plan to provide ICAO flight plan requirements and digital enhancements.

Economic Competitiveness:

- With regards to RTCA Taskforce 5 recommendations, develop and implement PBN routes and procedures, including RNP, RNAV, and Optimized Profile Descent (OPD) to expand development, based on targeted benefits.

3. Why Is This Particular Program Necessary?

FAA's ATO handles 70,000 flights per day and helps transport over 730 million passengers per year, contributing to 5.2 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

The Mission Support Services mission is to achieve results for the ATO service units by promoting standard processes, efficiency, and effectiveness through shared services. Core competencies support the following activities:

- Standardized administrative services;
- Financial, material, procurement, and logistics;
- Integrated planning, requirements, and program implementation management;
- Oversight of NAS procedures and changes affecting NAS operations and special activities; and
- Inspections, evaluations, safety risk management, accident and incident information gathering, and reporting services.

The Mission Support Services organization:

- Authorizes UAS operations in the NAS and to ensure that UAS flights do not compromise the high level of safety for other aviation, the public, and people and property on the ground.
- Conducts aeronautical studies to evaluate the effect of the construction or alteration on air traffic operating procedures; determine the potential hazardous effect of the proposed construction on air navigation; identify mitigating measures to enhance the safe and efficient use of the navigable airspace; and recommend marking and lighting configurations as well as charting of new objects to enhance pilot conspicuity.
- Develops and implements PBN routes and procedures that leverage emerging technologies and aircraft navigation capabilities. PBN is comprised of RNAV and RNP and describes an aircraft's capability to navigate using performance standards. RNAV enables aircraft to fly on any desired flight path within the coverage of ground- or spaced-based navigation aids, within the limits of the capability of the self-contained systems, or a combination of both capabilities. As such, RNAV aircraft have better access and flexibility for point-to-point operations.
- Redesigns airspace to improve flight efficiency. Airspace redesign and procedure development are targeting congested airspace areas such as Chicago, North Texas, Houston, Las Vegas, Southern California, and New York. Development efforts will include analysis and simulations, assessments of alternatives, and modeling of projected airspace and procedures.
- Develop an integrated aeronautical information system for digital data exchange that provided a common source of information of international standards supporting NexGen's tactical and strategic situational awareness.

4. How Do You Know The Program Works?

ATO sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule, and performance.

The "shared services environment" concept, under which many ATO processes have been standardized and regional resources consolidated, was the primary driver behind creating the service centers. As a result, we anticipate considerable cost savings over time. Pre-deployment estimates suggested an estimated savings of $360 million over a 10-year period. The Service Center roll-out took place in FY 2006; to date, a net savings of nearly $252 million has been realized.

The Mission Support Services' Airspace Management Program (AMP) provides a list of contributions to air traffic redesign to improve traffic flow. AMP completed an airspace study for the proposed Southern Nevada Supplement Airport including analysis, modeling and simulation, quantifying capacity, throughput, and delay; the initial report released in FY 2010 was adjusted due to operational concerns and finalized in February 2011 AMP designed routes and procedures supporting near-term enhancements at Las Vegas (LAS), referred to as LAS Optimization. Airspace sector modifications (for LAS Optimization) have been evaluated and modified by AMP and the environmental assessment should be completed in FY 2012.

AMP also delivered the Chicago Airspace Project facility design. Collaboration with industry via simulation resulted in a design with associated "profile descent" from Flight Level (FL)270 to Chicago Center's entry point at 12,000 feet. The designs of West departure routes off Orlando, Chicago O'Hare (ORD), and Midway (MDW) have been completed. The designs allow ORD and MDW departures to file any of the four initial routes instead of mandatory planned departure routes (PDRs) or "city pairs" assignments, letting users file for routes that will reap the benefit of "favorable winds" and fuel savings.

Other accomplishments made by AMP include: the completion of stakeholder meetings and the issuance of an airspace analysis for North Texas Airspace Review; completion of the Nevada Supplemental Airport (SNSA) airspace study and technical report; and finalization of LAS Optimization design and airspace agreements.

The FAA, in its firm commitment to provide end-to-end PBN capabilities in the NAS, has already developed and implemented 465 RNAV SIDs/STARs; 296 RNAV routes; and 305 RNP AR instrument approach procedures. The use of these procedures has already provided significant financial benefits to the airlines while enhancing the navigational safety and efficiency. The benefits continue to improve with the increased use of these procedures and as these procedures are repeatedly amended to meet the user needs. Currently, multiple PBN integrated projects are underway that would result in more than 190 new RNAV SIDs/STARs, 15 or more Q and T routes, and more than 110 new RNP AR procedures in the next 12-18 months.

In the fall of 2010, the FAA initiated two "prototype" Optimization of Airspace and Procedures for Metroplexes (OAPM) study teams for the Washington, DC and North Texas metropolitan areas. Those prototype study teams were used to exercise the study team approach and provide lessons learned to be applied at other sites. In FY 2011, five additional OAPM study teams completed studies at Charlotte, Northern California, Houston, Atlanta and Southern California. Design and implementation efforts are underway at two sites and four additional sites are set to begin in FY 2012. The OAPM initiative is expected to be a multi-year activity that will bring PBN based airspace and procedure solutions to many major airports by 2017.

In FY 2013, Mission Support requests $10,000,000 for the acceleration of PBN. The request provides funding for the following:

- OAPM $6,185,000 for travel and overtime to support the following activities:
    - Initiate analyses and studies through established study team processes at two Metroplex locations focusing on expediting integrated PBN procedure development coupled with airspace design to optimize benefits;
    - Initiate Design and Evaluation at four Metroplex locations; and
    - Initiate final pre-implementation/development work at three Metroplex locations with integration into NAS operations by the end of the fiscal year.

- NAV Lean $3,850,000 support:
    - Improve and streamline all processes used to request, prioritize, develop and implement instrument flight procedures (IFP). This initiative, known as the Navigation Procedures Implementation Plan (NAV Lean), will accelerate OAPM projects and NextGen by improving efficiency and production time for all IFPs.

Mission Support continues to participate in the UAS Executive Committee (EXCOM), an interagency group consisting of the Department of Defense, Department of Homeland Security, FAA, and National Aeronautical Space Administration (NASA) that focuses on the safe and efficient integration of UAS into the NAS. The service unit also completed four UAS international meetings working towards global harmonization of UAS operations criteria and procedures.

The Aeronautical Information Management Modernization Segment 1 Program implemented the digital NOTAM System at Atlantic City (ACY). ACY, located at the FAA's William J. Hughes Technical Center, is the first in the NAS to deliver digital NOTAMs, which provide computer-generated safety information to pilots and air traffic controllers about conditions at an airport such as construction and hazards. As of the first quarter of FY 2012, 42 airports are using the NOTAM Manager. The initial Centralized Altitude Reservations Functions capability and integration was completed for military airspace.

In Alaska, Aeronautical Information Management's Weather Camera Program installed and made services available to the public for 24 additional weather camera sites in FY 2011. In FY 2012, 24 additional weather camera sites are being installed, continuing efforts to supply visual meteorological information to pilots to reduce weather-related accidents from a baseline level of 0.28 to no more than 0.15 accidents per 100,000 operations within the State of Alaska.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The Mission Support Services mission is to promote the standardization of processes, efficiency, and effectiveness among ATO service units in En Route and Oceanic Services, Terminal Services, Technical Operations, and System Operations through shared services. The service unit's core work is performed at the three service center locations (Western, Eastern, and Central). Core work includes providing:

- Standardized administrative support services;
- Financial, material, procurement, and logistical support services;
- Integrated planning, requirements management, and program implementation management support services;
- Oversight and support for NAS procedures and changes which affect operations and special activities with the NAS; and
- Inspections, evaluations, safety risk management, accident and incident information gathering and reporting services, and support for NAS procedures and changes which affect operations and special activities with the NAS.

Funding requested in the FY 2013 submission will fund continued Mission Support Services contributions in the transition to NextGen. Funding will allow for continued development of PBN criteria and procedures, enabling performance-based procedures for Automatic Dependent Surveillance – Broadcast (ADS-B) equipped aircraft. A reduction in the requested funding will slow down delivery of these necessary procedures, thereby slowing implementation of NextGen capabilities to aircraft and the flying public.

Funding will facilitate implementation of the NAV Lean recommendations to include a streamlined version of the current core process (request, design and development, approval, implementation, and maintenance). Additionally, auxiliary processes, such as Safety Management System (SMS), environmental, and operational approval have recommendations aligned with this effort. The overall process will be better managed by having all Instrument Flight Procedure (IFP) requests submitted through an authorized Web-based portal established as the entry point into a system for processing, tracking, and managing the IFP development life cycle.

Funding will allow continued development of cornerstone documents and research needed for the integration of UAS into the NAS. A reduction in requested funding will delay execution and development of required research and documents to enable progress from accommodation to integration of UAS into the NAS.

The funding requested in FY 2013 in Aeronautical Information Management is to support two NexGen initiatives:

- Automating the coordination of Special Activity Airspace information and airport data and
- Providing integrated pilot briefings, on-demand NAS operational performance information, and airspace management for situational awareness and trajectory based operations.

A reduction in requested funding would delay the development of an intrinsic component, integrated aeronautical information, which provides the information and service foundation to deliver NexGen operational capabilities.

FY 2013 requested funding for the Weather Camera Program is to complete the 215 camera sites for service to the public, which would otherwise be delayed until funding could be obtained.

The requested levels of FY 2013 operations funding will pay the salaries of those personnel assigned to the three service centers. This will allow for continued work to more efficiently support air traffic operational service units.

Detailed Justification for Vice President Program Management, AJM-0

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Program Management Services – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Program Management Services	$0	$631,752	$631,752	$0

FAA's Program Management Organization (PMO) request is $631,752,000 and 668 FTP / 668 FTE. The creation of the PMO is based on an internal FAA transfer of programs and staffing from En Route and Oceanic Services, Terminal Services, Technical Operations and System Operations. The PMO is requesting $350,000 for the government-wide pay raise and $359,000 for one additional compensable workday.

Funding the FY 2013 request at this level will allow Program Management to support the FAA strategic plan initiatives for:

- Focus on the continued production of Wide Area Augmentation System (WAAS)/Localizer Performance with Vertical (LPV) Guidance or Localizer Performance (LP) Instrument Approach Procedures. Activities include: funding and delivering airport surveys to Mission Support Services and funding associated for flight inspection services provided by Aviation System Standards.
- Conduct procedures development and charting services to Mission Support Services and funding for flight inspection services to Aviation System Standards. Provide for production of Area Navigation (RNAV) Global Positioning System (GPS) LPV/LP procedures and RNAV GPS instrument approach procedures with LPV/LP/lateral navigation (LNAV) minimums, RNAV GPS instrument approach procedures with LPV/LP/LNAV minimums to runways in Alaska, and RNAV GPS WAAS Route Structures.
- Improve services at Commercial Aviation Safety Team (CAST) and non-CAST locations by ensuring service availability for Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR), High Intensity Approach Lighting System With Sequenced Flashing Lights (ALSF-2), Runway End Identifier Lights (REIL), Runway Visual Range (RVR) systems, upgrading Alaskan Satellite Telecommunications Infrastructure, National Engineering Support to assist with system optimization, engineering services to complete engineering at selected Airport Surface Detection Equipment-Model X (ASDE-X) sites, and improving all Runway Safety Area (RSA) Navigation Aids (NAVAIDs) at certified airports. Assist in establishing/enhancing infrastructure in support of National Airspace System (NAS) – wide common platform for the detection and reporting of suspected loss of standard separation events in the En Route, Terminal, and surface environments.
- Acquire Alaskan Satellite Telecommunication Infrastructure (ASTI) in accordance with the FAA Acquisition Management System (AMS). Continue activities for ASTI Tech Refresh including engineering and integration work efforts and upgrade of satellite communications equipment at 64 facilities.
- Acquire and replace Terminal Doppler Weather System (TDWR) Radom and Radar Data Acquisition Retrofit Modification as part of Service Life Extension Program (SLEP).
- Continue acquisition and deployment of WAAS, NAS Voice System (NVS), System Wide Information Management (SWIM), Data Communication System (DataComm), and Next Generation Distance Measuring Equipment (DME) programs.
- Develop Security Certification and Accreditation Packages (SCAPs), manage contracts, and maintain the Federal Telecommunications Infrastructure (FTI).
- Continue development and deployment of new Collaborative Air Traffic Management Technologies (CATMT) capabilities in support of Collaborative Decision Making (CDM). These capabilities reduce traffic delays associated with disruptive events in the NAS, such as severe weather, NAS equipment outages, and excessive traffic volume.
- Continue to consolidate Flight Services from three separate programs into a single service entity via the Future Flight Service Program (FFSP). This single contractual vehicle will lead to future cost savings and increased efficiency.

- Execute a Traffic Flow Management (TFM) System Technical Refresh program.
- Procure and install replacement hardware for TFMS Technical Refresh at the TFM Processing Center (TPC) at the William J. Hughes Technical Center (WJHTC). The refresh will prevent hardware obsolescence and performance degradation.

Key outputs expected to be achieved in the budget year with the requested resources:

- Fund the production of 500 WAAS approaches and formulate two lists of 400 runway ends each which require new airport obstruction surveys.
- Support achieving full operational capability of WAAS by completing all hardware and software changes needed to complete WAAS operational capability.
- Continue development of CATMT Work Package (WP) 2 and CATMT WP3 enhancement capabilities. CATMT WP2 will develop Collaborative Airspace Constraint Resolution (CACR), provide increased automation support to identify and resolve airspace congestion with increased planning capabilities and allowance of user preferences. CATMT WP2 will also initiate design of Airborne Reroute Execution (ABRR), which provides the ability to electronically send TFM generated airborne reroutes to en route control facility automation for ATC execution. CATMT WP3 will make software infrastructure changes which will allow airlines to switch to the FAA's Traffic Situation Display. The enhancement will provide improved performance, collaboration and decision support capability, and shared situational awareness to the user community.
- The TFM System Technical Refresh program will procure and install replacement hardware at the TPC at the WJHTC. In FY 2012 the refresh will complete hardware replacement of the TFMS legacy application National Traffic Management Log (NTML).
- Implement modifications to HOST and En Route Automation Modernization (ERAM) systems to establish a common platform for the detection and reporting of suspected loss of standard separation events.
- Maintain service availability of automation platforms by providing sufficient second-level engineering and supply support for critical operational systems, such as: En Route Communications Gateway (ECG), ERAM, User Request Evaluation Tool (URET), Advanced Technologies and Oceanic Procedures (ATOP), En Route Information Display (ERIDS), Display System Replacement (DSR), Enhanced Back-Up Surveillance (EBUS), Micro En Route Automated Radar Tracking System (MEART), and HOST.
- Improve Oceanic fuel efficiency per passenger seat for select city pairs and similar fleet by an average savings of 1 percent compared to the previous fiscal year's 2 year rolling average.
- Develop Oceanic fuel burn performance metric for FY 2013 and beyond.

Key outcomes expected to be achieved in budget year with the requested resources:

- Sustain adjusted operational availability of en route equipment at 99.7 percent for the reportable facilities that support the Nation's Core Airports Economic Competitiveness.
- Meet 90 percent of all Next Generation Air Transportation System (NextGen) acquisition milestones on schedule and at or below original budget while continuing to expand FAA's NextGen Implementation Plan to incorporate critical path decisions and milestones necessary to accomplish the mid-term commitments.
- Continue to sustain the adjusted operational availability of select terminal equipment at 99.7 percent for the reportable facilities that support the Nation's Core Airports through FY 2013. Accomplish this by maintaining the operation of the NAS Terminal environment by sustaining the terminal automation systems of towers and Terminal Radar Approach Controls (TRACONs) to meet target levels of performance.
- Lead the evaluation and expansion of the use of Converging Runway Display Aids (CRDAs) at airports with intersecting runways.

2. What Is This Program?

The Program Management Organization (PMO) supports the Department of Transportation's (DOT) Strategic Plan's: Provide full life cycle program management capability across all of the ATO from initial definition, through design, development and effective deployment of both NAS sustainment and NextGen modernization systems.

The PMO is made up of the following directorates:

- System Integration and Requirements Analysis Directorate
- Air Traffic Systems Directorate; and
- Enterprise Services Directorate.

The System Integration and Requirements Directorate analyzes NextGen operation capabilities, along with shortfalls and needs as stated by operations in order to define system alternatives and assist in prioritizing potential implementations. SIRA acts as the front end integrator for the programs directorates and defines system portfolios consistent with the NextGen Operational portfolios. These portfolios define inter-related investments targeted at operational capabilities that improve, extend and replace existing systems in order to increase safety, efficiency and capacity of the National Airspace System.

The Air Traffic Systems Directorate develops, acquires, deploys, maintains, sustains, and improves automation, surveillance and decision support systems that provide aircraft separation assurance and system-wide efficiency through flow control. We have approximately 12,000 pieces of equipment to maintain air traffic control operations utilizing complex voice and data switching equipment, radio and microwave transmission systems, local and remotely-located radio, and radar systems. Headquarters and Technical Center employees are responsible for sustainment management, engineering, production, logistics, testing, training, and systems and procedures implementation. Since the mid-1990s, we have fielded modern air traffic control, communications, display, and weather systems for controller use. Major acquisition programs such as ERAM and Automatic Dependent Surveillance-Broadcast (ADS-B) are replacing yesterday's equipment with flexible, resilient, scalable, and adaptive systems that will provide the platform for the NextGen. In addition, new en route separation standards, navigation procedures, and innovative routing are reducing flight time and saving fuel. Our efforts are also reducing airspace congestion. We are saving money for air carriers and general aviation, reducing delays for passengers, and decreasing airplane emissions.

Enterprise Services Directorate develops, acquires, deploys, maintains, sustains, and improves navigation, communications, weather and aeronautical information products and services for the NAS. Navigation Services covers projects in the following areas: GPS Satellite-Based Augmentation, GPS Ground-Based Augmentation, Ground Systems, Lighting Systems, and Technical Support. Communications Services provides communications and telecommunications services consistent with International Civil Aviation Organization (ICAO) standards required for air traffic control within the NAS. It provides communications infrastructure and services for the DOD to ensure interoperability with the NAS. Weather services provides sensor, processor and distribution systems required to provide accurate forecasts for timely air traffic decisions. Through unique customer/client relationships and customer-derived requirements, our full lifecycle service has the capability to define, design, build, deploy, commission, operate, support, and decommission communications, navigation and weather services.

- Our partners and stakeholders include:

- Other ATO Business Units, Service Units, and Offices
- Other FAA Offices and Lines of Business
- Department of Defense (DOD)
- International Civil Aviation Organization (ICAO)
- Airlines
- Business Aviation
- General Aviation

By the end of FY 2012, the accomplishments for the Program Management Organization include:

- Implement key work plans in support of delivering the NextGen mid-term operational vision for collaborative air traffic management. This solution set provides capabilities to improve traffic flow management system-wide as well as at the tactical or location-based level. Key work plans include:
    - Strategic Flow Management Integration (execution of flow strategies into controller tools). The program provides for the implementation of ERAM modifications needed to receive/process the Traffic Management Initiatives (TMI) in the ERAM baseline timeframe.

  - Flow Control – Strategic Flow Enhancement. This program will analyze the mid-term (FY 2012-2018) air traffic management (ATM) building blocks needed for the transition to the future NextGen system and the capability to improve the predictions for both capacity and demand.
- Improve on-time performance and operator and passenger access to information by using TFM, Traffic Management Advisor (TMA), and CATMT, such as Airspace Flow Programs.
- Design and develop CATMT WP2 enhancements by deploying Phase 1 of Corridor Integrated Weather System (CIWS) integration onto TFMS.
- Fund the production of WAAS/LPV Guidance or LP Instrument Approach Procedures.
  - Funding and delivering airport surveys to Mission Support Services and funding associated flight inspection services to Aviation System Standards.
  - Flight inspection of RNAV GPA WAAS Route Structures.
  - On-going efforts are focused on improving services at CAST and non-CAST locations by ensuring service availability for MALSR, ALSF-2, REIL, RVR systems, upgrading Alaskan Satellite Telecommunications Infrastructure, National Engineering Support to assist with system optimization, engineering services to complete engineering at selected ASDE-X sites, and improving all RSA NAVAIDs at certified airports.
- Acquisition and deployment of WAAS, NVS, SWIM, DataComm, and DME programs.
- Went operational with 271 new automated traffic counting platforms for managing daily and monthly facility traffic count reporting at Terminal Facilities across the NAS.

By the end of FY 2013, anticipated accomplishments for Program Management include:

- Deploy over 1,000 new Digital Multimode Radios.
- Continue the acquisition and deployment of WAAS, NVS, SWIM, DataComm, and DME programs.
- Complete documentation in support of NextGen Network Enabled Weather (NNEW) Segment 1 Final Investment Decision.
- Attain service availability for five Instrument Landing System (ILS) locations.
- Continue to develop CATMT WP2 and CATMT WP3 which provide six additional capability suites to improve the congestion management tools available to the Traffic Management Unit.
- Continue the TFMS Technology Refresh which replaces the hardware of the TPC at the FAA's WJHTC.
- Maintain the system hardware and software which includes developing software corrections, testing and implementing them for a safer and more efficient air traffic control system. It also provides for the on-site corrective and preventive maintenance and depot repair parts system. Modernizing and sustaining physical plant infrastructure is a long-term priority with remediation efforts planned across multiple fiscal years. We must maintain service availability of the en route and oceanic platforms by providing adequate second level engineering and supply support as well.
- Continue to improve the safety, capacity, and efficiency of the NAS by strengthening our efforts to reduce the number of operational errors in the en route environment. In the Oceanic airspace, we plan to reduce separation minima, thereby improving NAS on time arrival percentages and increasing fuel efficiency.
- Continue air traffic operations at 21 ARTCC and two CERAP control facilities.
- Continue to provide the support and technology to enable the safe increase in En Route and Oceanic capacity.
- Continue efforts in support of NextGen that include technical development activities for Collaborative Pre Departure OTM4D and a 5-Year En Route and Oceanic Research and Development Plan for NextGen Mid-term and beyond.
- Continue on-going efforts that support En Route Air Traffic Operations and Service Level Availability by providing Life Cycle Management of the physical plant infrastructure at the 21 ARTCCs and two CERAP facilities.
- Maintain En Route and Oceanic air traffic systems in a state which will not degrade the services provided to the flying public

3. Why Is This Particular Program Necessary?

FAA's ATO handles 70,000 flights per day and helps transport over 730 million passengers per year, contributing to 5.2 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

The PMO centralizes program offices that manage NextGen initiatives and the majority of other ATO programs under one organization that will specialize in program management. The PMO will have expertise and responsibility to manage program cost, schedule and scope. The PMO will play a critical role in the success of NextGen by acting as the bridge between strategic requirements and tactical program implementation to improve the safety and efficiency of our national airspace system. The PMO will also ensure tighter alignment and closer integration of NextGen initiatives and elevate visibility and consistency. The PMO will clarify program management career paths, and help us attract and retain the most highly skilled and motivated individuals on program management teams. Creating a separate organization within the Air Traffic Organization will boost key individual and organizational capabilities, such as program management, systems integration, software engineering, and communication, which are necessary to fully support and develop NextGen.

The PMO will define, design, develop, and deploy ATC systems, equipment, and other services necessary to operate, maintain, and improve the NAS. We will provide the critical infrastructure and first phase of NextGen with the ERAM and ADS-B Systems implementation. This organization will continue to provide its owners, customers, and system operators the highest degree of safety and service in the most efficient manner.

4. How Do You Know ?

ATO sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule, and performance. Selected programs are reviewed under the FAA's Post Implementation Review process to determine overall performance of the program against its metrics and the extent of operational benefits achieved. The PMO, through its second-level engineering function, also supports several operational metrics including:

- Sustain Adjusted Operational Availability at 99 percent for reportable facilities that support the NAS.
- Continue to sustain the adjusted operational availability of select terminal equipment at 99.7 percent for the reportable facilities that support the Nation's Core Airports through FY 2013. Accomplish this by maintaining the operation of the NAS Terminal environment by sustaining the terminal automation systems of towers and Terminal Radar Approach Controls (TRACONs) to meet target levels of performance.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The PMO plays a significant role associated with transition to NextGen. Controllers currently communicate with pilots using voice where revisions to aircraft flight paths are made through multiple instructions or lengthy verbal exchange. Many of the transformational improvements associated with NextGen including trajectory-based flight and net-centric operations cannot be achieved using the present automation, decision support or voice-based communications system.

Funding requested in the FY 2013 submission will continue the transition to NextGen. In addition to enroute automation modernization, supported by ADS-B, we are modernizing and providing commonality in terminal automation, coupling it with ADS-B and providing upgrades to Collaborative Air Traffic Management Tools to support NextGen operations. Connecting all of the automation to and through a flexible digital communications infrastructure, and feeding it with spaced based navigation will provide the information to both controllers, flow managers, dispatchers and pilots necessary for the efficienct and responsive National Airspace System envisioned by NextGen.

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Detailed Justification for Vice President Management Services, AJG-0

1. What Is The Request And What Will We Get For The Funds:

FY 2013 – Management Services – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Management Services	$166,112	$322,706	$323,029	+$323

The FY 2013 budget request for Management Services is $323,029,000 and 538 FTP / 562 FTE. This increase will provide $653,000 for the government-wide pay raise and $670,000 for one additional compensable workday.

Management Services is ATO's new service unit established from the Strategy and Performance Services. The ATO is a performance-based organization and Management Services ensures that performance stays on track by providing the framework to integrate the ATO's plans, programs, and activities. As an interim step in FAA's fully-implemented shared services approach, beginning in FY 2012, ATO's Information Technology (IT) group resides in Management Services.

Funding the FY 2013 request at this level will allow Management Services to:

- Lead the process for strategic and business planning and integration of the ATO Business Plan with the FAA Strategic Plan. Leads the Budget and Performance Integration Initiative including oversight of performance measures to be used by ATO service units.
- Coordinate Capital Investment Plan submission to Congress.
- Allocate and manage resources to meet financial performance target and provides support to the FAA and ATO with financial, business, and planning services.
- Manage and direct ATO internal and external communications. Develop and implement strategy and plans to communicate ATO internal and external messages.
- Coordinate and integrate ATO operations and programs communications messages across lines of business. Advise ATO on the best business practices for communications.
- Lead the development of strategy for and implementation of organizational transformation across ATO. As an internal consultant to ATO, utilize consistent frameworks such as change management, process improvement and facilitation to foster increased efficiency and effectiveness of the organization.
- Develop and implement an integrated strategy in managing labor relationships and liaison activities across ATO organizations and bargaining units. Provide AHR with a centralized and focused point of contact for technical information.
- Establishment of leadership assessment process based on the leadership competency model and conduct a pilot for a feedback mechanism to the organization for 10 percent of management in the ATO.
- Ensure ATO Career Progression Plan tools are accessible to 40 percent of the ATO population.
- Manage ATO human capital and ensure the implementation of standardized administrative processes and policies for the ATO including position management and classification, career paths and succession management, workforce planning, professional training, leadership development and performance management and recognition which all support long-term ATO talent management and business goals.
- Develop and provide oversight for the implementation of ATO administrative policies, processes, and guidance to ensure uniform application and standardization.
- Implement the ATO Leadership Development Plan to enable achievement of business goals.
- Identify, acquire, deliver, and evaluate non-operational training in support of ATO requirements.
- Develop, implement, communicate, and validate ATO performance management policies and tools.
- Manage and implement FAA telework within ATO. Establish baseline of participation to monitor increases and reductions.
- Provide policy, guidance, training, and tools for managing directives/records in the ATO.

- Monitor, reports, and make recommendations to ATO senior management on issues of diversity, including demographics, employment trends, and recruitment strategies.
- Develop and facilitate delivery of outreach strategies and major initiatives to promote education and public awareness of aviation occupations and other critical hiring opportunities within the ATO to establish broad-based diversity pipeline.

Key outputs and outcomes expected to be achieved in budget year with the requested resources:

- Improved operator and passenger access to the Department of Transportation's (DOT) Delay Reporting System by updating the NextGen Implementation Plan.
- Accurate and consistent workload planning and NAS modeling for investment analysis by delivering detailed demand forecasts at the service delivery point (SDP) level.
- A consolidated gate-to-gate measurement and analysis capability.
- An average daily airport capacity for the Nation's Core Airports of 103,068 arrivals and departures per day.
- A collaborative process in 65 percent of our facilities that engages our employees and unions in technical, procedural, and airspace changes in their work environment.
- An integrated strategy in managing labor relationships and liaison activities across ATO organizations and bargaining units.
- Reduced number of employees on OWCP Department of Labor Chargeback and associated compensation costs.
- The accurate number of controllers and technicians hired and trained needed to operate and maintain the NAS.
- Outreach strategies and major initiatives to promote education and public awareness of aviation occupations and other critical hiring opportunities within the ATO to establish broad-based diversity pipeline.
- A cyber security program in accordance with the Federal Information Security Management Act of 2002.
- Documentation that defines the multi-year strategy to establish IT as the single manager of all FAA non-NAS systems.
- FAA will be identified as DOT's infrastructure and operations (I&O) and data center service provider, and plans will be implemented to execute the assignment.
- Business Process Reengineering best practice applied to all new IT Projects.

Key outcomes expected to be achieved in budget year with the requested resources:

- Zero cyber security events that disable or significantly degrade ATO systems.
- Metrics and benchmark studies will show IT as a high-performance, low cost I&O provider.
- Data center operations and cloud computing initiatives will be among the most effective in government, as measured by service quality and unit cost metrics.
- Stronger IT governance through development of an inventory of IT systems; staffing plans to match organizational needs.
- World class application development practices, including industry leading project management solution architecture practices, and application and platform market clock management.
- Improved customer service.

2. What Is This Program?

Management Services supports DOT's Strategic Plan's Organizational Excellence: Financial Performance goals. We recruit, develop, and retain a diverse and collaborative workforce by providing an all-encompassing career progression plan and leadership development program along with personnel and organizational policies that meet the needs of our highly skilled workforce. We ensure that performance stays on track by providing the framework to integrate the ATO's plans, programs, and activities.

We work with aviation stakeholders to develop strategies for implementing solutions and to continue coordination with FAA offices. We identify airports forecasted to have chronic delays and projecting near-term demand, on a quarterly basis, comparing year-over-year changes in demand at these airports and identifying those which show unusually large growth. We coordinate ATO's international activities, providing effective, consistent, and well-coordinated strategic leadership, products, and services to ensure harmonization of domestic U.S. air traffic operations and NextGen technologies with the global civil aviation community.

The IT supports DOT's Organizational Excellence goal, making particular contributions toward the improved financial performance, open government, and diverse and collaborative DOT workforce outcomes.

The Information Services group is aligned with DOT's strategic goal of continuously-improving secure and efficient storage and exchange of critical information by incorporating performance goals that guide IT programs by strategies, decision criteria, industry accepted benchmarks, and historical metrics. We implement and enforce enterprise standards and continuously improve processes to maximize IT innovations and cost efficiencies. We also ensure the reliability of all FAA non-NAS systems by implementing policy, security, and emergency restoration capability supporting timely information delivery. A 2010 Gartner industry assessment of ATO IT validated our comparative benchmark performance in the top 10 percent of public sector IT organizations.

Information Services is responsible for delivery and sustainability of non-NAS IT capability to FAA. Expansion of I&O support to include all DOT modals (12,400 users via reimbursable agreement) is expected in FY 2013, which will result in lower unit cost to the FAA. Currently, the IT Office provides I&O support for 35,000 ATO users; 7,400 AVS personnel; and approximately 7,000 users from the rest of the FAA in 1,026 locations spread across the United States.

Information Services is also responsible for cyber security and fail-over continuity of operation protection for the non-NAS IT architecture. This complex IT environment, which includes over 2,700 servers, over 2,500 switches, over 500 systems and applications, 50,000 desktop and laptop computers, plus printers and IP-based telephones, requires far reaching management responsibilities including development and implementation of policy, oversight and assessment, system and information access, and incident response.

Our partners and stakeholders include:

- Office of the Inspector General (OIG)
- Congress
- Congressional Oversight Committees
- Local, county and state authorities
- Other Federal agencies
- Office of Management & Budget (OMB)
- Government Accountability Office (GAO)
- Civil Air Navigation Services Organization (CANSO) members, airlines and equipment manufacturers

By the end of FY 2012, the accomplishments for Management Services include:

- For surface traffic management, a 5 percent reduction in average taxi time at the Nation's Core Airports as identified by Future Airport Capacity Task 3 (FACT 3).
- A listing of airports that are expected to be congested by 2020 or 2030, taking into consideration all anticipated airfield capacity improvements and anticipated NextGen procedures and technologies.
- Detailed demand forecasts at the SDP level to assure accurate and consistent workload planning and NAS modeling for investment analysis.
- Improved operator and passenger access to DOT's Delay Reporting System.
- A consolidated gate-to-gate measurement and analysis capability.
- A detailed analysis of the operations of 12 percent of the ticketing carriers; trending the directional changes in delays and total operations.
- An economic analysis to quantify the impact of aviation on the National economy and report these findings in the bi-annual Economic Outlook.
- Transitional measures to support increasing focus on aviation's contribution to greenhouse gas emissions, reliance of fossil fuels, and security.
- Achieve a NAS on-time arrival rate of 88 percent at the Nation's Core Airports and maintain through FY 2013.
- A cadre of highly trained and experienced internal facilitation resources for field and headquarters ATO service units for meeting facilitation, team building support, workplace conflict resolution, and

organizational development activities. The facilitation services will be provided at lower cost than hiring external facilitators.

- Ensure that 70 percent of all eligible ATO management work force attends at least one training in the following training areas: Model Work Place (MWP); Equal Employment Opportunity (EEO); or Diversity Workshop training. Ensure 90 percent of all eligible ATO management work force completes the required Accountability Board Training.
- Increased participation in Internships, Co-Operative Education (Co-Op), and Summer Hires programs within the ATO.
- A Recruitment and Outreach Program to attract a diverse applicant pool for ATO mission-critical occupations in FY 2012.
- A national program to prepare air traffic controllers for success in their next level of leadership responsibility as Frontline Managers (FLM), and pilot a similar program for Frontline Managers aspiring to be Operations Managers (OM).
- A resource/clearinghouse to address ATO leaders' needs for coaching and developmental workshops, targeted at both individual and team level.
- Standardized processes and tools to support employee career progression throughout the ATO.
- A reduced number of employees on OWCP roles and associated compensation costs.
- An air traffic controller workforce that is within 2 percent, above or below, the projected annual totals in the Air Traffic Controller Workforce Plan.
- Implement FAA Information Technology Leadership Team (ITLT) approved software development standards and significantly enhanced Enterprise Data Center (EDC) disaster recovery (DR) plan and execution.

By the end of FY 2013, anticipated accomplishments for Management Services include:

- Improved operator and passenger access to the DOT's Delay Reporting System by updating the NextGen Implementation Plan.
- A collaborative process in 65 percent of our facilities that engages our employees and unions in technical, procedural, and airspace changes in their work environment.
- Accurate and consistent workload planning and NAS modeling for investment analysis by delivering detailed demand forecasts at the SDP level.
- Standardized policy processes for the ATO labor strategies.
- A consolidated gate-to-gate measurement and analysis capability.
- An average daily airport capacity for the Nation's Core Airports of 103,068 arrivals and departures per day.
- ATO Career Progression Plan tools will be accessible to 40 percent of the ATO population.
- National ATO hiring programs and processes to ensure that FAA has the controllers and technicians needed to operate and maintain the NAS including leading the Centralized Selection Process.
- An integrated strategy in managing labor relationships and liaison activities across ATO organizations and bargaining units.
- Reduced number of employees on OWCP Department of Labor Chargeback and associated compensation costs.
- The accurate number of controllers and technicians hired and trained needed to operate and maintain the NAS.
- An ATO Leadership Development Plan to enable achievement of business goals.
- Outreach strategies and major initiatives to promote education and public awareness of aviation occupations and other critical hiring opportunities within the ATO to establish broad-based diversity pipeline.
- Implement an efficient and effective cyber security program in accordance with the Federal Information Security Management Act of 2002 and contingent on funding, perform selected program activities.
- Incorporation of DOT users and infrastructure into a single DOT/FAA network, data center and support environment. DOT participation will be implemented via a reimbursable agreement.

3. Why Is This Particular Program Necessary?

FAA's ATO handles 70,000 flights per day and helps transport over 730 million passengers per year, contributing to 5.2 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

Management Services ensures that performance stays on track by providing the framework to integrate the ATO's plans, programs, and activities. We provide a wide variety of administrative services that support the overall operation of the ATO and help plan for a successful future. By providing performance measures, a foundation for administration, and communication of key goals and information to the ATO, we support the ATO in its core functions in accomplishing the organization's mission.

Information Services maintains and operates a readily available and secure infrastructure and an efficient user support capability. IT offers services that include applications, services, data center and hosting environments, and the enterprise architecture to facilitate the delivery and exchange of electronic information across the non-NAS environment. This unit provides IT risk management and information assurance security services to the Office of the Assistant Administrator for Finance and Management (AFN) systems to ensure that AFN security threats, vulnerabilities, and risks are mitigated in a cost beneficial manner, supporting FAA real-time security incident decision making. Additionally, IT professionals develop, deploy, and manage business and technical systems to facilitate alignment of IT services with AFN business goals.

The IT Office is responsible for implementation and compliance with Federal, DOT, and FAA standards to ensure IT delivery excellence and cost efficiencies. They support FAA's goals of Safety and Organizational Excellence by collecting, analyzing, and presenting aviation and management data. We support over 500 applications representing an annual investment of more than $150 million to ensure safety and efficiency throughout the NAS.

4. How Do You Know The Program Works?

The FAA sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule and performance. Current and anticipated metrics that will be used to manage services and communicate performance to our customers include:

- Customer satisfaction – four question survey sent after every service ticket is closed. In FY 2011 there were 420,000 service tickets generated, and a survey response rate of 15-20 percent.
- Data center operational availability.
- Unit cost for user support, call center, servers/hosting, data storage – published so potential customers can compare FAA cost to other service providers.
- Solution Delivery – For the delivery of application software (purchased and developed), the goal is a minimum of 90 percent of these projects deliver customer perceived value within 6 months of project approval/initiation.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The ATO is a performance-based organization, and Management Services ensures that performance stays on track by providing the framework to integrate the ATO's plans, programs, and activities. The organization is diverse and works together to provide a wide variety of administrative type services that support the overall operation and inter-workings of the ATO and help plan for a successful future.

The Management Services' Performance Analysis and Strategy organization supports the Aviation Access initiatives with activities that include efforts in evaluating the effectiveness of weather information in reducing delays, coordinating cross-agency and with the aviation community to annually update the NextGen Implementation Plan, and improving operator and passenger access to the DOT Delay Reporting System. Without adequate funding, the Management Services Unit will be unable to accomplish key tasks such as track flight and surface times, calculate a variety of metrics for the ATO, identify airports forecasted to have chronic delays over time, as well as project the demand forecast of the ATO.

The Management Services organization also supports the Workplace of Choice initiatives in a number of ways. For example, the ATO Administration and Talent Management office provides training, development, and certification programs to ATO leaders, the acquisition workforce, and other professionals across the ATO. Our goal is to ensure that the ATO has the skills it needs to meet current and future mission business strategies and help employees find training for their organizational needs, whether it is offered in-house, on-line, or through external providers. Human capital planning services, which support the ATO's organizational change strategies, are also provided.

The Management Services organization provides leadership and guidance to ATO in creating and maintaining a diverse, productive, professional workplace that enhances all ATO operations. The Management Services organization develops diversity and inclusion strategies and serves as ATO's center of expertise for resources, training, knowledge and best practices for all diversity and inclusion efforts.

The Management Services organization is responsible for identification and management of strategic communications messages and programs to connect ATO with its employees. The organization measures the effectiveness of ATO internal communications through research and analysis.

Appropriate funding allows Management Services to support key initiatives such as meeting Office of Personnel Management Hiring Standards and maintaining the air traffic controller workforce at optimum levels. Appropriate funding also allows Management Services to provide training services, consultations, and interventions to ATO service units to identify and reduce or eliminate barriers to maintaining a professional, model workplace. Appropriate funding allows Management Services to produce communications that provide corporate information to all ATO employees and external audiences and stakeholders.

Many FAA lines of business receive services from our IT group. These services include application development and maintenance, provision of data center and hosting environments, and development and oversight of the enterprise architecture to facilitate the delivery and exchange of electronic information across the non-NAS environment. This unit provides IT risk management and information assurance security services and is responsible for the development and management of a wide range of business and financial systems across FAA.

The services provided by this organization are integral to the support and operation of the entire FAA and as such, the work being done by this organization to some extent supports all of DOT Strategic and FAA strategic plan goals. However, there are several goals that are heavily supported by ATO Finance: Critical Acquisitions on Budget, Critical Acquisitions on Schedule, Unqualified Audit Opinion, Air Traffic Controller Workforce Plan, Information Security, Continuity of Operations and Cost Control, which tie to the DOT goals of Organizational Excellence.

IT costs have been benchmarked (ATO, FY 2010) and indicate that customer satisfaction and user support are among the best in both industry and government. Cost benchmarks consistently show our services to cost less than most agencies pay for similar services. This success has been due to management applying cost control and efficiency measures since FY 2006 – the funding requested will enable maintenance of the current level of service and incentive to find lower cost means and methods for the future.

Explanation of Funding Changes

	Dollars ($000)	FTE
Air Traffic Organization (ATO)	**+$71,111**	**-15**
Overview: For FY 2013, ATO requests $7,513,850,000, 31,198 FTPs and 31,736 FTEs in the Operations appropriation to meet its mission of moving air traffic safely and efficiently. This is an increase of $71,111,000 (1.0 percent) and a decrease of 15 FTEs from the FY 2012 Enacted level. The request provides for a discretionary increase of $10,000,000 for Performance-Based Navigation, an uncontrollable adjustment of $63,668,000 for contract pay raises associated with three collective bargaining units: National Air Traffic Controllers Association (NATCA) controllers ($58,000,000), Support Staff Specialists ($5,000,000) and NATCA Multi-unit employees ($668,000), $20,400,000 for the government-wide pay raise and $20,924,000 for one additional compensable workday. This request includes an internal transfer of programs and staffing to the Program Management Office (PMO) from the En Route and Oceanic Services, Terminal Services, Technical Operations and System Operations service units. The request also includes a base transfer of $7,850,000 from the Office of the Assistant Administrator for Finance and Management (AFN) to the Associate Administrator for Air Traffic (ATO) for Hangar 6. This request assumes workforce attrition in the air traffic controller workforce, -$49,628,000 in administrative cost efficiencies, and -$2,000,000 in cost savings in the Contract Towers program.		
Unavoidable Adjustments	**+$41,221**	
Pay Inflation: This increase is required to provide for costs associated with base salary increases. The factor used is 0.5 percent.	+20,297	
One Additional Compensable Day: This increase is due to one more compensable day in FY 2013 (261 in FY 2013 versus 260 in FY 2012).	+20,924	
Uncontrollable Adjustments	**+63,668**	
Contract Pay Raises: NATCA Arbitration Decision: At the direction of the White House, DOT Secretary LaHood implemented a binding arbitration process between the FAA and NATCA to resolve multiple outstanding issues. The panel completed its work and provided a final settlement for the NATCA controllers' contract which increased the pay scales for air traffic controllers over a 3-year period (FY 2010-2012). These increases are binding on the agency and are not subject to adjustment. The FY 2013 increase reflects the annualization of the first quarter cost of the FY 2012 pay adjustments required by the arbitration decision. It increases the air traffic controller payroll costs in the Terminal and En Route Service Units by $58 million. **Staff Support Contract**: In April 2010, FAA agreed to a new contract with the NATCA Staff Support bargaining unit that became effective on August 1, 2010. The contract expires on October 1, 2012, but can be extended in one year increments by mutual agreement. It covers approximately 650 Staff Support Specialists (also known as MSS1) who work primarily in larger Terminal facilities, En Route facilities, and the FAA's Command Center. These personnel provide management support relating to procedures, training, and quality assurance. Under the new agreement, Staff Support pay bands match those of the current Air Traffic Controller contract. In addition, Staff Support will receive 3 percent guaranteed increases to basic pay in January 2011 and January 2012. The FY 2013 budget includes an increase of $5 million to cover the incremental FY 2013 cost of this agreement. **NATCA Multi-Unit Agreement**: The ATO budget requests a $0.7 million increase for the new NATCA Multi Unit agreement between that group and the agency. There are approximately 59 Terminal and 107 En Route employees in the NATCA Multi-Unit. Costs associated with the NATCA Multi-Unit pay article that was awarded by an arbitrator in January 2011 and will run through December 31, 2014. The contract covers about 1,700 employees across six FAA offices (AVS, ATO, ARC, ARP, AGC, and ABA) and	63,668	

	Dollars ($000)	FTE
includes aircraft certification employees, computer specialists, program analysts, budget analysts and other professionals. In FY 2012, the only incremental cost is a lump-sum bonus equal to 1.5 percent of base pay, which was paid in October 2011. In FY 2013 and FY 2014, the primary cost driver is a guaranteed basic pay raise of 3.2 percent in January 2013 and 3.75 percent in January 2014.		
Discretionary Adjustments	**-$41,628**	**-35**
Performance Based Navigation (PBN): This request provides $6.2M for Optimization of Airspace and Procedures in a Metroplex (OAPM) support to: • Initiate analyses and studies through established study team processes at two Metroplex locations focusing on expediting integrated PBN procedure development coupled with airspace design to optimize benefits, • Initiate Design and Evaluation at four Metroplex locations, • Initiate final pre-implementation/development work at three Metroplex locations with integration into NAS operations by the end of the fiscal year, and • Provide Safety Analysis, simulations, environmental evaluations and policy development to support Performance Based Navigation development and initiation of implementation by the end of the fiscal year. This increase request will also provide $3.8M for NAV Lean support to improve and streamline all processes used to request, prioritize, develop and implement instrument flight procedures (IFP). This initiative, known as the Navigation Procedures Implementation Plan (NAV Lean), will accelerate OAPM projects and NextGen by improving efficiency and production time for all IFPs.	+10,000	
Administrative Efficiencies: ATO is confident that we can continue recent efforts to streamline administrative operations and achieve reductions in this area. This reduction is attributable to program savings and staffing efficiencies. ATO's focus for savings/cost efficiencies targets the following expenditures categories: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.	-49,628	
Contract Towers: As the Federal Government continues to explore ways to reduce costs and maximize efficiency, the Administration proposes changes to the Federal Contract Tower program. Under the cost share program, towers with societal benefits of less than half of the total cost of operating the tower will pay no more than 50 percent of those costs. FAA will use newly-available, site-specific cost information to update benefit-cost ratios and determine local share. As a result, FAA estimates $2 million in savings.	-2,000	
Workforce Attrition: The March 2012 Controller Workforce Plan will report a net reduction in the number of controllers projected on board at the end of FY 2013. This net reduction accounts for routine attrition, retirements and newly hired staff. The net reduction is in comparison to the estimated on board controller workforce at the end of FY 2012. The controller attrition line item in the budget does not show a cost savings amount, because the contract pay raise amount for controllers already includes the net impact of controller attrition and new hires.		-35
Base Transfers	**+$7,849**	**+20**
Hangar 6: This request includes a base transfer of $7.849 million and 20 FTE / FTP from the Office of the Associate Administrator of Finance and	+7,849	20

	Dollars ($000)	FTE
Management regarding Hangar 6 located at Ronald Reagan Washington National Airport. Hangar 6 provides aviation support for senior government official including the Secretary of Transportation, FAA Administrator and Deputy Administrator, NASA, the Federal Emergency Management Agency, Presidential Cabinet members, members of Congress, and other Federal government organizations. Hangar 6 is responsible for operating and maintaining three aircraft: two leased Cessna Citation Excels and one Gulfstream IV aircraft which is owned by the FAA.		

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Traditional Tables for Air Traffic Organization

The following pages represent information traditionally provided to the Committees on Appropriation for the FAA's air traffic control functions.

Controller Workforce FY 1981 Through FY 2013

FY 1981	6,578	FY 1992	15,147	FY 2003	15,691
FY 1982	11,290	FY 1993	14,970	FY 2004	14,934
FY 1983	11,980	FY 1994	14,953	FY 2005	14,540
FY 1984	12,213	FY 1995	14,614	FY 2006	14,618
FY 1985	12,968	FY 1996	14,360	FY 2007	14,874
FY 1986	12,615	FY 1997	14,588	FY 2008	15,381
FY 1987	13,007	FY 1998	14,966	FY 2009	15,770
FY 1988	13,960	FY 1999	15,096	FY 2010	15,696
FY 1989	14,340	FY 2000	15,153	FY 2011	15,418
FY 1990	14,645	FY 2001	15,233	FY 2012	15,260
FY 1991	14,976	FY 2002	15,478	FY 2013	15,148

System Maintenance Overtime

	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request
Field Maintenance			
Hours	318	330	343
Amount	18,662	19,591	20,161
Program and Technical Support			
Hours	25	29	31
Amount	1,622	1,906	1,961
Total			
Hours	343	359	374
Amount	20,284	21,497	22,122

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Aviation Safety Organization (AVS)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$1,252,991**	**7,455**	**128**	**7,470**
Unavoidable Adjustments	**+$10,715**			**+27**
FTE Annualization	+3,430			+27
Pay Inflation	+3,415			
One Additional Compensable Day	+3,870			
Uncontrollable Adjustments	**+$2,298**			
Contract Pay Raises	+2,298			
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$11,004**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-11,004			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$1,255,000**	**7,455**	**128**	**7,497**

Executive Summary: Aviation Safety (AVS)

1. What Is The Request And What Will We Get For The Funds?

The request of $1,255,000,000 and 7,497 full-time equivalents (FTEs) allows AVS to promote aviation safety by regulating and overseeing the civil aviation industry and continued airworthiness of aircraft, as well as certification of pilots, mechanics, and others in safety-related positions. This request is an increase of $2,009,000 above the FY 2012 enacted level of $1,252,991,000. The request includes increases for employee pay. The resource request will enable AVS to maintain safety inspectors and other safety critical staffing at the FY 2012 level. The resources requested will provide continued operational oversight, rulemaking, certification and program management services.

2. What Is The Program?

The AVS organization is responsible for setting the safety standards for every product, person and organization that produces and operates aircraft in the national airspace system (NAS). AVS employees determine compliance with those standards and issue certificates to demonstrate compliance. AVS employees provide oversight and surveillance to ensure certificate holders continue to comply with the standards.

3. Why Is This Particular Program Necessary?

The AVS organization is responsible for:

- Providing surveillance and oversight of existing certificate holders.
- Developing and establishing the safety and certification standards for the civil aviation industry.
- Determining compliance with certification standards.
- Issuing or denying certifications.
- Ongoing and wide-ranging transformation of the United States NAS encompassed by NextGen.

These essential activities contribute to the Department of Transportation's safety goal, which is the FAA's highest priority.

4. How Do You Know The Program Works?

In three of the last four calendar years, U.S. airlines have not had a fatal accident, and the U.S. airlines fatal accident rate has decreased by 82 percent since the late 1990's. The standards set by AVS, as well as the continued oversight and surveillance to assure compliance with those standards, are key contributors to this outstanding safety record.

AVS programs continue to contribute to the unparalleled safety of American aviation. The commercial air carriers' fatality rates per 100 million persons on board were not to exceed 8.1 for FY 2010. The FAA exceeded the goal by achieving a rate of 0.3 fatalities.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The public expects the FAA to continually reduce the risk of flying while improving the efficiency of the system. This funding level will enable AVS to maintain continued operational safety services; however, if FAA employment levels are reduced, certification services for new operators and manufacturers may take longer.

Detailed Justification for – Aviation Safety (AVS)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aviation Safety
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Total	**$1,256,832**	**$1,252,991**	**$1,255,000**	**+$2,009**
Flight Standards Service	835,181	830,778	833,087	+1,309
Aircraft Certification Service	207,481	209,269	209,969	+700
Office of Aerospace Medicine	55,003	55,352	55,352	0
Office of Rulemaking	6,060	6,111	6,111	0
Air Traffic Safety Oversight Service	22,449	22,619	22,619	0
Accident Investigation and Prevention Service	20,146	20,319	20,319	0
Office of Quality, Integration and Executive Service	110,512	108,543	107,543	0

The request of $1,255,000,000 (a 0.16 percent increase above FY 2012 and 7,497 FTEs continues aviation safety regulation and oversight of the civil aviation industry. This request is an overall increase of $2,009,000 above our base funding of $1,252,991,000. The resource request will enable AVS to maintain safety inspectors and other safety critical staffing at the FY 2012 enacted level. The resources requested will provide continued operational oversight, rulemaking, certification and program management services.

<u>NextGen:</u>

FY 2013 funding levels will support AVS's role in NextGen. AVS plays an integral role in NextGen, by setting, overseeing, and enforcing safety standards for all parts of the aviation industry. AVS employees must establish the standards and policies for NextGen operations, certify compliance with those standards, and assure continued operational safety once we adopt new aircraft technologies and change procedures for flight crews and controllers. Within AVS, the Flight Standards (AFS) and Aircraft Certification Services (AIR) are responsible for setting, overseeing and enforcing safety standards for all parts of the aviation industry.

<u>Air Operator Certification:</u>

FY 2013 funding levels will support Flight Standards (AFS) inspector and engineer positions that provide air operator certification services for new Part 121, 125, 129 and 133 at the requested funding level. AFS resources will continue for new certification requests, impacting applicants across Federal Aviation Regulations (FAR) Parts. AFS will continue to provide positions for activities such as Unmanned Aerial Systems, NextGen implementation, and air operation certification.

<u>Type and Production Certification:</u>

FY 2013 funding levels will support Aircraft Certification (AIR) engineers and inspectors whose primary function is to provide type and production certification services. AIR will continue to provide positions for activities such as NextGen implementation and type and production certification.

AVS FY 2012 key initiatives include:

- Developing policies, procedures and approval processes to enable operation of unmanned aircraft systems.
- Developing, managing and coordinating Helicopter Emergency Medical Services (HEMS) Rulemaking.

- Support the objective of reducing the commercial aviation accident rate by focusing on flight standardization for certification, fleet characteristics and provide recommendations for revisions to training and operations guidance.
- Support the objective of reducing the general aviation (GA) accident rate by focusing on flight standardization for certification, fleet characteristics and provide recommendations for revisions to training and operations guidance.
- Conducting certification and surveillance activities including production, airworthiness, air operator and air agency across the U.S.
- Providing certification, service and support for new operators, agencies and air carriers.
- Support the objective of reducing the commercial aviation accident rate by focusing on certification, production and fleet characteristics of aircraft manufacturers.
- Support the objective of reducing the GA accident rate by focusing on certification, production and fleet characteristics of aircraft manufacturers.
- Planning and implementing continuity of operations including inspections, surveillance, investigations and enforcement activities.
- Support the objective of reducing the commercial aviation accident rate by focusing on medical certification and surveillance of airmen.
- Support the objective of reducing the GA accident rate by focusing on medical certification and surveillance of airmen.
- Planning and implementing continuity of operations including inspections, surveillance, and investigation and auditing activities.
- Providing overall planning, direction, management and evaluation of AVS programs.
- Directing and managing the maintenance and improvement of the International Organization for Standardization (ISO) - 9001:2000-based Quality Management System (QMS) for all AVS services and offices to establish integration policy and processes for safety systems.

AVS FY 2013 key initiatives include:

- Supporting Agency emerging technology initiatives by developing standards, policies, and guidance needed to transition and operate in the NextGen environment.
- Developing policies, procedures and approval processes to enable seamless unmanned aircraft systems access to the NAS.
- Developing, managing and coordinating HEMS Rulemaking.
- Support the objective of reducing the commercial aviation accident rate by focusing on flight standardization, fleet characteristics and provide recommendations for revisions to training and operations guidance.
- Support the objective of reducing the GA accident rate by focusing on flight standardization, fleet characteristics and provide recommendations for revisions to training and operations guidance.
- Conducting certification and surveillance activities including oversight of design production, airworthiness, manufacturer, air operator and air agency across the U.S.
- Providing certification, service and support for new operators, agencies and air carriers.
- Support the objective of reducing the commercial aviation accident rate by focusing on design, production, and airworthiness certification, and continued airworthiness activities for all manufacturers of civil aeronautical products.
- Support the objective of reducing the GA accident rate by focusing on design, production, and airworthiness certification, and continued airworthiness activities for all manufacturers of civil aeronautical products.
- Planning and implementing continuity of operations including inspections, surveillance, investigations, and enforcement and auditing activities.
- Supporting a more proactive approach to safety by leading the agency efforts to adopt a Safety Management System (SMS).
- Increasing capability and expanding Aviation Safety Information and Analysis System (ASIAS) to provide better access and to more effectively monitor safety data.
- Support the objective of reducing the commercial aviation accident rate by focusing on medical certification and surveillance of airmen.
- Support the objective of reducing the GA accident rate by focusing on medical certification and surveillance of airmen.
- Providing overall planning, direction, management and evaluation of AVS programs.

- Directing and managing the maintenance and improvement of the ISO-9001:2008-based QMS. The AVS QMS ensures that AVS meets its safety requirements and continuously improves its processes for safety systems.
- Support the implementation of an enhanced AVS telework program by conducting research and performing other executive services needed to coordinate activities, ensure communications, and provide data, analysis, and recommendations as required.

2. What Is This Program?

AVS consists of seven distinct organizational elements serviced by approximately 7,455 personnel. Of the seven AVS organizational elements two – the Office of Rulemaking (ARM) and the Accident Investigation and Prevention Service (AVP) are solely Washington Headquarters elements. The other five – Flight Standards Service (AFS), Aircraft Certification Service (AIR), the Office of Aerospace Medicine (AAM), the Air Traffic Safety Oversight Service (AOV), and the Office of Quality, Integration, and Executive Services (AQS) – have field structures (including some overseas offices).

The seven AVS organizations perform the following activities:

<u>Flight Standards (AFS)</u> promotes aviation safety by establishing and overseeing operations, maintenance and certification standards for air carriers, commercial operators, air agencies, airmen, and civil aircraft, including aircraft registration.

Anticipated FY 2012 accomplishments include:

- Conducting/participating in Pilot Seminars and Flight Instructor Refresher Courses and Commercial Flight Instructor/Designated Pilot Examiner refresher courses at towered and non-towered airports.
- Developing appropriate policy, procedural guidance and aircraft certification programs for the emerging technologies needed to transition and operate in the NextGen environment.
- Validating with AIR the effectiveness of initiatives, interventions, and recommendations implemented by the GA loss of control workgroup and the amateur-built flight standardization board in FY 2011 to mitigate loss of control causes in GA.
- Implementing new safety standards required in HR 5900.

Anticipated FY 2013 AFS accomplishments include the following:

- Conducting/participating in Pilot Seminars and Flight Instructor Refresher Courses and Commercial Flight Instructor/Designated Pilot Examiner refresher courses at towered and non-towered airports.
- Developing appropriate policy, procedural guidance, and aircraft certification programs for the emerging technologies needed to transition and operate in the NextGen environment.
- Validating the effectiveness of initiatives, interventions, and recommendations implemented by the GA loss of control workgroup and the amateur-built flight standardization board to mitigate loss of control causes in GA.

<u>Aircraft Certification (AIR)</u> promotes aviation safety by developing and administering safety standards governing the type, production, and original airworthiness certification of aircraft, engines, propellers, appliances and noise level certification.

Anticipated FY 2012 accomplishments include:

- Promoting Helicopter Association International safety and issue two reports to the helicopter community.
- Supporting the issuance of Advisory Circulars (ACs) and Directives regarding the implementation of the Part 21 Aviation Parts final rule.
- Developing ACs in support of Automatic Dependant Surveillance-Broadcast (ADS-B) equipment.
- Incorporating guidance in AC 20-24B that will describe methods of compliance for FAA approval of alternative aviation jet fuels and aviation gasoline.

Anticipated FY 2013 AIR accomplishments include:

- Promoting Helicopter Association International safety and issuing two reports to the helicopter community.
- Supporting the issuance of ACs and Directives regarding the implementation of the Part 21 Aviation Parts final rule.
- Developing ACs in support of ADS-B equipment.
- Incorporating guidance in AC 20-24B that will describe methods of compliance for FAA approval of alternative aviation jet fuels and aviation gasoline.
- Validating with AFS the effectiveness of initiatives, interventions, and recommendations implemented by the GA loss of control workgroup and the amateur-built flight standardization board to mitigate loss of control causes in GA.

Office of Aerospace Medicine (AAM) promotes aviation safety by developing safety standards for the medical certification of airmen and medical clearance of ATCSs, surveillance of industry drug and alcohol testing programs, implementing substance abuse testing for FAA personnel in testing-designated positions, and aerospace medicine and human factors research.

Anticipated FY 2012 accomplishments include:

- Conducting surveillance, inspections, audits and evaluations for aviation industry random testing of safety sensitive employees.
- Issuing initial medical certificates in a timely manner indicating safety standards have been met.
- Conducting Aerospace Medical education and training.
- Each FAA region conducting two drug and alcohol special testing events based on monthly random selection for their regional jurisdiction.

Anticipated FY 2013 AAM accomplishments include:

- Continued development and establishment of medical standards for pilots and ATCSs.
- Continued to determine eligibility and issue medical certificates to qualified airmen.
- Continue to issue medical clearances to ATCSs.
- Continued conduct of compliance and enforcement surveillance inspections of aviation industry employers that have required employee drug and alcohol testing programs.
  - Manage the FAA "internal" substance abuse testing program.
  - Oversee the Aviation Medical Examiner (ME) Training and Oversight program for designees.

Office of Rulemaking (ARM) directs and manages FAA's rulemaking program and supports the agency's regulatory priorities.

Anticipated FY 2012 accomplishments include:

- Developing and implementing a strategic plan to address the recommendations received from the Independent Review Team.
- Continued implementation of a strategic plan to address the recommendations received from the Independent Review Team.
- Process 80 percent of exemption requests within 120 days.

Anticipated FY 2013 ARM accomplishments include:

- Sending critical safety rules to the Office of the Secretary of Transportation within 90 days of planned date.
- Continued processing of 80 percent of exemption requests within 120 days.
- Continuing improvements in FAA's rulemaking program.

Accident Investigation and Prevention Service (AVP) investigates aviation accidents and incidents to identify unsafe conditions and trends in the NAS and coordinates the corrective action process. The organization also provides analytical capabilities based on SMS principles and sound safety data analysis and process sharing, incorporating future hazardous/emerging risk assessments affecting the entire air transportation system and industry.

Anticipated FY 2012 accomplishments include:

- Leading ongoing agency efforts to effectively address National Transportation Safety Board (NTSB) recommendations issued to the FAA.
- Collecting safety data at a national level and consolidating the data under ASIAS.
- Conducting investigations of at least 85 percent of all GA accidents and 90 percent of all fatal GA accidents.
- Assisting China with adopting Commercial Aviation Safety Team (CAST) enhancements in order to maintain China's safety performance during growth of the aviation systems.

Anticipated FY 2013 AVP accomplishments include:

- Leading ongoing agency efforts to effectively address NTSB recommendations issued to the FAA.
- Collecting safety data at a national level and consolidate the data under ASIAS.
- Overseeing FAA adoption of the SMS.
- Analyzing data in conjunction with activity surrounding major accident investigations.
- Leading government/industry efforts for the CAST and the GA Joint Steering Committee.

Air Traffic Safety Oversight Service (AOV) provides safety oversight of the Air Traffic Organization (ATO), including oversight of SMS, new acquisitions, ATC procedures and operations, technical operations, and personnel certification criteria.

Anticipated FY 2012 accomplishments include:

- Conducting risk-based audits at 50 ATC Facilities.
- Conducting risk-based audits at 10 ATO Technical Operations facilities.

Anticipated FY 2013 AOV accomplishments include:

- Conducting risk-based audits at 55 ATC Facilities.
- Conducting risk-based audits at 12 ATO Technical Operations facilities.

Office of Quality, Integration, and Executive Services (AQS) provides overall planning, direction, management, and evaluation of AVS programs, as well as information technology services to all of AVS. This office also directs and manages the maintenance and improvement of the ISO-9001:2000-based QMS for all AVS services and offices, and establishes integration policy and processes for safety systems.

Anticipated FY 2012 accomplishments include:

- Supporting the creation of AVS delegation management system and migrating designee data from current systems.
- Finalizing the Service specific policies for AFS, AIR and AAM designees based on the consolidated efforts of the Designee Steering Group.
- Supporting the advancement and innovative delegation/certification system concepts, including transitioning to the new Organization Designation Authorization program.
- Supporting the further development of the Certificated Design Organization program.
- Supporting Open Government Initiative to make data available and improve on-line services and increase collaboration with citizens, stakeholders and government agencies.

Anticipated FY 2013 AQS accomplishments include:

- Continuing to support the AVS delegation management system as well as migrating designee data from the current systems.
- Continuing to support the advancement and innovative delegation/certification system concepts, including transitioning to the new Organization Designation Authorization program.

- Continuing to support the Open Government Initiative to make data available and improve on-line services and increase collaboration with citizens, stakeholders and government agencies.
- Developing, managing, and maintaining the full spectrum of information systems that provide aviation safety data used throughout AVS, other FAA lines of business and outside safety organizations such as the NTSB.
- Providing technology support services and information security to a mobile AVS workforce as well as external users of AVS information systems.

AVS supports the Department of Transportation's Strategic Plan's Safety Goal – specifically contributing toward the outcome of reducing transportation related injuries and fatalities. AVS activities in support of the safety strategic plan safety goal include:

- Establishing regulations and standards, conducting inspections, audits, surveillance, investigations, enforcement and certification activities related to operators, airmen and designees, aircraft manufacturers and suppliers. AFS, AIR, AAM and AVP partner with other AVS organizations, other FAA lines of business and other aviation agencies to assist with NextGen implementation. AVS also promotes safety of flight for civil aircraft and air commerce.
- Providing project management and analytical support to FAA teams on all agency rules as well as safety critical data analysis of the aviation industry. ARM and AQS work with other AVS organizations, FAA lines of business and other aviation agencies to help support system safety.
- Establishing, approving and accepting safety standards in providing independent oversight of the ATO through safety surveillance, audits, and targeted inspections; monitoring ATC procedures and operations, technical operations and facilities, personnel certification criteria; establishing standards and managing the credentialing of ATO safety personnel, including air traffic controllers and airway transportation specialists, executing approvals, acceptances, or updates of new ATO safety standards, waivers, or modifications and monitoring the daily operations of the NAS.
- Providing accident and incident investigation services, as well as safety critical data analysis of the aviation industry. We work closely with the NTSB for appropriate aviation-related matters.
- Directing and managing the maintenance and improvement of the ISO-9001:2000-based QMS for all AVS services and offices and establishing integration policy and processes for safety systems.

3. Why Is This Particular Program Necessary?

Most AVS responsibilities are based on statutes, regulations, orders and policy. AVS personnel establish safety standards, ensure compliance with those standards, and provide ongoing oversight of FAA approval/certificate holders. We also certify pilots, mechanics and others in key aviation positions and provide oversight of the Air Traffic Organization. These efforts have enabled us to achieve the safest period of civil aviation in aviation history. Without these necessary and essential services, the potential for aircraft accidents would dramatically increase.

The AVS organization is necessary to continue safe aircraft operations and maintenance for commercial and general aviation operators. Without these essential services:

- Continued operational safety of air carriers and air agencies would be jeopardized and the potential for aircraft accidents would dramatically increase, resulting in loss of property and/or life.
- Activities involving certification programs would decline significantly and limit airlines' ability to grow and to adapt to changing economic conditions, negatively impacting the national economy.
- Our ability to investigate accidents and incidents would be diminished. These investigations are necessary to find and fix safety problems before they become major deficiencies in the National Airspace System

The AVS organization is responsible for approving the design and manufacture of aeronautical products and parts (including replacement parts to maintain the operation and safety of the existing fleet). Without these functions, there would be no safety system governing aircraft design, manufacture, and oversight and the flying public would encounter unsafe aircraft. Similarly, AVS has the responsibility of determining if a person is medically qualified to operate an aircraft. If the organization did not determine if the pilot was medically competent to operate an aircraft, individuals with debilitating medical conditions could attempt to fly and cause an accident with potentially disastrous consequences. AAM's Air Traffic Controller Specialist (ATCS)

Health Program protects public safety by ensuring that ATCS are medically fit to perform their duties. AAM leverages resources through Aviation Medical Examiner (AME) who ensure ATCS are medically fit to control air traffic operations within the NAS.

The AVS mission is carried out by seven organizational units, each having a responsibility for providing safety services for the National Airspace System (NAS). The following paragraphs identify specific programs and responsibilities within the AVS services and offices that support safety:

Within AVS, AFS is responsible for certification and surveillance of U.S. air carriers and foreign air carriers operating in and over the U.S. through the establishment and oversight of safety requirements, standards and regulations. AFS operations vital to aviation safety include:

- Promoting the flight safety of civil aircraft in air commerce by setting certification standards for air carriers, commercial operators, air agencies, and airmen (except ATC operators).
- Directing, managing, and executing certification, inspection, and surveillance activities to ensure the adequacy of flight procedures, operating methods, airman qualification and proficiency, aircraft maintenance, and maintenance aspects of continued airworthiness programs.
- Managing systems for the registry of domestic civil aircraft and official airman records and supporting law enforcement agencies responsible for drug interdiction.
- Supporting strategic partnership efforts with other AVS organizations, FAA lines of business and other aviation agencies.
- Providing regulatory and technical assistance to international civil aviation authorities.
- Performing surveillance and certification of foreign repair stations.
- Providing certification and operation policy recommendations governing foreign air operators operating within the United States.

AIR has the regulatory responsibility for type, production, and airworthiness certification of civil aeronautical products and parts. AIR's functions which are essential to ensure the safety of the NAS include the following:

- Establishing safety standards and procedures governing the design, production, and continued airworthiness of aircraft and aircraft parts.
- Approving aircraft design, aircraft engines, propellers, and parts.
- Issuing approvals to manufacturing facilities upon showing compliance to the applicable safety standards.
- Determining whether aircraft meet applicable standards and are safe to fly.
- Providing oversight and surveillance of approval holders to ensure continued compliance to safety standards.
- Collecting and reviewing safety data, performing trend analysis, and taking the appropriate actions to ensure continued operational safety of the existing fleet.
- Managing designee qualifications, appointments and oversight.
- Investigating possible violations and initiating compliance and enforcement actions.
- Partnering with other AVS organizations, FAA lines of business and other aviation agencies to equip aircraft with technology to support NextGen.

AOV has the regulatory responsibility to provide independent safety oversight of the ATO and monitor ATO's compliance with safety standards and the SMS. AOV accomplishes its safety oversight functions by:

- Executing investigations of ATO accidents, incidents, and other occurrences that happen within the NAS.
- Approving changes to separation standards, procedures, new systems, hardware, and automation modifications and upgrades.
- Conducting system audits based on risk factors for accidents, incidents, Operational Errors, Operational Deviations, Runway Incursions, or significant non-compliance with approved safety standards in over 600 Air Traffic facilities.
- Analyzing the causes of Operational Errors to enable development and implementation of safety critical corrective actions.

AAM is responsible for a broad range of external and internal aviation safety programs related to medicine. These safety critical programs include:

- Developing and maintaining medical standards for pilots and ATCSs.
- Implementing and managing systems to medically certify commercial and GA pilots.
- Processing pilot medical certification and appeal cases.
- Managing medical clearance of air traffic controller specialists.
- Designating and overseeing Aviation Medical Examiners (AMEs).
- Conducting compliance and enforcement inspections of aviation industry drug and alcohol testing programs.
- Implementing and overseeing drug and alcohol testing of FAA employees in safety critical and security jobs.

ARM is responsible for ensuring FAA regulations are developed improve safety levels and are developed according to approved processes and are completed within mandated timelines. ARM accomplishes its rulemaking functions by:

- Developing, with the assistance of other internal stakeholders, FAA's rulemaking priorities for the current year and out-years.
- Coordinating the development of rules with all internal and external stakeholders.
- Processing petitions for rulemaking and petitions for exemption received from the aviation community.
- Developing and implementing improvements to critical FAA rulemaking and exemption processes and systems, and facilitates the ability of internal stakeholders to support such processes and systems.

AFS, AIR, AAM, and AOV will partner with other AVS organizations, FAA lines of business and other aviation agencies to implement NextGen. Additional specific skill sets are needed to develop standards, rulemaking and policy for flight technologies and procedures supporting safe flight using Enhanced Flight Vision System, Synthetic Vision systems, Area Navigation/Required Navigation Performance procedures, ADS-B and NextGen weather in the cockpit initiatives. ADS-B represents the foundation of the NextGen air traffic system. Unmanned aircraft systems are playing an increased role in daily operations in the NAS and must be safely integrated.

The implementation of Performance-Based Navigation within the NextGen framework requires changes in the character and manner by which instrument procedure standards and criteria are developed. Certification and Flight Standardization Boards of New Aircraft provide risk assessments and safety analyses and are required to prepare the NAS for the introduction of new aircraft. This includes international introduction of new aircraft as well. AVS is responsible for delivering new training on the certification, installation and operation of the new NextGen equipment to inspectors in multiple NextGen technologies.

The requested funding level will enable AVS to maintain resources for surveillance and oversight of the existing aviation fleet and production manufactures. The request will also enable AVS to accomplish NextGen implementation and certification services.

4. How Do You Know The Program Works?

Our effectiveness is acknowledged by stakeholders who continue to operate in a safe aviation system. As regulators, we are unique by the nature of what we do. Our work typically receives public attention only following an accident, incident, or other unwished-for circumstances, while our successes often go unnoticed. AVS is moving from diagnostic to prognostic identification of risk factors that are causal factors of accidents or incidents to learn and find ways to enhance aviation safety.

Although AVS continues to meet performance goals, the increased introduction of new aircraft technologies (both commercial and GA,) and the longer life expectancy of the current fleet has heightened public, Congressional and DOT-Office of Inspector General inquiries regarding aviation safety concerns. This requires AVS to increase its focus on risk-based analysis, information technology and designee management to mitigate these concerns.

AVS programs continue to contribute to the unparalleled safety of American aviation. The commercial air carriers' fatality rates per 100 million persons on board were not to exceed 8.1 for FY 2010. The FAA exceeded the goal by achieving a rate of 0.3 fatalities.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The requested funding level will enable AVS to maintain the staffing growth provided in the FY 2012 Consolidated and Further Continuing Appropriations Act. Our strategic goal for staffing is to have the right number of safety critical and support employees in the right locations thereby providing the aviation community with increased surveillance and oversight of air carriers, GA operations and repair stations. This request will enable oversight, audit activities and certification activities for FAR Parts 121, 135, and 145 and manufactures to be maintained at the FY 2012 level in FY 2013. However, if FAA employment levels are reduced, certification services for new operators and manufacturers may take longer.

The request enables AVS to continue providing oversight and surveillance, rulemaking and certification services for existing and new operators and manufacturers. As the number of aircraft flying in the NAS grows, and new aircraft models and technologies are introduced, they will continue to be sequenced based on available resources.

The market segment will be serviced based on AVS resource availability in an attempt to limit delays for new technologies that will be important for operators and controllers. AVS will be required to continue to balance certification resources against the need to maintain safety operations for the existing fleet and production manufacturers.

Explanation of Funding Changes

	Dollars ($000)	FTE
Aviation Safety	**+$2,009**	**+27**

For FY 2013, the Associate Administrator for Aviation Safety requests $1,255,000,000 and 7,497 FTEs to meet its mission. The FY 2013 request represents an increase of $2,009,000 and 27 FTEs above the FY 2012 request level. The FY 2013 request level reflects annualization of FY 2012 new hires; unavoidable and uncontrollable pay raises and inflation.

Unavoidable Adjustments	**+$10,715**	**+27**
FTE Annualization: This adjustment represents the annualized cost of the FY 2012 new hires and attrition.	3,430	+27
Pay Inflation: This increase is required to provide for costs associated with base salary increases. The factor used is 0.5 percent.	3,415	
One Additional Compensable Day: This increase is needed to provide for one additional compensable day in FY 2013.	3,870	
Uncontrollable Adjustments	**+$2,298**	
Contract Pay Raises: Costs are associated with the National Air Traffic Controllers Association Multi-Unit pay article that was awarded by an arbitrator in January 2011 and will run through December 31, 2014. The contract covers about 1,700 employees across six FAA offices (AVS, ATO, ARC, ARP, AGC, and ABA) and includes engineers, computer specialists, program analysts, budget analysts and other professionals. In FY 2012, the only incremental cost is a lump-sum bonus equal to 1.5 percent of base pay, which was paid in October 2011. In FY 2013 and FY 2014, the primary cost driver is a guaranteed basic pay raise of 3.2 percent in January 2013 and 3.75 percent in January 2014.	+2,298	
Discretionary Adjustments	**-$11,004**	
Administrative Efficiencies: AVS will achieve cost reductions of $11,004,000; through reductions in contractual services, supplies and travel. The staffing cost reductions will occur by significantly limiting hiring behind attrition in the first two quarters of the fiscal year. Non-labor cost efficiencies will occur as funding is constrained to stay within budget levels.	-11,004	

AVS Primary Customer Base
(General Public is our Ultimate Customer)

Air Operator Certificates: 6,110	**Active Pilots: 747,775**
116 Major Air Carriers – (e.g. United Airlines)	149,951 ATP
2,350 Commuter Air Carriers/On Demand Air Taxis	139,766 Commercial
161 Commercial Operators (e.g. Baltimore Orioles)	242,597 Private
454 Foreign air carriers (e.g. Lufthansa)	260 Recreational
331 External Load (Logging/Oil Platform)	2,557 Sport
2,189 Agricultural Operators	85,663 Student
509 Public Use Authorities (State/City/Police)	126,981 Foreign Pilot
Air Agency Certificates: 5,803	**Non-Pilot Air Personnel: 721,740**
554 Pilot Training Schools	368,548 Mechanics & Repairmen
4,957 Repair stations	41,948 control Tower Operators
171 Maintenance Training Schools	154,400 flight Attendants
121 Pilot Training Centers	74,997 Ground Instructors
	81,847 Other (Dispatchers/Flight Navigators/Parachute Riggers/Flight Engineers
Aircraft: 319,549	
7,705 Air Carrier Aircraft	**Flight Instructors: 93,612**
576 Commuter Air carrier Aircraft	
12,504 On-Demand Air Taxi Aircraft	**Airmen Medical Examinations: 438,699**
207,087 General Aviation Aircraft	21,946 Special Issuances
91,677 Inactive Aircraft	416,753 Special Issuances
Aviation Authorities – Other Countries	**Approved Manufacturers: 1,647**
30 Bilateral Agreements	
105 Foreign Carrier Aviation Authorities	**Aviation Industry Entities Covered by Anti-Drug & Alcohol Programs: 7,200**
188 Accident Investigation Authorities	
Check Airmen: 7,592	**National Transportation Safety Board**
5,590 Part 121	75 Safety Recommendations (5-year average)
201 Parts 121/135	30 Major Investigations (avg/yr)(new)
1,801 Part 135	
	ATCS Medical Clearance Exams: 17,669
Designees: 11,095	17,598 Controller Workforce
4,656 Aircraft Certification	71 Flight Service Station Workforce
1,444 Flight Standards	
4,995 Aerospace Medicine	**Occupational/Employee Health Services**
	48,853 FAA Employees
Mechanics with Inspection Authority: 20,458	

As of January, 2012

Staffing Information

	FY 2011 Actual	FY 2012 Enacted	Proposed Change	FY 2013 Request
Direct Full Time Equivalents (FTEs)	**7,442**	**7,470**	**+27**	**7,497**
Flight Standards	5,248	5,256	+17	5,273
Aircraft Certification	1,314	1,321	+10	1,331
Aerospace Medicine	376	382	0	382
Rulemaking	33	35	0	35
Air Traffic Safety Oversight	127	128	0	128
Accident Investigation and Prevention	65	66	0	66
Quality, Integration and Executive Services	279	282	0	282
End of Year Employment (FTP)	**7,338**	**7,455**	**0**	**7,455**
Flight Standards	5,190	5,254	0	5,254
Aircraft Certification	1,292	1,319	0	1,319
Aerospace Medicine	364	369	0	369
Rulemaking	33	36	0	36
Air Traffic Safety Oversight	123	133	0	133
Accident Investigation and Prevention	64	67	0	67
Quality, Integration and Executive Services	272	277	0	277

AVS Actual Staffing data reflects on-board as of the last full pay period of FY 2011. AVS staffing on September 30, 2011 was 7,467 employees.

Safety Critical / Operational Support Staffing
End of Year Employment, Full Time Permanent

	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request
Flight Standards	**5,190**	**5,254**	**5,254**
Engineers	14	12	12
Aviation Safety Inspectors	4,040	4,104	4,104
Safety Technical Specialists	447	448	448
Operational Support	689	690	690
Aircraft Certification	**1,292**	**1,319**	**1,319**
Manufacturing Safety Inspectors	252	258	258
Pilots, Engineers and CSTAs	715	734	734
Safety Technical Specialist	169	170	170
Operational Support	156	157	157
Aerospace Medicine	**364**	**369**	**369**
Physicians, Physician Assistants, Nurses	54	55	55
Alcohol/Drug Abatement Inspectors	65	68	68
Safety Technical Specialist	205	206	206
Operational Support	40	40	40
Air Traffic Safety Oversight	**123**	**133**	**133**
AOV Safety Inspectors	55	58	58
Air Traffic Controllers	63	68	68
Safety Technical Specialist	5	7	7
Operational Support	55	58	58
Rulemaking	**33**	**36**	**36**
Safety Technical Specialist	30	33	33
Operational Support	3	3	3
Accident Investigation and Prevention Service	**64**	**67**	**67**
Air Safety Inspectors	10	10	10
Safety Technical Specialist	47	48	48
Operational Support	7	9	9
Quality, Integration and Executive Services	**272**	**277**	**277**
Safety Critical Staff	125	126	126
Operational Support	147	151	151
Total	**7,338**	**7,455**	**7,455**
Safety Critical Staff	6,291	6,398	6,398
Operational Support	1,047	1,057	1,057

AVS Actual Staffing data reflects on-board as of the last full pay period of FY 2011. AVS staffing on September 30, 2011 was 7,467 employees.

Resource Summary
(Dollars in Thousands)

		FY 2011 Actual	FY 2012 Enacted	FY 2013 Request
Flight Standards		**$835,181**	**$830,778**	**$833,087**
	pcb	698,170	694,038	699,138
	o/o	137,011	136,740	133,949
Aircraft Certification		**207,481**	**209,269**	**209,969**
	pcb	186,622	188,768	189,468
	o/o	20,859	20,501	20,501
Aerospace Medicine		**55,003**	**55,352**	**55,352**
	pcb	43,297	43,973	43,973
	o/o	11,706	11,379	11,379
Rulemaking		**6,060**	**6,111**	**6,111**
	pcb	4,235	4,405	4,405
	o/o	1,825	1,706	1,706
Air Traffic Safety Oversight		**22,449**	**22,619**	**22,619**
	pcb	17,945	20,282	20,282
	o/o	4,504	2,337	2,337
Accident Investigation & Prevention Service		**20,146**	**20,319**	**20,319**
	pcb	10,390	10,730	10,730
	o/o	9,756	9,589	9,589
Quality, Integration and Executive Services		**110,512**	**108,543**	**107,543**
	pcb	39,070	44,131	44,131
	o/o	71,442	64,412	63,412
Total, Aviation Safety		**$1,256,832**	**$1,252,991**	**$1,255,000**
	pcb	999,729	1,006,327	1,012,127
	o/o	257,103	246,664	242,873

As of January 2012

Workload Indicators

	FY 2011 Actual	Estimated Change	FY 2012 Estimate	Estimated Change	FY 2013 Estimate
Flight Standards					
Airmen Certification Activities	151,390	-22.1%	117,867	-25.5%	87,840
Operator Certification/Certificate Management Activities	91,509	2.1%	93,444	1.2%	94,564
Investigation Activities	37,454	-3.7%	36,070	-1.7%	35,440
Non-ATOS Air Operator/Air Agency Surveillance Activities [Includes other than Part 121 Carriers]*	214,021	-4.9%	203,534	-3.5%	196,466
ATOS Operator Surveillance Activities	92,903	3.3%	96,002	4.7%	100,509
Enforcement and Investigation Activities	12,833	-7.1%	11,921	-3.1%	11,546
Education and Safety	10,760	-1.0%	10,650	0.0%	10,650
Aircraft Registration Activities	172,300	16.3%	200,357	12.2%	224,882
Airmen Certification Activities	225,859	3.0%	232,635	3.0%	239,614
Aircraft Certification					
TC/STCs Issued	1,000	2.0%	1,020	0.0%	1,020
Other Design Approvals Issued	3,066	1.3%	3,106	0.0%	3,106
Production Approvals Issued	65	0.0%	65	0.0%	65
Airworthiness Directives Issued	350	1.4%	355	0.0%	355
Certificate Management Audits	2,337	1.8%	2,378	0.0%	2,378
Aerospace Medicine					
Applications Processed/Received	378,187	0.0%	378,187	0.0%	378,187
DWI/NDR Recommendations Processed	7,099	0.0%	7,099	0.0%	7,099
Number of AMEs	3,515	0.0%	3,515	0.0%	3,515
Anti-Drug and Alcohol Registrations Completed	175	0.0%	175	0.0%	175
Anti-Drug and Alcohol MIS Annual Reports	3,250	0.0%	3,250	0.0%	3,250
Compliance and Enforcement Inspections	1,750	0.0%	1,750	0.0%	1,750
Number of Drug Tests	11,027	0.0%	11,027	0.0%	11,027
Number of Alcohol Tests	3,711	0.0%	3,711	0.0%	3,711
Accident Investigation and Prevention					
NTSB Recommendations Received	100	5.0%	105	0.0%	105
Accidents/Incidents Investigated	30	0.0%	30	0.0%	30
Follow-up Investigations	275	9.1%	300	0.0%	300
Special Accidents/Incidents Investigated	235	6.4%	250	0.0%	250
NTSB Hearings Participated In	2	33.3%	3	0.0%	3
FAA Recommendations Received	282	15.2%	325	0.0%	325
NTSB Requests Received	620	4.8%	650	0.0%	650
Rulemaking					
Exemptions	398	5.5%	420	0.0%	420
Petitions for Rulemaking	20	0.0%	20	0.0%	20
Rulemaking Projects	33	-9.1%	30	0.0%	30
Aviation Rulemaking Advisory Committee					
Tasks	3	-33.3%	2	0.0%	2
Recommendations	4	-50.0%	2	0.0%	2
Air Traffic Safety Oversight					
Safety Analysis and Audits	153,400	9.8%	168,500	0.0%	168,500
Safety Incident Investigations	12,569	0.0%	12,569	0.0%	12,569
Air Traffic Change Approvals	17,598	-40.9%	10,400	0.0%	10,400
Safety Report Reviews	18,295	34.5%	24,599	0.0%	24,599
Airmen Credentialing/Examination	27,899	0.0%	27,899	0.0%	27,899
Education and Safety	46,985	11.7%	52,500	0.0%	52,500

As of January 2012

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Commercial Space Transportation (AST)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$16,271**	**75**	**1**	**73**
Unavoidable Adjustments	**+$83**			
FTE Annualization				
Pay Inflation	+41			
One Additional Compensable Day	+42			
Uncontrollable Adjustments				
Contract Pay Raises				
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**+$346**			
Operational Safety Oversight	+846			
Spaceport Grants	-500			
Performance Based Navigation (PBN)				
Administrative Efficiencies				
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$16,700**	**75**	**1**	**73**

Executive Summary: Commercial Space Transportation (AST)

1. What Is The Request And What Will We Get For The Funds?

The request of $16,700,000 and 73 FTE / 75 FTP allows AST to ensure protection of public, property, and the national security and foreign policy interests of the United States during commercial space launch or reentry activities and to encourage, facilitate and promote U.S. commercial space transportation. Key outputs of the request include the issuance of licenses and permits to support a significant number of space launch or reentry activities, plus conduct of a corresponding number of inspections, continuation of operational safety oversight related to commercial human spaceflight activities, and continuation of basic and applied research.

2. What Is The Program?

AST regulates commercial space launch and reentry operations. Safety is our top priority, and our specific actions to ensure safe operations include developing and publishing regulations; granting licenses, experimental permits, and safety approvals; conducting safety inspections; and supporting range operations and space traffic management activities. The license and permit application process also includes conducting environmental assessments. Additionally, AST facilitates the economic competitiveness of the commercial space transportation industry.

3. Why Is This Particular Program Necessary?

AST was established in 1984 by Executive Order to provide a one-stop-shop in overseeing commercial space transportation activities. A key challenge that we are facing today involves the beginning of a new era in commercial human spaceflight: suborbital human spaceflight (space tourism) and orbital crew transportation to the International Space Station. Publication of the National Space Policy signals an even greater role for the commercial space industry in America's overall space strategy and utilization of space-based systems. AST's activities support this growth in the commercial space industry.

4. How Do You Know The Program Works?

AST's safety record to date has been excellent: since 1989, we have licensed 205 commercial space launches without any loss of life, serious injuries, or significant property damage to the general public. This record has been maintained while experiencing significant growth in the number of space launch operators and spaceports.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

In December 2009, the Government Accountability Office (GAO) reported that the U.S. commercial space launch industry is expected to expand as space tourism develops and NASA starts to rely on the commercial sector for space transportation requirements (Report GAO-10-286T available at *http://www.gao.gov/new.items/d10286t.pdf*). In addition, NASA's Commercial Cargo Resupply Services Program, Suborbital Flight Opportunities Program, and the Commercial Crew Program have all resulted in requirements for AST coordination and engagement preparatory to licensing activities. This expansion of the industry will directly increase AST's regulatory safety workload.

Detailed Justification for – Commercial Space Transportation (AST)

What Do I Need To Know Before Reading This Justification?

NASA retirement of the Space Shuttle in 2011 shifted responsibility for International Space Station cargo delivery from NASA's Space Shuttle launches to commercial space launches, and thus into the AST licensing regimen. AST regulates all commercial space transportation activity. In the National Space Policy released on June 28, 2010, the United States "is committed to encouraging and facilitating the growth of a U.S. commercial space sector that supports U.S. needs, is globally competitive, and advances U.S. leadership in the generation of new markets and innovation-driven entrepreneurship."

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Commercial Space Transportation
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Total	**$15,021**	**$16,271**	**$16,700**	**$429**
Core Business Operations	14,021	15,271	15,700	+429
Center of Excellence	500	1,000	1,000	0
Spaceport Grants	500	0	0	0

During FY 2012 execution, AST reduced the spaceport Grants funding to further support core business operations.

FAA's Commercial Space Transportation Program requests $16,700,000 and 73 FTE / 75 FTP for FY 2013. This is an increase of $429,000 (2.6 percent) over the FY 2012 enacted budget. This funding will allow AST to ensure the protection of the public, property, and the national security and foreign policy interests of the United States during commercial space launch or reentry activities and to encourage, facilitate and promote U.S. commercial space transportation. All space launches and reentries by U.S. citizens except those "by and for the U.S. Government" require a license from FAA. AST currently is administering 11 active launch licenses for launches of Pegasus, Taurus, Atlas V, Delta IV, Delta II, and Falcon 9. There are currently eight licenses for launch site operations and two license amendments submitted for significant launch site license modifications.

The FY 2013 budget request provides the resources necessary for AST to meet a significant increase in commercial space launch and reentry operations in 2013. Based on industry provided launch manifests and planned flight test programs, AST forecasts more than 40 launch and reentry operations in 2013, a tenfold increase from 2011 operations. This increased commercial launch rate reflects a higher flight rate by experienced launch operators under multi-launch operator's licenses from existing spaceports, as well as new launch licenses and permits for newly developed launch systems and spaceports which are the direct result from current NASA and USAF investments in the commercial space launch industry. AST is already performing initial safety analyses for some of the new launch systems and spaceports forecast to be operating in 2013.

The increased activity levels in the commercial space industry creates a factor of six increase in the corresponding number of licenses evaluated and issued, environmental assessments, safety analyses, and safety inspections for AST staff. To meet these increased workload demands, AST will use the additional funds to augment our existing staff by employing up to ten safety experts through contract mechanisms. This will allow AST to double the number of our staff assigned to operational safety oversight functions in our field offices, and also to increase the number of simultaneous safety analyses we can perform. AST expects to continue developing new rulemaking projects (or revising existing regulations) to keep regulations current with the increasing complexity and diversity of new manned space launch and reentry systems, including the new hybrid launch systems which blend aircraft and rocket systems to operate at the edge of space.

The request also allows us to actively and continuously participate in joint United States Air Force (USAF) / FAA Common Standards Working Groups and in the USAF Range Commanders Council to maintain common launch safety requirements at Air Force launch sites. Additionally, we will be able to aid the Department of Defense (DoD) in understanding commercial space entrepreneurial capabilities and their potential to fulfill military requirements. Because commercial entities typically launch out of U.S. military launch facilities (ranges), we work closely with our Air Force partners to report and resolve any issues of public safety non-compliance. AST has four full-time employees located at Patrick AFB (Eastern Range) for these purposes with direct support provided from other AST staff as required. We also collaborate within FAA to ensure commercial space transportation requirements and operating characteristics are effectively captured within the evolving NextGen system requirements and that commercial spaceflight operations are safely integrated within the NAS.

The distribution of FY 2013 resources among AST's core business operations is illustrated in the table below, identifying both manpower and total funds allocations to the core business functions.

			(Dollars in Thousands)			
FY 2013 Program/Function	FTE	%	PC&B	Non-PCB	Total	%
Core Programs Total	**73**	**100%**	**$11,400**	**$5,300**	**$16,700**	**100%**
Licenses, Permits, Safety Approvals	12	17%	1,950	68	2,018	12%
Regulations and Analyses	11	16%	1,800	1,150	2,950	17%
Range and Field Operations	10	13%	1,500	450	1,950	12%
Resource Management and Administration	10	13%	1,500	877	2,377	14%
Safety Inspections	8	11%	1,200	82	1,282	8%
Space Transportation Integration	5.5	9%	975	11	986	6%
Industry Viability	6	8%	900	702	1,602	10%
Safety Research	5	7%	750	1,218	1,968	12%
Environmental Analyses	3	4%	450	681	1,131	7%
International Policy and Outreach	2.5	3%	375	61	436	3%

In addition to enabling AST's core business operations, the FY 2013 request also provides resources for focused operations to address the emergence of commercial human spaceflight and related technological and infrastructure needs.

Operational safety oversight of human spaceflight will require developing technical expertise in several new areas including environmental control, life support, and crew survivability. To date, AST's launch safety oversight experience and authority has been primarily focused on unmanned launches of satellites into orbit using expendable launch vehicles (Title 49 USC, Subtitle IX, Chapter 701, July 2007). Congress's intent was for the regulatory standards governing human spaceflight to evolve as the industry matured so that regulations neither stifled technology development nor exposed crew or spaceflight participants to avoidable risks. In accordance with the new FAA reauthorization language, this eight year learning period will be extended until October 1, 2015. To further prepare FAA for its role in appropriately regulating the commercial space flight industry when this "waiting period" expires, AST will continue discussions with industry stakeholders.

AST is committed to industry-based R&D and Science, Technology, Engineering and Math (STEM) education through its Center of Excellence (COE). In 2010, the formal COE organizational structure was established to encourage the teaming of resources and capabilities of academia, industry, and government to focus on research areas of primary interest to AST and the U.S. commercial space transportation industry as a whole. FAA, under the direction of the Administrator, established the COE with the intent of funding the program at a level of $1 million per year through FY 2019. Start-up funds in FY 2010 came from No-Year RE&D funds in order to keep the COE operational until AST could incorporate this financial requirement into its base budget.

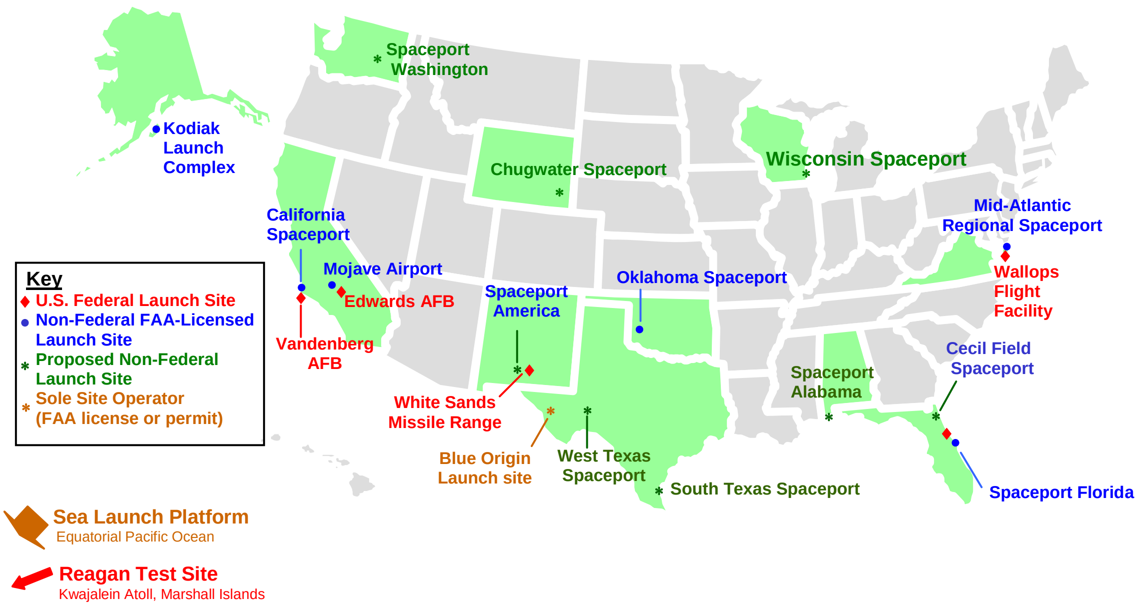
SAFETY – FY 2013 Key Outputs and Outcomes:

- Execute the licensing process for reusable launch vehicles that will carry people on suborbital trajectories.
- Process a spaceport license application for Falcon 9 launches from Vandenberg Air Force Base.

- Inspect and monitor licensed operations to ensure the license holder is in compliance with all terms and conditions of the license during launch and reentry operations.
- Make experimental permit determinations within 120 days of receiving an acceptable application, make license determinations within 180 days of receiving an acceptable application, and make safety approval determinations within 180 days of receiving a complete application.
- Develop analysis tools and models to improve the safety of commercial space transportation.
- Collect and analyze launch and reentry vehicle anomaly and failure data to track trends and monitor safety indicators.
- Continue rulemaking efforts for clarifying part 420 (License to Operate a Launch Site), parts 431 and 435 (Launch and Reentry of Reusable Launch Vehicle), part 417 (Launch Safety), and part 437 (Experimental Permit).
- Develop advisory circulars and guidance materials for commercial human spaceflight.

U.S. Spaceports

Commercial and Government Active and Proposed Launch Sites



ECONOMIC COMPETITIVENESS – FY 2013 Key Outputs and Outcomes:

- Manage research and development projects awarded to the Center of Excellence for Commercial Space Transportation.
- Provide for comprehensive environmental analyses and compliance during the development and operation of space launch sites, spaceflight preparation, and space launch and reentry activities, consistent with the National Environmental Protection Act.

2. What Is This Program?

FAA's Office of Commercial Space Transportation (AST) was established by Executive Order in 1984. Our mission is to ensure protection of the public, property, and the national security and foreign policy interests of the United States during commercial launch or reentry activities, and to encourage, facilitate, and promote U.S. commercial space transportation. Safety is our highest priority. The National Space Policy and current NASA direction reflect a greater reliance by the Federal Government on the commercial space industry to accomplish national objectives. We support the Department of Transportation's (DOT) Strategic Goals for Safety and Economic Competitiveness.

Safety

AST has an outstanding safety record. Since 1989, we have licensed 205 commercial launches without any loss of life, serious injuries, or significant property damage to the general public. We conduct safety inspections to ensure licensees and permittees are adhering to regulatory requirements. Inspections include at least one annual inspection at commercial launch site operations and at least one inspection of launch operations at time of flight.

AST activities in the support of the DOT Strategic Plan's Safety Goal include:

- Conducting inspections,
- Granting licenses, experimental permits, and safety approvals,
- Developing and issuing regulations,
- Performing accident investigation and prevention activities, and
- Supporting federal range operations and related aircraft traffic management.

Safety inspection is an AST core function that directs the monitoring of all licensed and permitted commercial space transportation activities. These activities include those conducted by the licensee/permittee, its contractors and subcontractors. All AST safety inspectors are credentialed and carry their credentials during inspections. They use approved safety inspection plans, templates, and checklists to conduct and document inspections. A safety inspection encompasses more than flight activities alone. Inspectors also monitor and participate in mission dress rehearsals, safe and arm checks, flight termination system installation and checkout, accident investigation, and other activities related to public safety. The program is built upon a firm foundation comprised of written documentation including "Safety Inspection Process and Procedures (P008)," "Safety Inspector Training & Certification Program (P008A)," "Safety Inspector Roles & Responsibilities (P008B)," and the AST qualification matrix which denotes minimum safety inspector training requirements.

Licensing is an AST core function that fulfills statutory mandates and regulatory requirements that are designed to insure public health and safety, safety of property, and compliance with U.S. foreign policy and national security requirements. Licensing includes policy and payload reviews to determine that the proposed activity does not adversely affect U.S. foreign policy or national security interests. The Commercial Space Launch Amendments Act of 2004 gives FAA the specific responsibility of regulating commercial human spaceflight, but prohibits FAA from regulating crew and passenger safety before December 23, 2012. FAA reauthorization language has extended this regulatory waiting period until October 1, 2015. FAA meanwhile will use this opportunity to further engage with industry stakeholders to better prepare the FAA for its role in appropriately regulating the commercial space flight industry when this provision expires.

AST is also responsible for licensing the operation of launch sites or "spaceports." Since 1996 we have licensed the operation of California Spaceport at Vandenberg Air Force Base; Spaceport Florida at Cape Canaveral Air Force Station; Mid-Atlantic Regional Spaceport at Wallops Flight Facility in Virginia; Mojave Air and Space Port in California; Kodiak Launch Complex on Kodiak Island, Alaska; Oklahoma Spaceport in Burns Flat, Oklahoma; Spaceport America near Las Cruces, New Mexico; and Cecil Field in Jacksonville, Florida.

Organizational Excellence

AST has reorganized and continues to improve our effectiveness and efficiency by examining our staff assignments and focusing work into new functional organizations. For example, we consolidated the Licensing, Permitting & Safety Approval functions into one organization and reassigned our staff to become specialists in AST's core operations disciplines (Safety Inspectors do only that). We are also deploying more staff to work at launch site locations to directly and more continuously oversee spaceport and launch operator operations.

Economic Competitiveness:

As the government regulator for the dynamic and challenging field of commercial space transportation, AST relies heavily on technical and industry research to maintain the necessary expertise and our understanding of the latest scientific developments. AST accomplishes the following in support of the Economic Competitiveness Goal in DOT's Strategic Plan:

- Operate a Center of Excellence for Commercial Space Transportation (COE-CST). The goal is to create a cost sharing partnership of academia, industry, and government that will focus on research areas of primary interest to AST and the U.S. commercial space transportation industry as a whole. Our purpose is to forge a union of public sector (FAA, spaceport authorities, state/local governments, etc.), private sector, and academic institutions to create a world class consortium. This union results in a dollar for dollar match of funds invested by the FAA. The COE-CST will foster research leading to the development of effective policies, procedures, and support technologies for the advancement of safe, efficient commercial space transportation in accordance with national policies and Congressional direction. The COE-CST is performing basic and applied research through a variety of analyses, development, and prototyping activities.

- Publish Research and Development Projects. Our Commercial Space Transportation Advisory Committee provides guidance in identifying and determining activities that will help us keep pace with emerging space industry developments so we can appropriately regulate and support the industry. We publish several annual and quarterly launch reports to provide information about significant changes in the commercial space transportation industry. We also maintain the STAR database, considered the "gold standard" for commercial space transportation information.

Our partners and stakeholders include the U.S. Air Force Space Command (AFSPC), specifically AFSPC Headquarters (Peterson AFB, CO), the 14th Air Force, 30th and 45th Space Wings of the U.S. Air Force, NASA, Department of State, Department of Commerce, Department of Energy, the Federal Communications Commission, other FAA lines of business, the National Transportation Safety Board, Academia (via COE-CST), plus industry and state/local governments (via COE-CST).

Anticipated accomplishments for the Office of Commercial Space Transportation include:

- Complete evaluations for one modified launch site operator license (VAFB).
- Make determinations on five launch operator licenses and three reentry operator licenses to support NASA's Commercial Orbital Transportation Services Contract. In addition, at least two other companies have informed AST they will apply for commercial satellite launch licenses.
- Conduct commercial space transportation research studies through the Center of Excellence
- Manage the execution of all research projects conducted by the COE and by other safety analysis or safety tools development support contracts.
- Make determinations related to the issuance of launch licenses for suborbital spaceflight to Scaled Composites, Blue Origin, Masten Space Systems, and Armadillo Aerospace to conduct human spaceflight and research missions.
- Continue Rulemaking efforts on part 420 (License to Operate a Launch Site), parts 431 and 435 (Launch and Reentry of Reusable Launch Vehicle), part 417 (Launch Safety), and part 437 (Experimental Permit).
- Issue multiple safety approvals to suppliers of space transportation components or services.
- Update AST explosive safety tools and models to better protect the public from launch vehicle explosions.

3. Why Is This Particular Program Necessary?

The new era of commercial human spaceflight will arrive with the issuance of the first license for suborbital human spaceflight. The X-Prize winning flight of SpaceShipOne in 2004 awakened the nation and the world to the potential for both a new space-related market and a new way of doing space business. Today our office is working with a number of different companies, each of which is in the process of designing, building, and testing rocket-powered vehicles capable of carrying people to the edge of space, where they will be able to look out at the black sky above, see the curvature of the Earth below, and experience the magic of weightlessness. We anticipate that not all of the companies engaged in this effort will be successful. Some will likely encounter technical difficulties. Others may have financial challenges. But AST has already issued permits for test flights and operations involving a variety of reusable launch vehicle concepts.

As compared to suborbital missions, orbital flights include a number of additional challenges. To begin with, the mission durations of orbital flights will be significantly greater than those for suborbital flights. While a suborbital flight will most likely be measured in minutes, orbital operations are typically measured in days. As a result, continuous reliable system performance and more complex systems are required for orbital flights.

Commercial space transportation, licensed and regulated by the FAA, is an essential element of our nation's space transportation policy. Utilizing commercial services for space transportation has been a national policy item for many years, but due to the high capital investment barriers and significant technical challenges, the commercial industry has made slow progress. Now, the commercial space entrepreneur has achieved financial and technical sophistication that allows commercial space transportation to assume in practice what has been promised in policy. NASA recognized the capability of the commercial industry and awarded the Commercial Orbital Transportation Services and Commercial Resupply Services contracts to two entrepreneurial companies. Congress recognized its value with its termination of government programs replicating available commercial space products. President Obama recognized the inherent value of commercial space transportation in his submission of the FY 2012 Budget to Congress; directing NASA to utilize commercial space transportation to fulfill low earth orbit requirements with commercially available services, freeing up valuable resources for inherently government missions and programs.

4. How Do You Know The Program Works?

The nation's space program is undergoing very significant changes. With the retirement of the Space Shuttle, NASA must rely on private industry to launch cargo, supplies, and astronauts, to the International Space Station. Because those missions will involve commercial launches, the FAA will be responsible for granting the necessary licenses. This is a challenging new responsibility, but we are continuing our work with NASA on this effort.

AST issues licenses for commercial launches of both orbital and suborbital rockets, and our stewardship and regulation has been highly effective. The first AST licensed launch was a suborbital launch of a Starfire vehicle on March 29, 1989. Since then, AST has licensed 205 launches, with no fatalities, serious injuries, or significant property damage to the uninvolved public.

Maintaining this outstanding record is our highest priority. As we gain experience with an increased number of commercial launches, we will be establishing new metrics to measure the success of our program. Current indicators of our success to date include:

- Provided direct input in the National Space Policy (June 28, 2010) which has a very strong emphasis on commercial space activities and their role in U.S. Government missions.
- Rendered a license in every case within the congressionally mandated 180 day time limit following receipt of a complete application.
- Met the congressional standard of 120 days to issue a permit in every case upon receipt of a complete application.
- Licensed eight commercial spaceports in six states within the congressional timelines in every instance upon receipt of a complete application.
- Passed every internal and external audit of our Environmental Management System.

- Implemented the Congressionally-directed Space Transportation Infrastructure Matching Grant program in just nine months.
- Identified issues early such that no major public safety related non-compliances have been identified and no resulting enforcement actions have been required.
- Awarded three Congressionally-created Safety Approvals (to NASTAR, Zero G Corp, and SpaceTEC) for their unique commercial training facilities and technician education programs.
- Created the world's first international Human Spaceflight Safety committee, co-chaired by the Government of Sweden and Virgin Galactic Corporation.
- AST has actively explored opportunities to increase international leadership in spaceflight safety, and based on our successful program, we have been asked by representatives of several foreign governments for advice on establishing spaceflight regulatory regimes.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

In December 2009, the Government Accountability Office (GAO) reported that the U.S. commercial space launch industry is expected to expand as space tourism develops and NASA starts to rely on the commercial sector for space transportation requirements (Report GAO-10-286T available at *http://www.gao.gov/new.items/d10286t.pdf*). This expansion will directly affect the AST regulatory safety role. For example, the report explains that AST will face increases in its licensing and regulatory workload. Congress will also face decisions about whether to support the U.S. industry by continuing to provide liability indemnification to lower its costs. The report then adds that AST will face policy and procedural issues when it integrates the operations of spacecraft into the Next Generation Air Transportation System and the international space traffic architecture. Finally, the report identifies coordinating the federal response to the commercial space industry's expansion as an issue for the federal government in the absence of a national space launch strategy for setting priorities and establishing federal agency roles. The report states in part, "We believe FAA has taken reasonable steps to ensure that it has adequate resources to fulfill its safety oversight role. However, if the industry begins to expand, as senior FAA officials predict, to 200 to 300 annual launches, a reassessment of FAA's resources and areas of expertise would be appropriate. Moreover, as NASA-sponsored commercial space launches increase, FAA's need for regulatory resources and expertise may change, according to industry experts we spoke with."

Reductions to the requested level would require a reduction in the scope of support for the Center of Excellence commitment. Deeper cuts would necessitate reductions in essential support services related to environmental compliance, air traffic integration, and future regulatory development authority, as well as terminating selected mission-related research. These reductions would impede the timely implementation of commercial space transportation industry support to NASA and other federal government agencies' missions; thus also impeding the President's vision for increasing the government's utilization of the commercial space transportation industry.

All commercial space transportation activities rely on FAA's licensing and permitting for safety oversight. This oversight will be seriously degraded if our funding does not keep pace with the accelerated rate of development in the industry.

Explanation of Funding Changes

	Dollars ($000)	FTE
Commercial Space Transportation (AST)	**+$429**	
Overview: For FY 2013, the Associate Administrator for Commercial Space Transportation requires $16,700,000 and 73 FTE / 75 FTP / 1 OTFTP in Operations to meet its mission of protecting the public, property, and national security and foreign policy interests of the United States during a commercial launch or reentry activity and to encourage, facilitate, and promote U.S. commercial space transportation. The FY 2013 request corresponds to an increase of $429,000 over the FY 2012 enacted level for contract support in operational safety oversight. The FY 2013 request level reflects unavoidable adjustments and non-pay inflation.		
Unavoidable Adjustments	**+$83**	
Pay Inflation: This increase is required to provide for costs associated with base salary increases. The factor used is 0.5 percent.	+41	
One Additional Compensable Day: This adjustment factors in one additional compensable day in FY 2013.	+42	
Uncontrollable Adjustments		
Discretionary Adjustments	**+$346**	
Operational Safety Oversight: Increase presence at field locations in direct response to the growing commercial launch operations and related license/permit and inspection activities being conducted across the US by the continued growing list of commercial space transportation operators and programs.	+846	
Spaceport Grants: Discretionary reduction of $0.5 million to reflect suspension of the Commercial Spaceport Grants Program.	-500	

Finance and Management (AFN)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$582,117**	**1,326**	**36**	**1,322**
Unavoidable Adjustments	**+$1,386**			
FTE Annualization				
Pay Inflation	+715			
One Additional Compensable Day	+671			
Uncontrollable Adjustments	**+$1,010**	**+5**		**+5**
Contract Pay Raises	+1,010			
Staffing Adjustment		+5		+5
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$3,073**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-3,073			
Contract Towers				
Base Transfers	**-$7,849**	**-19**	**-1**	**-20**
Hangar 6	-7,849	-19	-1	-20
FY 2013 Request	**$573,591**	**1,312**	**35**	**1,307**

Executive Summary: Finance and Management (AFN)

1. What Is the Request and What Will We Get for the Funds?

FY 2013 – Assistant Administrator for Finance and Management (AFN) – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Total	**$503,478**	**$582,117**	**$573,591**	**-$8,526**
Financial Services (ABA)	114,888	145,326	145,157	-169
Acquisition and Business Services (ACQ)	0	45,947	45,894	-53
Information Services (AIO)	48,827	52,473	52,412	-61
Regions and Center Operations (ARC)	339,763	338,370	330,128	-8,242

(Note: In FY 2011, ACQ and portions of ABA were in the Air Traffic Organization. Actuals for these entities are included in the tables for ATO for FY 2011).

On September 19, 2011, Congress supported FAA's reprogramming request creating a new shared services organization under the Assistant Administrator for Finance and Management (AFN).

A shared service is a service that is commonly needed by most, if not all, organizations across the FAA. Information technology, finance, contracting, property management, and acquisitions are all examples of shared services. AFN was developed with the goal of streamlining functions to ensure they are delivered as effectively and efficiently as possible. This new organization will deliver upon our agency's goals to improve accountability and enhance operational efficiency through the responsible stewardship of FAA resources.

AFN brings together the following four functions for the FAA:

- Financial Services (ABA)
- Acquisition and Business Services (ACQ)
- Information Services (AIO)
- Regions and Center Operations (ARC)

In FY 2012, AFN has made great strides in consolidating the organizations and we are actively looking for areas to improve. Resources are being internally realigned as the multi layered organizations are combined and streamlined. In FY 2013, it is expected that additional changes to the organization will continue as areas are identified for consolidation or business process improvements.

For FY 2013, $573,591,000 and 1,307 FTE are requested for FAA's Administrator for Finance and Management. The request provides for salaries and benefits, pay annualization, non-pay inflation, as well as one additional compensatory day. The request also includes a decrease of $3,073,000 in administrative efficiencies and the requested base transfer of Hangar 6 from the ARC component of AFN to ATO ($7,849,000). Incorporated into this submission, is a budget neutral request by AIO to increase our authorized positions and FTE by five which will result from converting contract support to federal employee status and a transfer of 19 FTP and 1 OTFTP from ARC to ATO for the Hangar 6 movement.

Function	Functional Description	Key Actions
Financial Services (ABA)	Budget formulation; budget execution; oversight; workforce planning; and financial planning and analysis.	▪ Serves as the Agency's Chief Financial Officer ▪ Provides accounting, and financial advisory services ▪ Audit liaison ▪ Investment planning and analysis ▪ Budget formulation and execution ▪ Provide/analyze pricing associated with labor negotiations ▪ Establish financial policy, guidance and internal controls ▪ Financial training development ▪ Travel card policy and management ▪ Workforce planning models/staffing standards ▪ Financial and accounting system processes, data standardization, and requirements management
Acquisition and Business Services (ACQ)	Centralized acquisition and contracting support (excluding real estate, property and transportation); acquisition policy, guidance and oversight; and acquisition workforce development, planning and training	▪ Contract award and administration ▪ Small Business development ▪ Cost/price analysis and audits ▪ Acquisition policy, guidance and tools ▪ Acquisition oversight and evaluation ▪ Administration of the FAA Purchase Card Program ▪ Investment decision and acquisition program governance ▪ Earned value management ▪ Post implementation acquisition review ▪ Streamline and automate procurement processes ▪ Acquisition workforce planning ▪ Acquisition career management and workforce training
Information Services (AIO)	Information Technology (IT) policy and strategy, protection of agency IT assets from cyber-attacks, ensure alignment between IT investment and agency business needs, and provide cost effective enterprise-wide shared IT services.	▪ Serves as the agency's Chief Information Officer (CIO) ▪ Develop and maintain the IT strategic plan for the FAA ▪ Direct the operations for FAA-wide IT resources for the Shared Services Organization ▪ Manage and provide centralized governance for FAA enterprise-wide IT function ▪ Provide IT focused process engineering, training, consultation, evaluation, and support to FAA ▪ Maintain an information management program ▪ Manage and direct the Information Systems Security Program ▪ Ensure future IT requirements are satisfied ▪ Provide IT services, local area network administration ▪ Manage the FAA Enterprise Architecture for National Airspace (NAS) and non-NAS

Function	Functional Description	Key Actions
		systems
Regions and Center Operations (ARC)	Provide oversight and management of internal and external corporate matters within the nine FAA regions and the Aeronautical Center.	▪ Provide leadership for critical FAA and NextGen initiatives ▪ Provide command, control, communication support and emergency planning ▪ Provide national policy, training, and oversight for life-cycle accountability for real, personal and government furnished property ▪ Manage FAA administrative office space ▪ Manage the national FOIA program

2. What Is the Program?

AFN provides a shared services environment for the FAA, established to consolidated common support services and provide a centralized and strategic focus for finance, acquisition, information services and the regions and center operations. AFN provides core services in these areas to support the FAA goal of continuing to provide the safest, most efficient aerospace system in the world and to optimally position ourselves to provide the next generation of air traffic management.

3. Why Is This Particular Program Necessary?

The FAA is a complex agency in that its responsibilities include not only the regulatory and oversight services provided to commercial and private aviation, but FAA also has responsibility for the operational management of air traffic services to commercial, private and military aviation.

Because of the intricacies and scope of that mission, the FAA is a large agency with more than 47,000 employees, a budget of more than $16 billion and with 63,000 facilities positioned around the world. The resource management needs for such an organization are, by the very nature of the complexity of the organization, tremendous. AFN was established to more effectively manage those resources. It will ensure the integrity, transparency, efficiency, and consistency of business, financial, information technology, acquisitions, and regions and center operations resource management and practices while allowing the regulatory and operational arms of the FAA to more closely focus on their primary responsibilities.

4. How Do You Know the Program Works?

AFN sets annual performance goals centered around the FAA and DOT goals of organizational excellence and corporate support services. For example, in the area of finance and acquisitions, we measure program performance using schedule and budget metrics and earned value management techniques.

In addition, AFN has established quantitative and qualitative memorandums of agreement with its internal support customers to ensure the support provided meets their needs and expectations. The target activities associated with these goals are monitored on a monthly basis.

5. Why Do We Want/Need to Fund the Program at the Requested Level?

The services provided by AFN are the backbone of support on which the operational and regulatory arms of the FAA rely. Space and property management, IT infrastructure, acquisition of goods and services, payment for those goods and services are just a few examples of the types of support that the FAA must obtain in order for their employees to work effectively and safely.

Approximately 56 percent of the AFN budgetary request is for payroll and rent. The vast majority of the remaining funding is slated for basic fixed operating expenses such as telecommunications, IT infrastructure and security, maintenance and operations of our financial systems, and other operating costs.

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Financial Services (ABA)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$145,326**	**235**		**242**
Unavoidable Adjustments	**+$346**			
FTE Annualization				
Pay Inflation	+178			
One Additional Compensable Day	+168			
Uncontrollable Adjustments	**+$252**			
Contract Pay Raises	+252			
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$767**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-767			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$145,157**	**235**		**242**

Detailed Justification for Financial Services (ABA)

What Do I Need To Know Before Reading This Justification?

The Department of Transportation (DOT) initiated a five-year project, led by a Business Transformation Team (BTT), to upgrade the Department-wide financial systems to Oracle's Release 12 (Oracle 12i). This project includes the migration to upgrade the core accounting system which must operate on a currently supported platform of Oracle software in order to continue to comply with Federal IT and security standards.

The upgrade means that numerous interfacing systems need to be reviewed. In addition, over 5,000 users must receive training in the use of the new core financial system that is used to record all financial transactions. We have over 100 mixed financial and program management systems that require re-engineering to continue providing essential financial data for effective management of our budget and related operations of the National Airspace System (NAS). Without the re-engineering of over 100 systems and databases that consolidate financial and operations data, the agency's managers will be unable to effectively and efficiently manage agency programs.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Assistant Administrator for Finance and Management (AFN) – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Financial Services (ABA)	$114,888	$145,326	$145,157	-$169

(Note: The FY 2011 actuals exclude portions of ABA that were in the Air Traffic Organization. Actuals for those organizations are included within ATO's FY 2011 totals).

Financial Services (ABA)

The FY 2013 budget request of $145,157,000 (a 1 percent decrease from the FY 2012 enacted level) and 235 FTEs will support the ABA program. This will provide for salaries and benefits for FTEs, as well as estimated non-pay ABA activities including ongoing program support costs to sustain continuing financial operations for the agency. The request will cover the FY 2013 activities and acquisitions necessary to support the BTT/Oracle 12i financial transformation activities. The request includes $976,000 and 4 FTEs due to the inclusion of the Assistant Administrator for Finance and Management from the shared services realignment.

Our FY 2013 key outputs and outcomes include:

- Continue to improve and simplify business processes.
- Obtain a clean audit opinion with no material weakness in internal control.
- Improve the quality, timeliness and usefulness of financial information for management decision-making.
- Implement an aggressive agency-wide cost efficiency program.
- Provide analytic, resource-based support to the agency's financial decision-making processes and in agency negotiations with our labor unions.
- Centralize agency-level functions including:
  - Investment and Planning Analysis
  - Budget Formulation and Execution management and oversight for all FAA funding
  - Pricing associated with labor negotiations and contracts
  - Financial Training Development
  - Travel Card Management
  - Workforce planning models/staffing standards development and oversight

2. What Is This Program?

ABA serves as FAA's primary budget and financial management steward overseeing and maintaining financial systems, financial policy, financial reporting and spearheading cost efficiency as well as government-wide management reforms to ensure resources are managed with integrity. Our program primarily supports the DOT goal of Organizational Excellence and the outcome of Improved Financial Performance.

ABA's Office of Budget & Programs (ABP) develops the FAA budget requests and submits budget justifications to the Department of Transportation's Budget Office, OMB and various committees of the House and Senate. ABP ensures budget needs are well justified and explained and manages Congressional activities with the appropriation committee/subcommittees including programmatic briefings, hearings, report preparations, and technical assistance. We lead the development and oversight of the FAA's performance budget ensuring that sufficient funding is available to support critical strategic plan activities and initiatives. We oversee the execution of the agency's current and prior year appropriations, manage the Airport and Airway Trust Fund, and oversee the reimbursable program. This includes issuing guidance for spending, lines of business/staff office allowances, tracking obligations versus allowances throughout the year, as well as preparing and coordinating with external authorities regarding numerous apportionment requests for all FAA organizations. ABP issues and maintains funds control policy, systems and processes for all budgetary activities, and procedures to ensure compliance with budget-related legislation, OMB circulars, and appropriation law. In dealing with the complexity of Reimbursable Agreements, we have established a multi-organizational workgroup to update national policy on the establishment and management of those agreements.

This office provides "end user" training on various financial management processes and procedures to employees across the FAA, such as funds certification, financial management, financial training, internal controls, and purchase card use. This training assists in our agency-wide effort to ensure standardization of financial processes that are consistently compliant with the proper distribution of appropriations, as well as increases our effort to reduce error-prone, redundant data entry workload. Financial policies are actively promoted through our FAA website. In promoting employees to adhere to FAA Financial policies, directives, and standard operating procedures, we have established the website as the "go to" hands on tool to increase user compliance.

The Office of Financial Controls (AFC) provides a variety of financial analyses required by the Administrator and other audiences. This office reviews all contracts above $10 million to ensure that cost estimates are reasonable, contract types are justified and contracts are competitively bid. AFC oversees all strategic sourcing activity for FAA and has been singularly responsible for implementing strategic sourcing contracts for the purchase of office supplies, office equipment, IT hardware and software, etc. The office manages the Agency's Cost Control and Efficiency Measures programs. The office has a dedicated metrics team providing reports to AFN, ATO, and other audiences. It also has a business process reengineering team that uses Six Sigma tools to suggest and implement improvements. For example, FAA is implementing changes to Air Traffic Controller hiring and training based on a recent review. Examples of the changes include improved facility placement for new hires and targeted training delivery based on requirements and aptitude.

The Office of Investment Planning & Analysis (AFI) ensures proposed capital investments undergo a rigorous investment analysis process, resulting in business cases that support Joint Resource Council decisions. The office provides full-service business case support including cost estimating, benefits analysis and operations research, business case integration, and schedule assessment. AFI works closely with the Program Management Organization and the NextGen organization to advance major capital investment decisions.

The overall financial management of the Agency is the responsibility of two component units, the Office of Financial Operations (AFO) and the Office of Financial Reporting and Accountability (AFR).

AFO leads all accounting operations, including the processing of all financial transactions as well as the management of the DELPHI general ledger system and the Procurement Requisition Information System for

Management (PRISM) system. We purchase the actual services for accounting data entry, billing, collection, payments, etc., and the management and operation of the DELPHI operating system from the Enterprise Services Center (ESC) in Oklahoma City, Oklahoma, through the DOT. AFO routinely prepares a Cost Accounting Report that determines the cost of providing FAA services. This data assists organizations in making educated business decisions. In doing this, AFO maintains and updates accounting policies and procedures and develops financial systems training so that procedures are understood and followed.

AFR has the key role of developing the consolidated financial statements of the agency, quality assurance over the agency's general ledger, and reconciling general ledger activity and balances. We provide internal control (internal audit) services including routinely examining key processes to identify and correct potential fraud, waste and abuse, as well as opportunities for increased efficiency and effectiveness and reliability of financial information – as directed by OMB Circular A-123 and other OMB guidance. AFR also issues and maintains all agency financial policy and manages the government travel charge card program for over 35,000 cardholders.

Our Information Systems and Technology (ABA-20) staff supports all IT and financial data needs of ABA and of other organizations including direct management of 26 enterprise financial systems within ABA and the Enterprise Architecture oversight of approximately 120 additional financial and mix-financial systems deployed in the other FAA lines of business and staff offices. In addition we provide IT support to the ESC for the core accounting system (DELPHI) and FAA's procurement system (PRISM). We also host and operate FAA's Cost Accounting System (CAS) and Labor Distribution Reporting (LDR) System. Changes in the alignment of this organization within AFN are anticipated as AFN actively reviews these functions and determines the appropriate segments to be moved to the new shared Information Services organization.

The Office of Labor Analysis (ALA) supports the ATC Workforce Plan goal by analyzing and refining the staffing standard models utilized in producing the ATC Workforce Plan each year for the Administrator and Congress. The plan is a key document that drives hiring, training, and staffing requirements, supports the FAA's safety mission, and meets external stakeholder requirements. We are involved in labor negotiations and other operating policy initiatives/reviews by performing cost analysis, forecasting, monitoring and fulfilling requests for data and information by FAA negotiating teams and executives. Our office plays a key role in advising Congress on the appropriate level of FAA controllers through publication and transmittal of the annual ATC Workforce Plan. We have a structured approach for planning and air traffic controller hiring, training, and placement across all FAA ATC facilities through use of the workforce plan as a business tool.

Anticipated FY 2013 Accomplishments:

- Obtain an unqualified audit opinion on agency financial statements with no material weaknesses.
- Continue to improve DELPHI enhancements to budget execution to better track about 10,000 capital project authorizations.
- Develop and enhance agency-wide training in financial management and financial systems to ensure that executives and managers understand their fiscal roles and responsibilities and that employees are better equipped to meet increased efficiency and accountability objectives.
- Improve the Data Quality Framework surrounding Federal spending information—as required by the Open Government Directive, M-10-06, to ensure the ongoing quality of Federal spending information, the effectiveness and efficiency of operations producing and disseminating financial information, and the reliability of financial information reported to the public.
- Monitor and test grant programs as required by the Improper Payments Information Act of 2002 and Executive Order 13520.
- Review acquisitions of $10 million or more to ensure the procurement represents a good investment of taxpayer resources and that appropriate alternatives were considered.
- Expand the internal controls function to more rigorously identify both financial and operational areas for improvement which promotes required transparent and detailed reporting to the public.
- Implement revised Overflight Fees to more accurately charge flights that use agency services but neither take-off nor land in the United States.
- Present effective budget requests and conduct effective program oversight; maintain required funding needs for NextGen modernization activities.
- Ensure agency funds and resources are utilized effectively and maintain compliance with the Anti-Deficiency Act.

- Continue to implement and improve the centralized structure for oversight of well over $400 million in reimbursable work.
- Produce the ATC Workforce Plan for 2013 – 2022 which is a projection of changes in air traffic forecasts, controller retirements, and staffing requirements ranges for our air traffic control facilities to support FAA's safety mission to meet external stakeholders requirements**.**
- Provide extensive software support during the deployment phase of the NAS-wide Traffic Analysis and Review Program (TARP) which supports improved measurement and analysis of safety performance.
- Collect and analyze Cost Control Efficiency data from multiple sources to identify trends in operational and overhead costs by facility such as cost per controlled flight and ATO overhead rate.
- Enhance the global leadership position of the FAA by providing analytical support to the Civil Air Navigation Services Organization (CANSO) in producing the Annual Benchmarking Report.
- Conduct a suite of formal financial training classes hosted within the FAA to standardize operating procedures, internal controls, purchase card use, and fund certification**.**
- Develop and establish, with program and management elements, numerical measures and indicators of financial performance, program performance and the resulting public benefits achieved.
- Perform analysis of agency investments and monitor acquisition program baselines.
- Support a full range of FAA acquisition decisions, including NAS and non-NAS.
- Apply business case discipline to new investment categories (e.g., facilities and variable quantity investments).
- Develop updated cost estimator training in support of the larger acquisition community.
- Continue to expand the role if the Labor Analysis group to include workforce planning and labor cost analysis for AVS and other FAA business units.

3. Why Is This Particular Program Necessary?

ABA leads the agency's efforts to achieve the Cost Control Program and Unqualified Audit Opinion performance targets. In addition to ABA's strategic work linked to the DOT's Strategic Plan, we have fundamental responsibilities to maintain a strong agency-wide foundation of accountability and financial management. We continue to support improving secure and efficient storage and exchange of critical financial information. The ability to capture this financial data ensures we achieve the President's goal of greater transparency in Government. Our organizational financial management policies further the President's goals to encourage economic growth, invest in the future, and responsibly govern the Nation.

The upgrade of the DOT core accounting system to Oracle release 12 is necessary to maintain software and system support. This will involve the migration to a newly designed version of Oracle Federal Financials. As a result of the core accounting system upgrade, we must train over 5,000 users on the upgraded system and on more than 100 program management systems that must be re-engineered in connection with the upgrade. Training is critical to the successful implementation of the new core accounting system to ensure our managers and employees are able to use and interpret timely and accurate financial data to make program management decisions. Our internal controls activities, such as testing under A-123, are also necessary to provide management with assurance that our financial and Federal spending data being disseminated to the public is reliable and that our operations are effective and efficient.

Our partners and stakeholders include:

- FAA's Line of Business/Staff Offices
- Department of Transportation
- Office of the Inspector General (OIG)
- Other Federal agencies
- Office of Management & Budget (OMB)
- Congress / Congressional Oversight Committees
- Government Accountability Office (GAO)
- Local, county and state authorities
- Airlines and equipment manufacturers
- Civil Air Navigation Services Organization (CANSO) members

4. How Do You Know The Program Works?

In recent years, there has been an increasing recognition of the need for effective oversight of financial decision-making processes. The agency has implemented oversight of proposed acquisitions, travel, and conferences, as well as new procedures, to provide executive oversight over administrative information technology investments. We believe this added oversight demonstrates how serious the agency's commitment is to ensuring that we manage the taxpayer's resources effectively.

ABA's contributions to the agency's success have been measured by how well cost and financial information are integrated into the agency's business processes and by the analytical contribution that ABA-generated information makes to data-based decision-making at the Agency and Line of Business levels. Our highest priorities include improving business processes and resolving issues related to the DOT core accounting system, DELPHI, and our acquisition system, PRISM, or cost accounting system, CAS, and the Labor Distribution Reporting (LDR) system; maintaining an "unqualified audit opinion" with no material weaknesses in internal controls with a focus on managing agency assets; and, continuing to implement and improve the Cost Control Program in support of DOT and FAA's strategic goals and objectives.

While we seek the resources to continue to improve the quality, timeliness, and usefulness of our financial data, we know the program works through several indicators:

- As external recognition of our transparency and accountability, the Association of Government Accountants recently awarded FAA its Certificate of Excellence in Accountability Reporting (CEAR) for our FY 2010 Performance and Accountability Report. We have continuously strived to clearly and simply present our performance against our performance targets and link our expenses to our strategic goals so the American people can understand how we are using our tax dollars to serve them. The recently awarded CEAR marks the seventh time we have received this award.
- Because of rigorous internal controls and carefully monitored financial processes, in FY 2011, we not only received an unqualified audit opinion with no material weaknesses, but also no significant deficiencies were noted. Since FY 2007 we have received consecutive unqualified opinions, there have been no material weaknesses since FY 2008, and no significant deficiencies in FY 2011. This trend shows substantial improvement over time.
- The cost control program resulted in $97 million in cost savings/avoidance during FY 2011. Since its FY 2005 inception, the program has achieved over $680 million in cumulative annual savings. One of the signature programs, the Strategic Sourcing for Various Equipment and Supplies program, has resulted in over $100 million in cumulative savings through the use of nation-wide contracts to leverage the agency's spending and achieve discounted pricing for purchases such as office supplies, office equipment, and IT hardware.
- We continue to improve the use of cost and program management data for effective decision-making decisions about the implementation of agency programs and resources.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The funding request of $145,157,118 is essential for ABA to continue to reinforce management financial knowledge base with the improvement of DELPHI, PRISM, CAS, and LDR data. This funding will allow us to provide configuration management and other policy, procedures, and security for FAA financial management systems thus assuring that agency executives and managers are aware of the financial information available for their use in program analysis and decision-making.

The requested funding will support the initial activities toward the upgrade of DOT's core accounting system to Oracle 12i. This upgrade will allow the FAA to improve its timeliness and accuracy of financial reporting as well as provide more program level data to agency managers. The upgrade of the DOT core accounting system will require FAA to re-engineer its mixed financial and program management systems to continue to support the agency in the management and implementation of its programs.

The requested funding also supports the evaluation of FAA capital and operational business cases for thoroughness and accuracy in preparation for investment decisions and to ensure investments meet established business case criteria. Investment Planning and Analysis plays a significant role in the development and analysis of program requirements for the NextGen programs. Funding below the requested level would not allow the FAA to complete its analysis and evaluation of many FAA capital and operational business cases, including many NEXGEN related investments.

Funding below the requested level would not allow FAA to support the development and testing of the required upgrade to the DOT core accounting system. ABA will not be able to train agency staff on the accounting system, and the agency will not be able to code, generate, and interpret financial management data in order to manage the agency's resources.

If FAA's mixed financial and program management systems are not re-engineered to comply with the upgrade to the DOT core accounting system, we will not be able to:

- Interface procurement transactions with the core accounting system; this will result in manual processing which will delay agency procurement actions.
- Develop the allocation and reporting of agency cost accounting data to program managers.
- Provide financial data to the agency's Corporate Work Plan which is used to manage FAA project implementations and reimbursable project management.
- Train over 5,000 employees on the new standardized accounting code structure. This will result in the delay of processing and impact the accuracy of FAA's accounting transactions.
- Re-engineer its financial and program systems which allow the agency to manage its programs and financial resources.
- Maintain our unqualified audit opinion with no material weakness since the agency will not be able to track and manage its program transactions in a timely and accurate manner and on a platform that continues to be supported by Oracle.
- Maintain our LDR system. This system is a key component of cost accounting data, representing labor costs which comprise about 45 percent of our total appropriated costs.

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Acquisition and Business Services (ACQ)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$45,947**	**256**	**1**	**256**
Unavoidable Adjustments	**+$109**			
FTE Annualization				
Pay Inflation	+56			
One Additional Compensable Day	+53			
Uncontrollable Adjustments	**+$80**			
Contract Pay Raises	+80			
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$243**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-243			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$45,894**	**256**	**1**	**256**

Detailed Justification for Acquisition and Business Services (ACQ)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Assistant Administrator for Finance and Management (AFN) – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Acquisition and Business Services (ACQ)		$45,947	$45,894	-$53

(Note: The FY 2011 actuals exclude portions of ACQ that were in the Air Traffic Organization. Actuals for those organizations are included within ATO's FY 2011 totals).

Acquisition and Business Services (ACQ)

The FY 2013 budget request for Acquisition and Business Services is $45,893,874 and 256 FTP/256 FTE. The request provides for salaries and benefits, pay annualization, non-pay inflation, as well as one additional compensatory day. The request also includes a reduction of $243,000 for administrative efficiencies.

The Office of Acquisition and Business Services is led by FAA's Chief Acquisition Officer and serves as the executive agent for FAA's Acquisition Management System (AMS). It is one of the four pillars within the new shared services organization, AFN. ACQ chairs FAA's investment review board (the Joint Resources Council) and manages FAA's investment management process for capital investments including Next Generation Air Transportation System (NextGen) and other major systems acquisitions. In addition to managing FAA acquisition policy and the investment decision process, the ACQ organization awards and administers all contracts and agreements for FAA Headquarters, Technical Center, Regions, and Service Centers, as well as monitors contractors' quality assurance systems and accepts or rejects systems, equipment, and materials. ACQ also manages FAA's Small Business Program and achievement of small business contract goals; manages training, certification, and workforce planning for FAA's acquisition workforce (including program managers, systems engineers, contracting officers, cost estimators, test and evaluation specialists, and other core acquisition disciplines); and conducts oversight and reviews of agency acquisitions.

Funding at the requested level will allow ACQ to accomplish/manage:

- Contract Award and Administration: Award and administer all contracts and agreements for FAA headquarters, Technical Center, Regions and Service Centers, including but not limited to all Next Generation Air Transportation System (NextGen) transformational technologies and other National Airspace System (NAS) system procurements.
- Small Business Development: Manage FAA's Small Business Development Program, including policy, guidance, and tools, to meet agency, department, and administration goals; with a specific target to award at least 25 percent of total direct procurement dollars to Small Businesses.
- Cost/Price Analysis & Audits: Provide expert-level cost/price analysis tools, training, advice, and assistance to FAA contracting and program personnel to strengthen price negotiation and ensure FAA pays fair and reasonable rates for the products and services it procures. Manage agreements with Defense Contract Audit Agency (DCAA) to perform audits of cost reimbursable, time, material, labor hour contracts with an estimated value of $100 million or more. Order audits of cost reimbursable and time, material and labor hours contracts under $100 million using non-DCAA sources.
- Acquisition Policy: Manage, update, and strengthen FAA's Acquisition Management System (AMS) to ensure FAA's acquisition policy and guidance is compliant with applicable laws and regulations. Provide clear direction to agency personnel. Support timely, proper, and best value acquisition of the goods and services that support the safe and efficient operation of the NAS.
- Acquisition Oversight: Perform nationwide contract reviews for compliance with policies and procedures, and implement corrective actions where necessary, and track findings and

recommendations, to promote consistent implementation of FAA's AMS, process improvement, and procurement integrity.

- FAA's Purchase Card Program: Provide oversight of FAA's purchase card program to ensure compliance with regulation and policy, promote uniform standards and policy interpretation, identify and take appropriate action against improper use, and realize increased cost savings through increased, compliant use of purchase cards.
- Investment Decision Process & Acquisition Program Governance: Support informed investment decisions (e.g., NextGen and other major NAS system acquisitions) by managing FAA's investment decision-making process, ensuring business cases and other documents and reviews are completed prior to presenting before investment decision authorities. Support on-going acquisition program oversight and reviews by serving as Secretariat for the Joint Resources Council. Document and track decisions and action items and maintain the official repository of baseline documents and other records. Source of documentation for internal and external stakeholders, such as Office of the Inspector General (OIG), Office of Management and Budget (OMB), and General Accountability Office (GAO).
- Earned-Value Management: Provide guidance, training, assistance, and reviews to support acquisition programs in applying Earned Value Management (EVM).
- Post-Implementation Reviews: Conduct Post-Implementation Reviews of acquisition programs to assess attainment of benefits.
- Streamline and Automate Procurement Processes: Continue development of FAA's Unified Contracting System (UCS), which will be an electronic, secure internet-based contract lifecycle management system. UCS will automate what are currently paper-intensive manual processes, provide immediate access to procurement related information leading to improved transparency and oversight, and timely, accurate reporting.
- Acquisition Workforce Plan: Manage annual update of FAA's Acquisition Workforce Plan and implement Plan strategies and initiatives. Track gains, losses, and actual on-board data for personnel in the various acquisition professions and other workforce metrics, such as certification levels. This plan is a key document that drives staffing and training/development requirements, supports FAA's strategic initiatives related to NextGen and acquisitions, and meets external stakeholder requirements.
- Acquisition Career Management: Manage training and certification programs for acquisition personnel, including program/project managers, contracting officers/specialists, Contracting Officer's Technical Representative (COTRs), systems engineers, test and evaluation specialists, and logistics specialists. Develop/maintain an acquisition workforce portal, automated certification process tool, career path guidance, and other tools and guidance to build FAA's acquisition and program management capabilities.

Key outputs expected to be achieved in budget year with the requested resources:

- Improved contract management through oversight controls.
- Audit cost reimbursable contracts over $100 million and report on DCAA audit status quarterly.
- Standardized electronic storage of procurement documentation.
- Management of the investment decision-making process and establishment of EVM and Post-Implementation Review process.
- Update cost and pricing guidance for contracting and upgrade hand-on training guides.
- Annual update of FAA's Acquisition Workforce Plan.

Key outcomes expected to be achieved in budget year with the requested resources:

- Close 85 percent of the number of cost reimbursable contracts eligible for close-out and report quarterly.
- Publish annual update of FAA's Acquisition Workforce Plan.
- Maintain Acquisition Workforce within 5 percent of projected annual staffing requirement in the Acquisition Workforce Plan.
- Award 25 percent of the total direct procurement dollars to small businesses.
- Improvement in cost and pricing resulting in receiving the best price/value for goods and services.
- Standardized maintenance of electronic procurement documentation and enhanced analysis and reporting capabilities.
- The National Acquisitions Evaluation Program (NAEP) onsite reviews commence in February 2012. Contract review sites will include HQ Systems Operations; and Central, Western-Pacific and Northwest Mountain Regions. Onsite reviews of Logistic Management specialists (LMS) will include Southern,

Western-Pacific, Northwest Mountain and Great Lakes Regions. Statistical sampling will provide a 95 percent confidence level for the FAA contract population. All reviews will be completed by July, 2012.

2. What is the Program?

Acquisition and Business Services acquires the goods and services to support the safe and efficient operation of the NAS. It supports the Department of Transportation's Organizational Excellence goal, contributing particularly to the outcome of Improved Financial Performance.

The FAA contracted for more than $4.8 billion in goods and services in FY 2011 through more than 44,000 procurement actions. These contracting actions were for essential equipment, facilities, supplies, and services to maintain FAA operations and programs and for transition to the NextGen of air traffic management services.

ACQ provides policy, oversight, training, and services in the areas of acquisition and contract administration to help FAA meet related performance targets.

We serve as the executive agent for the FAA's procurement policy (AMS), investment decision process, the Acquisition Workforce Plan, the certification program for personnel in a broad range of acquisition-related professions, and acquisition program evaluation and oversight. We also act as the agency's small business advocate.

We manage the investment decision-making process for all investment decision authorities, including the Joint Resources Council (JRC) and the ATO Executive Council, which assists agency executives in making timely and better-informed investment decisions. Additionally, we will manage the EVM and Post-Implementation Review processes on behalf of the agency in accordance with OMB, GAO, and AMS policy requirements.

We are in the second phase of development of the Unified Contracting System (UCS), an automated business process management system for procurement. It will provide an end-to-end electronic system to produce, route, manage, store, and retrieve the roughly 50,000 contractual documents that are produced yearly by the FAA. It will interface with established financial management systems, streamlining what is currently an inefficient process using paper-based records. UCS will improve oversight, standardization, management of information, and reporting capabilities. This is particularly important considering the growing complexity and volume of contracting actions.

The quality and effectiveness of the acquisition process depends on the development of a capable and competent acquisition workforce. Since FAA is exempt from the Federal Acquisition Regulation (FAR) and has its own Acquisition Management System (AMS), FAA provides AMS specific training that builds upon federal acquisition training and certification standards. The Acquisition Career Management program provides agency contracting officers and specialists with competency-based training and certification, at progressive career levels, and continuous learning training that meet and exceed government-wide standards.

Having a comprehensive Acquisition Workforce Plan is critically important as FAA transitions to NextGen while simultaneously maintaining the current system safely and effectively. Today, FAA's acquisitions are more complex than ever and require new approaches and skills to support NextGen acquisition work. The Acquisition Workforce Plan is integral to ensuring FAA's acquisition workforce staffing and professional development requirements are met in the coming years. The plan serves as FAA's guide for workforce staffing and development decisions and provides strategies for hiring, training, developing, and retaining acquisition employees.

By the end of FY 2013, the anticipated accomplishments for Acquisition and Business Services include:

- Evaluate compliance with published AMS standards and implement corrective actions where required.
- Complete implementation of all newly created procurement documents being electronically stored in a standard naming and filing convention.

- Publish annual update of FAA's Acquisition Workforce Plan and continue to build a high performing acquisition workforce capable of successfully supporting NextGen and the transformation of our NAS.
- Develop/update agency-wide acquisition policy, guidance, and tools to manage the agency's AMS.

3. Why is this Particular Program Necessary?

FAA handles 50,000 flights per day and helps transport over 700 million passengers per year, contributing to 5.6 percent of the total U.S. economy. FAA relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

Congress directed FAA to establish a set of acquisition regulations apart from the FAR. It is fundamental for us to establish and adhere to a strong acquisition policy to ensure the sustainability of the NAS and the agency as a whole. It secures the proper use and control of federally-funded contracts for services and materials. We are responsible for establishing the FAA's AMS and overseeing policy adherence.

Contracting is an inherently governmental process. Contracting officers are warranted by the Federal Government as the only individuals who can obligate the government to pay for goods and services. Warrants are graduated by knowledge, ability, and experience. Contracting officers and other workforce personnel are trained not only in the Federal laws and policies surrounding procurement but also in the specifics of the AMS. FAA issued over $4.8 billion in contract awards in FY 2011. The number and complexity of the contracts associated with the NextGen effort will substantially increase our workload in FY 2013. This effort will need to be sustained until the transition to NextGen is completed and older systems, equipment, and technologies have been decommissioned.

We are working to ensure that FAA's acquisition workforce has the right skill mix to ensure success. The acquisition workforce includes:

- Contracting Officers
- Contracts Specialist
- Program Managers
- Project Managers
- Researchers
- Engineers
- Systems Engineers
- Contracting Officers Technical Representatives
- Business and Financial Analysts
- Cost Analysts
- Logistics Specialists
- Test and Evaluation Specialists
- Procurement Attorneys
- Other Specialized Acquisition Support Personnel

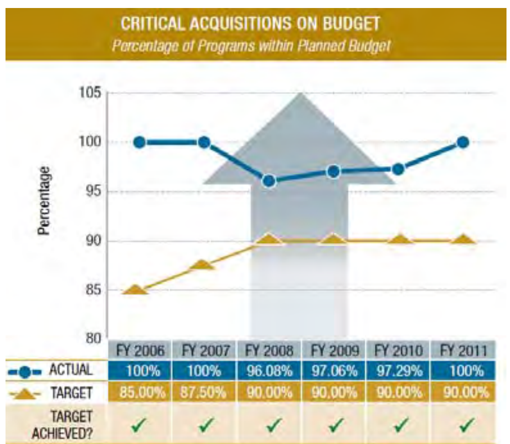
Our partners and stakeholders include both internal and external customers. Internally, we provide agency-wide support on acquisition and contracts management as well as quality assurance on major NAS Systems contract deliverables to FAA. We are an integral part of the NextGen development and support related changes to the NAS. We will also continue to support existing FAA programs. Because the FAA Acquisition Executive resides in our office, we provide procurement policy and oversight to the FAA as a whole. We lead the efforts in developing a competent and well-trained acquisition workforce.

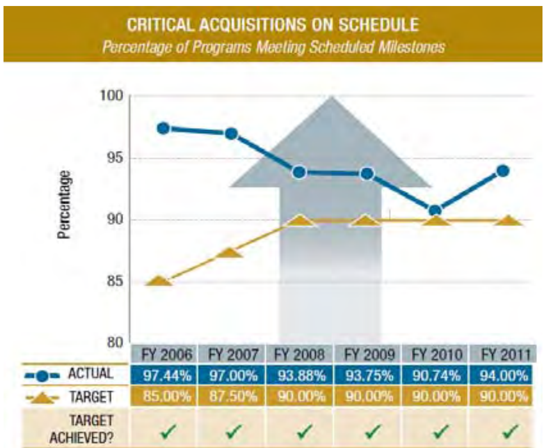
Externally, we have a reporting relationship with the DOT, OIG, GAO, OMB, and Congress. Ultimately, we support the flying public as the services provided by this office are core to the maintenance of the NAS and the development of the next generation of aircraft control and safety. Finally, we support Federal taxpayers by enforcing a sound acquisition policy to deliver best value procurement actions and control of federally funded contracts for services and materials.

4. How Do You Know the Program Works?

FAA sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule and performance.

In ACQ, we have undertaken major initiatives intended to strengthen our capabilities in managing our major systems acquisition programs. We have incorporated key practices into our investments and operational review processes.





We have established metrics to determine the success of the Acquisition Workforce Plan which will be used to report progress over time. The metrics include counts of on-board and new hire staff, length of time to fill acquisition positions, numbers of employees certified by discipline, and attrition rates for disciplines. FAA was removed from the GAO's High Risk List in 2009.

Implementation of the UCS will allow us to easily track and monitor contract data and contract processing time. Anticipated improvements from this system will streamline document processing and storage, converting a manual process into a more efficient automated process. This will avoid time and labor costs associated with manual contract management processes as a whole. Efficiencies generated by this program will be realized across all FAA lines of business and staff offices, including budget, finance, security, and program management offices.

Implementation of this program will allow us to baseline productivity and effort. The UCS will allow FAA to make process changes and managerial decisions to improve the acquisition processes. Given the increase in workload and complexity anticipated for the implementation of NextGen such efforts will be critically important.

5. Why do We Want/Need to Fund the Program at the Requested Level?

The development and implementation of NextGen is one of the most critical issues facing the FAA. The agency must position itself to meet the increased acquisition workforce demands of NextGen through focused planning, competency development, and targeted recruiting and hiring. At the same time, Acquisition and Business Services must provide acquisition support to the existing NAS infrastructure and the FAA as a whole.

The funding in this request allows Acquisition and Business Services to conduct effective workforce planning and to train, develop, and certify personnel in key acquisition disciplines to ensure FAA has sufficient numbers of skilled acquisition professionals (current and pipeline) to successfully manage acquisitions. This funding will further allow ACQ to continue to strengthen and streamline acquisition policy and processes and provide adequate oversight of procurement actions throughout the agency.

Acquisition of quality goods and services is a core service, integral to the support and operation of the entire FAA and as such, the work being done by this organization to some extent supports all of the DOT Strategic and FAA strategic plan goals. However, there are three goals that are specific to acquisition that are heavily supported by the Office of Acquisition and Business Services: Critical Acquisitions on Budget, Critical Acquisitions on Schedule, and Unqualified Audit Opinion which tie to the DOT goals of Organizational Excellence.

The FY 2013 budget request will allow us to perform our mission. Our current staff is already being asked to pick up a larger work load because of the NextGen activities, to support the Program Management Office in the ATO. Reduction to the Acquisition and Business Services budget will likely result in bottlenecks and delays in providing procurement support to NextGen investments and a reduction in the training needed by the workforce, reducing over-all capability and slowing the acquisition process.

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Information Services (AIO)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$52,473**	**114**	**6**	**117**
Unavoidable Adjustments	**+$124**			
FTE Annualization				
Pay Inflation	+64			
One Additional Compensable Day	+60			
Uncontrollable Adjustments	**+$91**	**+5**		**+5**
Contract Pay Raises	+91			
Staffing Adjustment		+5		+5
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$277**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-277			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$52,412**	**119**	**6**	**122**

Detailed Justification for –Information Services (AIO)

What Do I Need To Know Before Reading This Justification?

In FY 2011, the FAA requested and received support for a reprogramming effort to establish an agency-wide Shared Services organization under the Office of Finance and Management (AFN). In FY 2012, the agency began to create this organization under the guidance of a new Assistant Administrator for Finance and Management. The goal is to streamline and achieve greater efficiency while ensuring the integrity, transparency, and consistency of business, financial, information technology, acquisition, and regions and center operations, as well as to position the FAA to effectively implement the Next Generation Air Transportation System (NextGen). AIO represents the organizational component of AFN responsible for the leadership and delivery of FAA non-NAS IT solutions and services (National Airspace System).

In FY 2013, AIO's primary focus is to lead the integration of the IT Shared Services organization. We will work collaboratively with our partners to integrate previously existing IT work and staff from each line of business and staff office. Cyber security, privacy initiatives, and enterprise–wide application support will still be key work along with other major initiatives such as data center consolidation efforts and portfolio management.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Assistant Administrator for Finance and Management (AFN) – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Information Services (AIO)	$48,827	$52,473	$52,412	-$61

Information Services (AIO)

The FY 2013 budget request of $52,412,200 and 122 FTEs will support AIO leadership for the IT Shared Services Organization (ITSSO), leadership and delivery of Information Security and Privacy initiatives, and leadership and delivery of FAA enterprise-wide non-NAS IT initiatives delivered via the ITSSO.

This request will support the following major programs and initiatives: delivery of ITSSO initiatives; FAA Enterprise Architecture; agency wide information systems security services and as well as specific cyber security protection to FAA and DOT through its Cyber Security Management Center; and delivery of IT services to the other organizational components of AFN. Security services include IT system certifications, internet configurations, vulnerability remediation, security awareness training, as well as sensor monitoring and analysis support and the FAA Privacy program.

The FY 2013 request provides for salaries and benefits for AIO personnel, pay annualization, non-pay inflation rate, as well as one additional compensatory day. The request also includes $277,000 in administrative efficiencies.

The request includes a staffing adjustment at the FAA Cyber Security Management Center for 5 FTE and positions with no increase in cost. In order to create efficiencies at the Cyber Security Management Center, AIO proposes to convert contract positions to Federal staff to save contract dollars and apply savings to its ongoing operational costs. The Cyber Security Management Center continues to meet increasing service requirements with the same level of funding. Base funds cover federal staff, contract services, purchase and maintenance costs for specialized hardware and software technology tools, and facility infrastructure costs. In FY 2011, the FAA had a total of 4,876,324,373 cyber alerts and approximately 2,800 incidents. In a continuing effort to defend against these events, the ISS will maintain its present support level and look for ways to meet increasing requirements through internal efficiencies and creative problem solving strategies.

In FY 2013 we expect to deliver the following services, solutions, and outcomes:

- Achieve zero cyber security events that significantly disable or degrade FAA mission critical services.
- Ensure resolution of all high and moderate risk vulnerabilities due in FY 2013 as planned and as funding allows.
- Ensure adequate security controls are in place to prevent cyber terrorist attacks from penetrating FAA networks.
- Train and develop Information System Security (ISS) professionals and provide security awareness training for all FAA employees and contractors.
- Continue to provide and populate an actionable Enterprise Architecture which is used in the development and delivery of FAA IT enabled solutions.
- Continue to comply with Trusted Internet Connections (TIC) mandates and implement common configurations for the three consolidated FAA Internet Access Points.
- Continue the implementation of formal IT Portfolio Management across the ITSSO to achieve rationalization and optimization of the FAA application and solutions portfolio.
- Continue the consolidation and closure of FAA Data Centers per the FAA Data Center Consolidation Initiative
- Develop and maintain information architecture to seamlessly share information between agencies participating in the Next Generation Air Transportation System.
- Transition FAA internal public client applications and services to be IPv6 compatible.
- Comply with Trusted Internet Connections (TIC) mandates and implement common configurations.
- Lead the expansion of Data Loss Prevention services as funding allows.
- Complete all scheduled PII systems SSN reduction activity to eliminate unnecessary use of SSN.
- Continue with efforts to consolidate/virtualize servers.
- Reduce the number of data center facilities and improve data center security.

2. What Is This Program?

The purpose of the Shared Services Organization is to streamline functions to ensure that they are delivered as effectively and efficiently as possible. This new organization delivers upon our agency goals to improve accountability and enhance operational efficiency through the responsible stewardship of FAA resources.

AIO has the primary responsibility to formulate agency IT policy and strategy, to protect agency IT assets from cyber-attacks, to ensure alignment between IT investment and agency business needs, and provide cost effective enterprise-wide shared services. Information is critical to the operation and mission of FAA. IT drives the creation, processing, and delivery of that information in every major agency business process. The descriptions below cover all AIO services which are funded through its base level. Due to the continuing Advanced Persistent Threat and security attacks against FAA websites, internal networks, and other technology systems FAA must continue to be ever vigilant in the coming years. The Agency will continue to fund and support its cyber security center, information system security activities, information system security architecture, and privacy program, as well as find ways to create efficiencies through increasing our enterprise-wide services.

The Information Services Program is comprised of the following components:

- Information Systems Security (ISS) including:
  - ISS Compliance, Certifications, Remediation, and Training
  - Cyber Security Management Center

- Privacy Program including:
  - Data Loss Protection
  - Privacy Policy and Guidance
  - Privacy Compliance, Remediation, and Training

- FAA Wide Information Technology Services including:

- IT Governance, Capital Planning, Records, Directives & Forms Management, and Business Process Improvement
- Enterprise Architecture (EA) Policy, Guidance and Compliance
- Enterprise Wide IT Applications and Infrastructure Governance and Optimization

Information Systems Security

Our ISS program, under the leadership of the FAA Chief Information Security Officer (CISO), is currently meeting its goal to "achieve zero cyber security events that significantly disable or degrade FAA mission critical services". ISS funds all cyber security work protecting FAA networks and the operation of the Cyber Security Management Center (CSMC). The program includes:

ISS Compliance, Certifications, Remediation, and Training: The ISS compliance, certification, remediation, and training activities are key to IT systems risk mitigation. The purpose of Risk Management (RM) is to identify potential problems before they occur so that RM activities can be planned and invoked as needed across the program to mitigate adverse impacts on the achievement of objectives. These activities include:

- Compliance – Ensure compliance with OMB, General Services Administration, National Institute of Standards and Technology, and DOT Information System Security/Information Assurance, and Information Technology regulations, standards, requirements and guidance.
- Certification – Implement system authorization processes to identify and document vulnerabilities and develop a plan of action and milestones to address vulnerabilities.
- Remediation – Coordinate activities to remediate identified IT system vulnerabilities.
- FISMA Reporting and Audit Response – report required areas in the CIO Reporting section for FISMA, including automated feeds for configuration management and vulnerabilities. Respond to all aspects of the DOT OIG FISMA audit.
- Training – Develop and conduct specialized ISS personnel training as well as generalized security awareness training for all FAA employees.

Cyber Security Management Center: The CSMC, operated by the FAA, serves as DOT's focal point for all information security incidents and is a centralized operation responsible for:

- Monitoring and tracking information security incidents,
- Conducting sensor data analysis and establishing trend analysis documentation,
- Providing a proactive and responsive corrective action capability,
- Protecting FAA's information infrastructure using advanced cyber defense strategies,
- Enhancing FAA architecture to harden individual systems and networking elements,
- Improving recovery rate times and enhancing boundary protection by completing remediation of vulnerabilities, and
- Listing critical vulnerabilities as identified using various protection tools and providing information through the Cyber Security Management Center Customer Portal.

Privacy Program

The privacy program protects the agency's personally identifiable information and mitigates risk for identity theft and data loss. Activities produce:

- A privacy performance measurement framework to assess operations, progress, and risk.
- Targeted FAA system privacy compliance reviews.
- Third party security and privacy assessments and remediation of identified vulnerabilities.
- Privacy Threshold Analyses (PTAs), Privacy Impact Assessments (PIAs), and System of Records Notices (SORNs) that assess potential threats to PII and determine what controls must be implemented.
- Data Loss Protection software tools to electronically protect all digitally or electronically stored files and information types FAA enterprise wide storing PII.
- Identity monitoring services for employees and individuals affected by FAA privacy breaches.
- Role-based training for privacy key personnel.

FAA Wide Information Technology (IT) Services

The Information Services Program provides ongoing services to all FAA organizational components for IT policy, planning, governance, business process improvement, enterprise architecture, and applications, data, and infrastructure governance and optimization. These services allow FAA to deploy effective and efficient IT enabled solutions which are developed and maintained with appropriate oversight and financial and schedule constraints.

IT Governance, Capital Planning, Records, Directives & Forms Management, and Business Process Improvement: FAA meets all Federal requirements for IT policy, governance, and capital planning. In addition, ongoing business process improvement activities take place throughout the organization. Activities include:

- Ensuring critical IT acquisitions are on schedule.
- Developing and issuing appropriate IT policy, regulations, and guidance.
- Evaluating IT Earned Value Management Policy changes as they relates to IT Dashboard, Exhibit 300 and 53 reporting. Working collaboratively with the EVM Focal Point and perform reviews at the program level.
- Monitoring, supporting, and enhancing project execution by implementing a American National Standards Institute/Electronic Industries Alliance Standard-compliant earned value management system for all major IT acquisition programs.
- Monitoring, analyzing, and reporting on investment portfolio performance for major acquisition programs.
- Leading the preparation of business cases required by OMB Circular A-11 as part of the Capital Planning and Investment Control (CPIC) processes.
- Reviewing CPIC support documentation for agency capital programs.
- Implementing sound business cases for all FAA capital programs.
- Providing training and guidance.

Records, Directives and Forms Management: Collect and store important records; develop and publish agency directives; regulate forms used throughout the FAA.

Business Process Improvement: Provide process improvement services to FAA organizations and support ongoing efficiency projects throughout the enterprise.

Enterprise Architecture (EA) Policy, Compliance and Guidance (EA):_ Enhance FAA Enterprise Architecture to provide IT Investment Management and Portfolio Management services and coordinate NAS and Non-NAS EA alignment where possible with common policy, procedures and tools. Activities include:

- Architectural Governance - EA charters, plans, process, and tools updates.
- Non-NAS EA IT Governance Model - Policy, procedures, and processes for operation of architecture related oversight boards and board controlled processes.
- Architecture Update – Annual EA update and guidelines including data, information and information security architectures.
- Acquisition Management System Alignment - EA guidance compliant with FAA, OMB, and DOT guidelines.
- CIO Architecture Services - Provide information to the FAA CIO and IT Leadership Team on issues related to architectures, IT standards, and IT investments.

Enterprise Wide IT Applications and Infrastructure Governance and Optimization:_ AIO provides centralized governance and management of FAA enterprise-wide IT application and infrastructure initiatives and solutions. The shared services delivery model eliminates redundancy and optimizes FAA information systems. Activities include:

- Consolidating redundant IT applications and infrastructures and managing the operations of enterprise-wide IT solutions.
- Developing and implementing standardized, performance-based IT acquisition processes.
- Leading agency-wide application and infrastructure strategic initiatives, including oversight of studies for improving enterprise applications and infrastructure.

- Leading and managing agency-wide IT strategic sourcing.

IT Portfolio Management: AIO will continue to lead the implementation of formal IT portfolio management across the FAA ITSSO. This initiative began in FY 2012, and in FY 2013 will address rationalization of the IT solutions and systems across the FAA in the non-NAS environment. We expect to identify opportunities to reduce the number of applications and solutions supporting functional areas (e.g., human resources, financial management, administrative management, and training) and to eliminate or retire legacy applications which are no longer providing business value to the FAA. Portfolio management will also enable us to identify applications and solutions ripe for reengineering using more modern IT tools, platforms, and methods. This will increase the value to the FAA of these reengineered solutions by reducing the cost of maintenance, enhancing capability, and providing an improved user experience.

The Information Services Program is linked to DOT's Organizational Excellence strategic goal and its Open Government and Improved Financial Performance outcomes. Information security and privacy activities allow FAA to be prepared for cyber security attacks, to minimize risks to its IT systems, and to prevent data loss. These enterprise wide services provide cost effective and secure infrastructure and applications solutions.

3. Why Is This Particular Program Necessary?

IT Shared Services Organization (ITSSO)

In FY 2012, the agency began to create this organization under the guidance of a new Assistant Administrator for Finance and Management. The continued development and deployment of the ITSSO is necessary to achieve the desired outcomes of the reprogramming request approved by Congress in FY 2011.

More work is needed to integrate the legacy FAA Line of Business and Staff Office IT organizations into our single ITSSO. We have branded this transformation Destination: One IT. In FY 2013, activity is focused on the continued identification of consolidation opportunities by our chartered working groups and actions of these groups to achieve transformational outcomes. AIO is responsible for providing the vision, strategy, and leadership to achieve Destination: One IT.

One example of recent success is the use of technical specialists formerly aligned with a single Line of Business (Safety, Air Traffic, and Regions and Center) to provide deskside support to multiple Lines of Business. This has eliminated the need for travel to various locations and has saved the FAA tens of thousands of dollars in travel costs.

Failure to fund AIO will result in the loss of the leadership needed to achieve success for the FAA Shared Services Organization and the realization of the benefits of shared services to the FAA If funding is not provided to continue the activities underway to achieve a single ITSSO, opportunities for improving the delivery of IT enabled solutions with quality and speed, for cost reduction, for reengineering solutions and systems, for retiring systems, and for optimizing the IT organization of the FAA will be lost.

Information Systems Security and Cyber Security

Cyber security is becoming more critical every year as cyber terrorists from other countries continue to try to breach FAA, and U.S. systems in general. Recent legislative proposals emphasis the growing threat and the need for improving the protection of information as a strategic asset.

There are also growing numbers of countries that are attacking high profile government agencies within the US. The Cyber Security Management Center has mature relationships with Department of Defense (DOD) and other federal civilian agencies including US CERT, and US Cyber Command. The Cyber Security Management Center support contract requires in-depth knowledge of computer security practices and implementation over multiple areas in FAA. The level of effort to meet this requirement must be performed by a select group of contractors who have the experience and certifications needed to perform the task. AIO is on track to convert five Time and Material (T&M) positions to Federal positions for FY 2013 to ensure cost savings to the government and retain corporate knowledge in the event of contractual changes.

In addition, protecting FAA networks requires a robust hardware and software infrastructure. It is imperative to ensure an efficient and secure transition from the as-is to the to-be operations to attain an actionable enterprise architecture. An actionable EA aligns the business processes and capabilities to the FAA strategic vision. It also provides concrete examples for the required services and technologies.

Without these cyber security technologies and services, our capacity to ensure FAA networks are protected from malicious activity would be greatly reduced.

Privacy
FAA has made significant progress in achieving the reduction of PII data in its databases and in the deployment of tools to monitor and prevent the release of PII and sensitive information outside the firewalls of the FAA.

A loss of funding at this time would delay and greatly diminish our ability to complete the safeguarding of PII data and significantly reduce the risk of data privacy breaches.

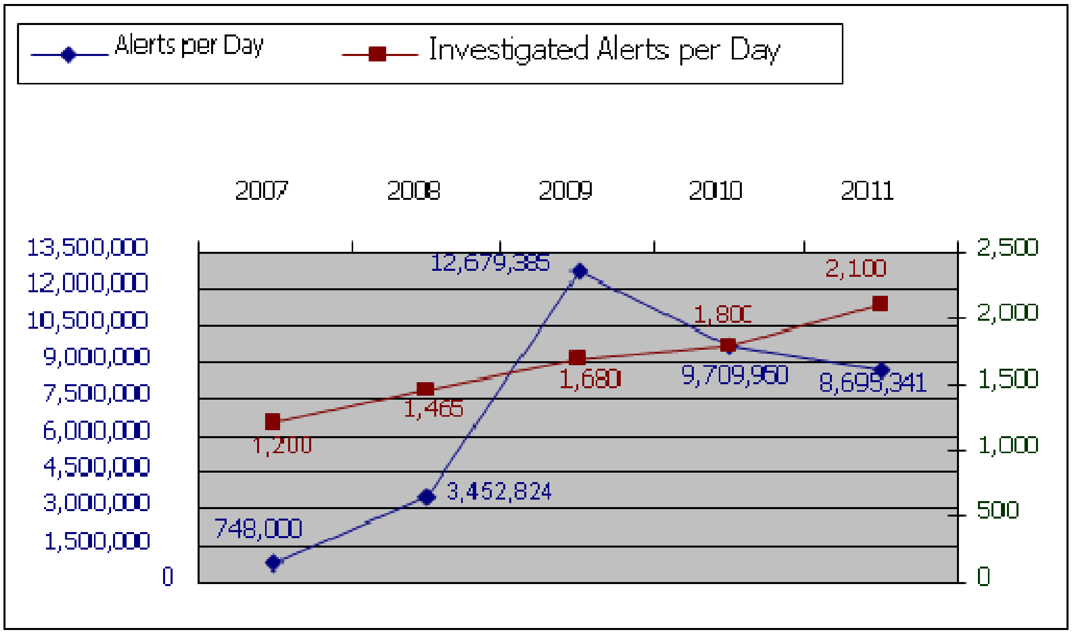
4. How Do You Know The Program Works?

AIO will establish quantitative and qualitative memorandums of agreement with its internal organizational partners to ensure support provided meets needs and expectations. The target activities associated with these goals are monitored on a monthly basis.

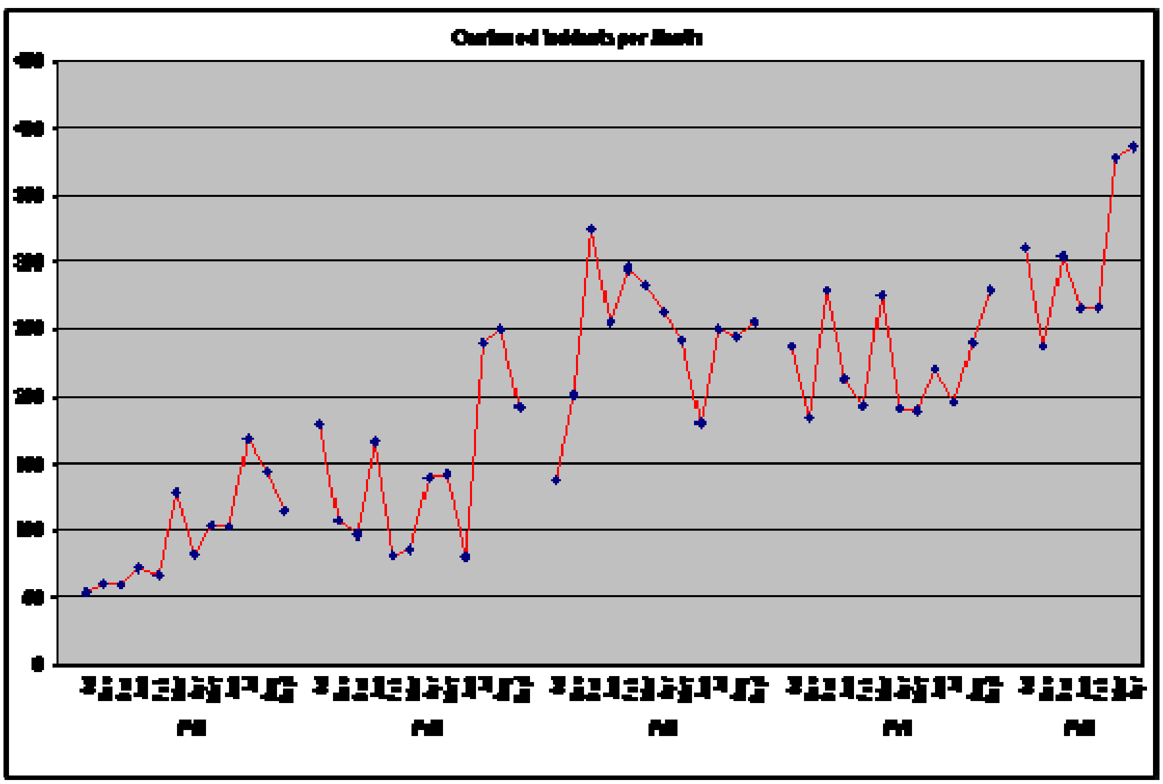
Memorandums of Agreement (MOAs) and Service Level Agreements (SLAs) will transfer managerial authority of the LOB IT organization to IT Shared Services (ITSS) under AFN, thus giving AIO accountability for delivering IT services as set forth in the SLA. Performance targets will be included in the SLA's so we can ensure expected levels of services are consistently and continuously provided. Furthermore, where it makes good business sense, AIO will also be responsible for providing oversight and work direction, which enables us to begin delivering more enterprise (FAA wide) IT services. All IT organizations within the OBs/SOs will continue to support the mission of their respective existing customer base in FY 2012.

It is well documented that federal agencies are lagging behind in the advanced technology and resources necessary to be 100 percent effective in preventing major incidents. FAA is no exception, but has taken significant steps in closing that gap. These include: mapping, logging, sensor placement, development of secure enclaves, focused protection of executive systems, Intrusion Protection Systems, enhanced Advanced Persistent Threat (APT) software system capabilities, and a mature Flexible Analysis System (FAS) for full packet capture.

We know the Information Services Program is meeting its mission and mitigating risks. No cyber security events that disable or degrade IT systems have been reported in the face of increasing threats.



The chart below shows the increasing number of incidents resulting from the constant cyber attacks since 2007.



5. Why Do We Want/Need To Fund The Program At The Requested Level?

AIO is leading the effort in FY 2012 and beyond to establish an Information Technology environment that will respond faster and more cost effectively to the evolving nature and adaptive capabilities of IT. The organization will enable an enterprise alignment and integration of IT, business, and mission goals. AIO is working across legacy Lines of Business to establish service level agreements for the delivery of information technology products and services. The Lines of Business staff will collaborate using multiple working groups to accomplish FAA IT Shared Services activities.

The IT Wide Services provided by AIO are a large part of the support on which the operational and regulatory arms of the FAA rely. Space and property management, IT infrastructure, acquisition of goods and services, payment for those goods and services are just a few examples of the types of support that the FAA must obtain in order for their employees to work effectively and safely.

Approximately 56% of the AFN budgetary request is for payroll and rent. The vast majority of the remaining funding is slated for basic fixed operating expenses such as telecommunications, IT infrastructure and security, maintenance and operations of our financial systems, and other operating costs .

Key AIO program outcomes in FY 2013 are:

- Complete Phase II of the Shared Services Initiative
- Ensuring IT serves as a strategic enabler for the agency, providing secure and efficient capabilities to store and exchange the agency's critical information
- Zero cyber security events that degrade or disable our mission critical systems
- Reducing FAA privacy data loss and application software security risks
- Transitioning client applications and services to be Internet Protocol Version 6 (IPv6) compliant.

Security risks continue to increase at an alarming rate. The sharp increase in "Special Threat" events over the past several years and the number of alerts shows that FAA is still a target for cyber terrorists. Insufficient funding poses a serious risk to FAA infrastructure, applications, and network operational security. Also, our key information systems security measure, zero cyber security event threats that disable or degrade our networks, may not be achieved. Breaches to our systems, or outright network outages could have an impact on aviation and the US economy, impact FAA's reputation and public image, and cost more than the funding and positions requested.

In FY 2009, FAA experienced a significant privacy breach impacting over 48,000 employees. The Privacy Program worked with the Cyber Security Management Center and the Center is now in the process of receiving privacy alerts from the data feeds that are derived from systems within the AOT-100 IT Infrastructure Division. Cyber Security Management Center will generate incidents and send notifications to the systems owners and the Information Systems Security Managers (ISSM).

A reduction in funding below the requested level could reduce FAA's ability to prevent data loss from increasing threats and attacks on our mission critical networks and applications. A sustained level for the Privacy Program pushes out the planned improvements and program maturity goals. Identity theft for FAA employees would become a significant and growing risk. A sustained level in enterprise wide services impacts our ability to implement new cost efficiencies across FAA and to ensure that IT is a strategic enabler for the agency. A lack of appropriate implementation controls through governance and EA for large IT investments can cost FAA additional development and implementation funds as well and increase data security and privacy risks.

A reduction in Privacy Program funding will adversely affect the FAA's privacy posture by impacting our ability to reduce privacy risks, prevent breaches, implement data protection activities, and ensure compliance with federal regulations.

The agency has successfully focused on and remediated High risk vulnerabilities identified in Plans of Actions and Milestones (POA&Ms) to a manageable number. However, the Agency still maintains a large number of Medium vulnerabilities affecting systems that provide Human Resources (Personnel, Privacy), Financial (Budget, Grants, and Payroll), Security (Facilities, Intrusion Detection, and Hazardous Materials), and Flight Standards/Safety (Aircraft, Airman, and Medical). A Medium vulnerability is defined as a vulnerability that if exercised, may result in the costly loss of tangible assets or resources; (2) may violate, harm, or impede an organization's mission, reputation, or interest; or (3) may result in harm or injury. Remediation of these Medium vulnerabilities will enable the Agency to reduce the potential for identity theft and protect the personal privacy information of employees and the general public, including pilots. It will improve operational efficiency, security, and safety by ensuring the availability and integrity of services.

In addition, the Department of Transportation (DOT) Office of the Chief Information Officer (OCIO) reports the agency POA&M status on a monthly basis to the OMB, DHS, and the Deputy Secretary in support of the Federal Information Security Management Act of 2002 (FISMA). FISMA requires the efficient remediation of vulnerabilities identified in POA&Ms across the Federal Government. Currently the FAA is identified as RED in these monthly status reports under the POA&M management section. AIO will continue to work all actions specified in the POA&Ms and to guide the actions taken to implement remediation strategies.

A current snapshot indicates there are 826 medium vulnerabilities in approximately 300 systems scheduled for remediation in FY 2011 – FY 2013, for a total estimated cost of $21,755,400. Of those 826 vulnerabilities, 143 are scheduled for completion in FY 2013 for an estimated cost of $7,801,780. These numbers will continue to fluctuate during FY 2011 – FY 2013 and beyond as systems stay in production and annual assessments, recertification, and audits generate additional POA&Ms. Any reduction in funding will impact our ability to remediate systems in each of these years.

Our goal in FY 2013 is to complete the Shared Services transition, and start to maximize returns and efficiencies under the programs. The results will be tangible business value using the new service delivery model, including through cross-organizational (i.e., across LOBs/SOs) working groups to implement and continually monitor the transformation.

Under Shared Services, the LOB based Information System Security Officer (ISSO) and Privacy Representative and related functions and staff, will work collaboratively under the direction of the CIO. This will reinforce a unified line of sight for the agency, with resultant increases in accountability and improved outcomes.

In FY 2013, the IT Shared Services effort will include consolidation of IT systems to achieve cost reductions by eliminating redundant and parallel systems within the LOBs. Targeted consolidations include multiple asset and inventory systems, and the 43 official financial tracking and reporting/CUFF systems. Consolidation will result in improved security posture, standardization, more robust and real-time reporting, and significantly reduced maintenance costs, and data collection, entry and verification time.

Regions and Center Operations (ARC)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$338,370**	**722**	**29**	**707**
Unavoidable Adjustments	**+$806**			
FTE Annualization				
Pay Inflation	+416			
One Additional Compensable Day	+390			
Uncontrollable Adjustments	**+$587**			
Contract Pay Raises	+587			
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$1,786**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-1,786			
Contract Towers				
Base Transfers	**-$7,849**	**-19**	**-1**	**-20**
Hangar 6	-7,849	-19	-1	-20
FY 2013 Request	**$330,128**	**703**	**28**	**687**

Detailed Justification for –Regions and Center Operations (ARC)

What Do I Need To Know Before Reading This Justification?

The Office of the Deputy Assistant Administrator for Regions and Center Operations (ARC) is one of the four pillars of the newly created Office of the Assistant Administrator for Finance Management Shared Services. Under the shared services concept ARC will provide ongoing facility, regional emergency operations, training, logistics support and other critical services to both internal and external customers for the FAA. Prior to the creation of AFN, FAA real property management, logistics/material management and personal property management functions resided among multiple FAA organizations. In FY 2012, as part of the shared services organization efficiencies these functions were realigned under ARC.

1. What Is The Request And What Will We Get For The Funds?

For FY 2013, $330,127,800 and 687 FTE are requested for FAA's Deputy Assistant Administrator for Regions and Center Operations. The request provides for salaries and benefits, pay annualization, non-pay inflation, as well as one compensatory day. The request also includes a $1,786,000 decrease for administrative efficiencies and the requested base transfer of Hangar 6 from ARC to ATO ($7,849,000). There is an associated transfer of 19 FTP and 1 OTFTP from ARC to ATO for the Hangar 6 movement.

FY 2013 – Assistant Administrator for Finance and Management (AFN) – Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Regions and Center Operations (ARC)	$339,763	$338,370	$330,128	-$8,242

Our key activities include:

Function	Functional Description	Key Actions
Logistics	Provide parts and logistics services in support of the National Airspace System (NAS).	▪ Repair, modify, and overhaul quality products to meet NAS requirements.
		▪ Manage all National Stock Numbers for NAS equipment from point of acquisition or repair through to customer use and return.
Training	Provide technical training at the FAA Academy for safety-related occupations.	▪ Conduct introductory resident training for all Air Traffic Control (ATC) new hires and follow-on courses at the FAA Academy consistent with the ATC Workforce Plan's increasing student numbers.
	Provide training for FAA supervisors, managers, and executives.	▪ Deliver managerial, executive and technical training and related support services for the agency and other aviation organizations.
Information Technology / Financial Services	Conduct financial operations and system support	▪ Provide financial services processing and reporting of financial information, including accounting data, for FAA, DOT and other federal government agencies.
Regional Operations Centers	Operate Regional/Center Operations Centers (ROCs)	▪ Provide round the clock, immediate command, control and communications for all incidents related to NAS continuity.
Real Estate /	Conduct, real estate, material	▪ Manage a portfolio of real property

Function	Functional Description	Key Actions
Material Management /Acquisition	management, and center acquisition activities	assets exceeding $7 billion .
		▪ Manage FAA personal property assets valued at $11.4 billion from capitalization to disposal.
		▪ Acquire service and construction contracts for National Airspace System (NAS) customers valued at approximately $1 billion annually.
Facilities	Oversee and manage infrastructure operation and maintenance programs in Washington, D.C., regional office facilities, and the Mike Monroney Aeronautical Center.	▪ Maintain a safe, secure, professional and environmentally compliant work environment for FAA employees, contractors, and tenant organizations.

2. What Is This Program?

As an integral part of the Office of the Assistant Administrator for Finance Management Shared Services, the Office of the Deputy Assistant Administrator for Regions and Center Operations (ARC) will provide critical aviation leadership, integration, and business services to internal and external customers. ARC's role is to lead, support, and integrate critical aviation initiatives and the delivery of enterprise services that support the FAA and the DOT. These initiatives include, but are not limited to, real and personal property, government furnished property, and transportation services.

The ARC organization includes offices located at the Mike Monroney Aeronautical Center in Oklahoma City, Oklahoma, at each of the nine regions, and at Washington headquarters, and is responsible for:

- Providing parts and logistics services in support of the National Airspace System (NAS).
- Conducting introductory resident training for all Air Traffic Control (ATC) new hires and follow-on courses at the FAA Academy consistent with the ATC Workforce Plan.
- Conducting financial operations and system support for FAA, the DOT and other federal government agencies through the Enterprise Service Center.
- Delivering managerial, executive and technical training and related support services for the agency and other aviation organizations.
- Operating Regional/Center Operations Centers (ROCs) that provide around-the-clock, immediate command, control and communications for all incidents related to NAS continuity.
- Conducting acquisition, real estate and materiel management activities and identifying excess real property assets that are candidates for disposal, termination, replacement, renovation or transfer.
- Overseeing and managing infrastructure operation and maintenance programs in Washington, D.C., regional office facilities, and the Mike Monroney Aeronautical Center.
- Serving as the agency focal point for the Chicago O'Hare International Airport Modernization Program.
- Providing national leadership for the Air Tour Management Plan (ATMP) program and supporting environmental streamlining efforts and noise issues.
- Providing aviation safety services to the Federated States of Micronesia, the Republic of the Marshall Islands and the Republic of Palau.

We provide mission support to all DOT goals, specifically those supporting Organizational Excellence. The FAA Academy at the Mike Monroney Aeronautical Center in Oklahoma City is the primary provider of technical, managerial, and executive training for the Agency and is the largest training facility within the Department of Transportation (DOT). The FAA Academy delivers training and related support services to the agency and other aviation organizations, both domestic and international.

The Academy plays a vital role in the development of state-of-the-art management and executive training. We provide mandatory training for newly appointed frontline, middle and senior managers as well as Continuing Management Education for incumbent managers (e.g., Labor Management Relations, Managerial Coaching and Mentoring, and Constructive Conflict Management).

We also play a critical role in FAA's overall emergency preparedness by coordinating programs and exercises aimed at increasing emergency response readiness and capability. The Regional Operations Centers (ROCs) are 24/7 information and communications hubs that provide voice and data dissemination necessary to direct management and operation of the National Airspace System. ROCs and Cornerstone Regional Operations Centers (C-ROCs) coordinate communications response for aircraft accidents, emergencies, missing aircraft, hijackings, security threats, facility and system outages, airport closures, severe weather impacts, earthquakes, and public information requests and complaints.

Regional Administrators and their staffs represent the agency in regional contacts with military services, aviation industry, other government agencies, aviation organizations, elected officials, educational institutions, and civic and private groups. The Regional Administrators serve as the local corporate representatives for the FAA Administrator. Along with their staffs, they are responsible for communicating with FAA's internal and external customers, disseminating information and answering inquiries. ARC works closely with state and local aviation organizations, both public and private, on aviation topics of mutual interest and promotes aviation careers through relationships with educational institutions and development of aviation curriculum materials. The Regional Administrators and Center Director serve as the senior agency aviation official in the regions/center, providing cross-functional oversight and integration for the agency, relations with industry, the public, and various governmental organizations, as well as leadership for lines of business support programs.

Our anticipated accomplishments include enhancements or improvements to:

Function	FY 2013
Logistics	▪ Increase cumulative fill rate for stocked items (expendable items and repaired items).
	▪ Use root cause analysis, trending, and action plan tools, decrease defective parts to improve quality of assets provided to technicians.
Training	▪ Conduct 98 percent of planned, programmed, and funded ATO Technical Training courses (100 percent of Air Traffic initial qualification).
	▪ Further improve training quality (technical and management) to meet student's and manager's expectation for value and job skill enhancement.
Information Technology / Financial Services	▪ Positively affect overhead costs through establishment of targets and monitoring.
	▪ Improve service provision through timely mitigation of audit findings focusing on strengthening processes and closing process gaps.
	▪ Maintain 99.5 percent availability for IT systems as defined in service level agreements with customers.
Regional Operations Centers	▪ Successfully test transferring DOT Crisis Management Center (CMC) system to the DOT alternate site as the ASO C-ROC transfers its operations to another Operations Center
Acquisition / Real Estate / Material Management	▪ Improve contract cycle time and quality of contracting office support.
Facilities	▪ Further integrate environmental, occupational safety and health requirements, minimizing pollution and waste, conservation of natural resources, and prevention of injury and illness while at work through utilization of a Quality Management System with management reviews and internal and external audits.

3. Why is this Particular Program Necessary?

The FAA Logistics Center (FAALC), located at the Aeronautical Center, is the primary provider for parts and logistics services in support of the NAS. The FAALC manages the central NAS inventory warehouses and distribution facilities for FAA, providing routine and emergency logistics products and services to 8,000 FAA customers at 41,000 facilities and 28,000 sites, as well as to the Department of Defense (Air Force, Navy, and Army), state agencies and foreign countries. The Logistics Center provides core logistics support functions to the NAS, including:

- Supply chain management, including inventory management, for approximately 62,000 National Stock Numbers (NSNs), with an inventory value of approximately $760 million.
- Centralized depot level overhaul, maintenance and repair of NAS Equipment, and on site overhaul and maintenance for certain large systems such as towers and radar arrays.
- Storage and distribution management of NAS assets within a 725,000 sq. ft. centralized warehouse.
- Depot level engineering support.
- Agency focal point for Depot Level Integrated Logistics planning and implementation for NAS acquisition programs.

Air traffic controllers use the products managed and repaired by the Logistics Center to ensure the safe and effective movement of aircraft through the Nation's airspace. Life-cycle logistics support is critical to the efficient, effective and safe operation of the NAS. The agency is continuously seeking to improve its core logistics support functions, striving to reduce NAS asset delivery times and improve repair item quality. Business management improvements and cost efficiencies will be achieved at the Aeronautical Center by replacing the primary automation system that supports FAALC service operations, the Logistics and Inventory System (LIS). Expanding and improving system capabilities and performance will reduce operating costs by right-sizing the agency's spares inventory, better managing depot throughput and increasing visibility into vendor and parts performance. The Logistics Center is taking the lead in applying 2D barcode technology to improve NAS asset visibility and tracking throughout the supply chain. Life-cycle logistics support is critical to the efficient, effective and safe operation of the NAS. As the agency moves toward NextGen technology, a fully integrated logistics support approach is vital to ensure operational efficiency well into the future.

We provide a variety of real estate and personal property management services in support of the Federal Aviation Administration. As part of the shared services realignment, personal property, government furnished equipment and logistics/materiel functions were consolidated under ARC from multiple organizations in order to gain efficiencies and reduce redundancies.

ARC also oversees the consolidated FAA purchase card program for FAA's nine regions and the Aeronautical Center. Purchase card expenditures average $90,000,000 annually. The Aeronautical Center currently awards approximately $600 million annually in contracts for equipment, material, and services in support of the National Airspace System.

For example, in FY 2011 we:

- Administered over 850 active contracts/leases with a total estimated potential value of well over $2 billion.
- Oversaw over 221,000 purchase card transactions valued at more than $90 million.
- Developed and delivered training has significantly improved purchase card policy compliance.
- Supported FAA's Small Business program by attending multiple business outreach events, and hosted local marketing expositions.

We also have lead responsibility for the Federal Real Property Asset Management throughout the life cycle process. The Aviation Logistics Office maintains the Department-wide inventory of real property and the data and performance measures associated with approximately 67,300 buildings, structures, and land parcels. Federal real property is tracked in FAA's Real Estate Management System which also is the repository for DOT's entire real property inventory. Over the past several years, we have made steady progress in disposing of assets that are surplus, not mission critical, in poor condition or are under-utilized. As part of our real property management responsibilities, we establish service level agreements with our customers and for funding administrative space leases within each of the nine regions administered by the General Services Administration in addition to field facilities for the Agency's Flight Standards (AVS) and Security and Hazardous Materials (ASH) organizations.

Our Facilities Management staff provides administrative and operational support for FAA employees at headquarters and at the regional level, including the monitoring of all GSA space activities. Facilities Management oversees administrative telecommunications, personal property, motor vehicle management, and all building management activities including space and property management, nationwide rent program, parking, transit benefits, mail, printing and graphics services, customer service desk, janitorial, building repairs, maintenance, design and construction, telecommunications management, national wireless program, building security, safety issues, and emergency evacuation plans. The goal is to provide efficient, multifaceted facilities management services that are innovative, environmentally responsive, and cost effective in support of FAA's mission and goals.

4. How Do You Know The Program Works?

A number of key performance measures are used to determine if projects are helping achieve their objectives. Improvement projects are prioritized and selected based on their potential contribution. Customer satisfaction surveys are routinely distributed and gathered for feedback, and we continue to act upon that feedback always looking for ways to proactively address our customers' mission needs. Several industry best practices provide a framework for monitoring process performance. Hundreds of process measures are captured and reviewed for trends to assess effectiveness, and leadership hosts quarterly management reviews to ensure policy and management systems remain suitable, adequate, and effective. Our challenge will be to maintain quality, service, schedule, and performance while securing new workload and operating with fewer resources.

The FAA Logistics Center provides parts for the operation and maintenance of NAS equipment. This level of customer support is provided 365 days a year, 24 hours a day, 7 days a week to ensure that there are no NAS equipment outages. The Logistics Center strives to continually improve the quality and delivery of parts and reduce customer costs by improving processes and tracking performance. Not only are we looking for dollar savings, we want to improve our value by reducing the cycle times of our processes; this applies not only to industrial operations but business operations as well. Our key performance indicators track customer satisfaction, parts quality, and effectiveness in getting the right part to customers at the right time. We have increased customer satisfaction and reduced parts delivery time while improving the quality of parts provided, operating a state-of-the-art warehouse management system that ensures inventory accuracy.

Our leadership and management are challenged to carry out the mission as resources continue to shrink. We are committed to providing employees and visitors with a safe work environment. Facility risk assessments and regular employee training all contribute to reducing and preventing workplace hazards. Facility related services ensure employees, contractors, and students have the facilities needed to perform a multitude of functions to meet their mission and business demands on a daily basis. Each year, the Aeronautical Center campus continues to grow and expand to include new facilities and infrastructure to maintain, operate, and improve with increasingly constrained resources and budgets.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Executive branch departments and agencies are required to establish clear goals and objectives to promote the efficient and economical use of America's real property assets and to assure management accountability for improving Federal real property management. The FAA has the lead responsibility for the Department of Transportation, and within the FAA, ARC leads the Federal Real Property Asset Management initiative. ARC's Aviation Logistics Office maintains the Department-wide inventory of real property and the data and performance measures associated with approximately 67,300 buildings, structures, and land parcels. Federal real property is tracked in FAA's Real Estate Management System (REMS) which also is the repository for DOT's entire real property inventory. Assets that are surplus, are not mission critical, are in poor condition, are under-utilized, and/or reflect high annual operation and maintenance costs are considered candidates for disposition. As of FY 2011, the agency has disposed of approximately 13,640 real property assets with an equivalent replacement value of $520 million and has reduced the Agency's operation and maintenance costs by $65 million. Savings resulting from the disposition of property have been applied toward future disposition efforts, as well as updates, upgrades, repairs, and renovation of current assets. Funding reductions would jeopardize this effort's ongoing success.

ARC is also responsible for leading and integrating logistics initiatives and real property management in support of FAA and DOT. Consolidation of FAA real property, government furnished property and logistics/materiel functions into ARC were completed in FY 2012. Analysis of the roles, responsibilities, and functions are continuing to ensure process efficiency. ARC's facility management responsibilities include planning, programming, policies and processes associated with Washington DC/metropolitan area FAA buildings and structures including building security, parking management, and space and property management. ARC is also responsible for funding administrative space leases within each of the nine regions administered by the General Services Administration in addition to field facilities for the Agency's Flight Standards (AVS) and Security and Hazardous Materials (ASH) organizations. The continued expansion of the Aviation Safety workforce comes with a requirement for additional space. Most of the leases contain early termination penalties and escalation clauses placing additional financial pressure on the Agency.

Absorbing any additional reductions while maintaining our lease and staffing commitments would be difficult, likely forcing reductions to our base services and causing us to affect staffing levels. Of the approximately $330 million being requested, nearly $144 million is associated with rental costs for existing administrative space leases with another $87.8million funding on-board personnel expenses. The balance of our funding request includes other mandatory costs including facility operations at the Aeronautical Center, Guard Services throughout the regions and Headquarters and payments to the DOT working capital fund.

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Explanation of Funding Changes

	Dollars ($000)	FTE
Finance and Management (AFN)	**-$8,526**	**-15**
Overview: In FY 2012, AFN has made great strides in consolidating the organizations and we are actively looking for areas to improve. Resources are being internally realigned as the multi layered organizations are combined and streamlined. In FY2013, it is expected that additional changes to the organization will continue as areas are identified for consolidation or business process improvements. For FY 2013, $573,591,000 and 1,307 FTE are requested for FAA's Administrator for Finance and Management. The request provides for salaries and benefits, pay annualization, non-pay inflation, as well as one additional compensatory day. The request also includes a decrease of $3,073,000 for administrative efficiencies and the requested base transfer of Hangar 6 from the ARC component of AFN to ATO ($7,849,000). Incorporated into this submission, is a budget neutral request by AIO to increase our authorized positions by 5 FTE and positions which will result from a conversion of contract support to federal employee status and a transfer of 19 FTP and one OTFTP from ARC to ATO for the Hangar 6 movement.		
Unavoidable Adjustments	**+$1,386**	
Pay Inflation: This increase is required to provide for costs associated with base salary increases. The factor used is 0.5 percent.	+715	
One Additional Compensable Day: This increase is needed to provide for one additional compensable day in FY 2013.	+671	
Uncontrollable Adjustments	**+$1,010**	**+5**
Contract Pay Raises: Costs are associated with the National Air Traffic Controllers Association Multi-Unit pay article that was awarded by an arbitrator in January 2011 and will run through December 31, 2014. The contract covers about 1,700 employees across six FAA offices (AVS, ATO, ARC, ARP, AGC, and ABA) and includes engineers, computer specialists, program analysts, budget analysts and other professionals. In FY 2012, the only incremental cost is a lump-sum bonus equal to 1.5 percent of base pay, which was paid in October 2011. In FY 2013 and FY 2014, the primary cost driver is a guaranteed basic pay raise of 3.2 percent in January 2013 and 3.75 percent in January 2014.	+1,010	
Staffing Adjustment: This increase reflects a technical adjustment to accommodate anticipated program execution:		+5
Discretionary Adjustments	**-$3,073**	
Administrative Efficiencies: Cost reductions will be realized through staffing attrition and avoidance in contractual services, supplies and travel	-3,073	
Base Transfers	**-$7,849**	**-20**
Hangar 6: This request includes a base transfer of $7.849 million and 20 FTE / FTP from the Office of the Associate Administrator of Finance and Management regarding Hangar 6 located at Ronal Reagan Washington National Airport. Hangar 6 provides aviation support for senior government official including the Secretary of Transportation, FAA Administrator and Deputy Administrator, NASA, the Federal Emergency Management Agency, Presidential Cabinet members, members of Congress, and other Federal government organizations. Hangar 6 is responsible for operating and maintaining three aircraft: two leased Cessna Citation Excels and one Gulfstream IV aircraft which is owned by the FAA.	-7,849	-20

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NextGen and Operations Planning (ANG)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$60,134**	**202**	**10**	**202**
Unavoidable Adjustments	**+$196**			
FTE Annualization				
Pay Inflation	+97			
One Additional Compensable Day	+99			
Uncontrollable Adjustments				
Contract Pay Raises				
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$266**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-266			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$60,064**	**202**	**10**	**202**

Executive Summary: NextGen and Operations Planning (ANG)

1. What Is the Request and What Will We Get for the Funds?

The Office of the Assistant Administrator for NextGen is requesting $60,064,000 and 202 FTP / 202 FTE to meet its mission in FY 2013 of satisfying the increased need for the National Airspace System to deliver expanded service and capacity with increasingly greater fuel efficiency and reduced environmental impact.

2. What Is the Program?

NextGen includes new systems, technologies, and procedures that will help reduce delays, expand air traffic capacity, and mitigate aviation's impact on the environment, while ensuring the highest levels of safety. NextGen executes the mission of the FAA: establishing goals, system safety and security, long-term strategies, budgets, and priorities and resource allocations that support continuous improvement of service value, and achievement of performance targets.

3. Why Is This Particular Program Necessary?

NextGen is our evolutionary blueprint for modernizing air transportation with revolutionary technologies. It represents a wide-ranging transformation of the entire national air transportation system to meet future demand and support the economic viability of aviation while improving safety and protecting the environment.

4. How Do You Know the Program Works?

NextGen sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule and performance. The NextGen Implementation Plan published in March 2011 includes the status of the NextGen transformational and implementation programs and a comprehensive listing of the projects underway this fiscal year that support NextGen.

5. Why Do We Want/Need to Fund the Program at the Requested Level?

NextGen provides the FAA with strategic and tactical planning which results in a well-defined picture of where we want to go and a roadmap showing how to get there. Nearly 45 percent of NextGen's Operations budget is for payroll. Our non-pay costs are primarily for the operations support of the WJHTC.

Detailed Justification for NextGen and Operations Planning (ANG)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen and Operations Planning– Budget Request ($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
NextGen and Operations Planning Services		$60,134	$60,064	-$70

The Next Generation Air Transportation System (NextGen) is requesting $60,064,000 and 202 FTP / 202 FTE to meet its mission in FY 2013 of satisfying the increased need for the National Airspace System to deliver expanded service and capacity with increasingly greater fuel efficiency and reduced environmental impact. The request provides funding for unavoidable adjustments of pay raises ($97,000) and one additional compensable day ($99,000). It also reflects a discretionary decrease for administrative efficiencies (-$266,000).

Funding the FY 2013 request at this level will allow NextGen to:

- Publish the annual Next Generation Implementation Plan reflecting agency and aviation community air traffic control (ATC) modernization priorities.
- Provide the management discipline and infrastructure for tracking, monitoring, and reporting milestone completions for NextGen programs across the FAA.
- Strategically link funding requests with the acquisition of research and development products or services that support FAA's transition to NextGen.
- Provide for facility maintenance, engineering and support services for all properties located at the William J. Hughes Technical Center (WJHTC) including land, buildings, and infrastructure.
- Utilize the SE-2020 contract vehicle to facilitate effective, innovative, and economical solutions to the advancement of air transportation, accomplished through efficient contract management and the delivery of NextGen products and services.

Key outcomes expected to be achieved in the budget year with the requested resources:

- Ensure all contracts are on schedule and within budget.
- Execute NextGen implementation based upon FAA NextGen implementation and approved National Airspace System (NAS) Enterprise Architecture.
- Provide facility maintenance, environmental management system, and engineering support for all properties located at the WJHTC.
- Safeguard both employees and campus infrastructure by ensuring compliance to environmental laws, policies, directives, and initiatives; manage cross-agency relationships through support agreements and land permits.
- Manage, oversee, and administer the Systems Engineering 2020 (SE-2020) contract vehicle through portfolio management to determine best-fit for delivery of requirements, tracking of performance metrics, and ensuring the integrity of contractual information.

Key outputs expected to be achieved in budget year with the requested resources:

- Provide test and evaluation services to ensure current and future automation, communications, surveillance, navigation programs, and air transportation systems are efficiently and comprehensively verified, validated, and integrated as identified in approved Corporate Work Plan.
- Provide technically and operationally sound evaluations, analyses, data, and services from air transportation system, local airport, airspace, and user perspectives to characterize performance of proposed NextGen changes.

- Provide analytical studies and related safety monitoring services in support of separation reductions in U.S. sovereign airspace, international airspace where FAA has delegated authority to provide air traffic services, and international airspace where the U.S. and its citizens have safety-related interests.
- Conduct the bi-annual review of the Performance of Reduced Vertical Separation Minimum Operations (RVSM) in North America (U.S., Canada, and Mexico) compared to International Civil Aviation Organization (ICAO) - Recommended Requirements.
- Participate in separation standards related meetings, providing subject matter expertise that supports ICAO panels and working groups. Provide information for the development of ICAO Separation Standards Reports and Technical Working Papers.
- Enhance the Federal Laboratory through partnerships with other government organizations, academia, and industry; information exchange; and outreach activities. Provide Congress with fiscal year achievements for the FAA Technology Transfer Program. Create NextGen research leveraging plan by establishing an information and technology exchange between the Federal Lab and the Next Generation Aviation Research and Technology Park.
- Maintain the NAS laboratory systems and supporting infrastructure at the WJHTC by providing workforce training in the areas of management, system maintenance, simulation and modeling, and other competencies needed to support the WJHTC laboratories and equipment. Also provide required travel necessary for site visits, conferences, and meetings to maintain currency with NAS and NextGen programs. Provide labor and supplies for repair and replacement of parts for the NAS laboratory equipment and aircraft supporting the WJHTC laboratories.

2. What Is This Program?

NextGen includes new systems, technologies, and procedures that will help reduce delays, expand air traffic capacity, and mitigate aviation's impact on the environment, while ensuring the highest levels of safety.

NextGen supports the Department of Transportation's (DOT) Economic Competitiveness Goal: Maximize economic returns on transportation policies and investments.

NextGen executes the mission of the FAA: establishing goals, system safety and security, long-term strategies, budgets, and priorities and resource allocations that support continuous improvement of service value, and achievement of performance targets.

We maintain the NextGen Plan, develop planning documentation for member agencies, and inform internal and external customers of NextGen status. We transfer technology from research programs to federal agencies with operational responsibilities and to the private sector to optimize safety, capacity, security, and reduce negative environmental impacts. We deliver research and technical development to improve and evolve the NAS Enterprise Architecture. We implement technologies identified in the NextGen Implementation plan to transition the NAS to meet forecasted demand. Our NAS Lifecycle Integration Office monitors the execution of the FAA plan to integrate NextGen systems, technologies, and procedures into the future NAS.

We establish and manage the NAS architecture to ensure that it meets current and future service requirements:

- Conduct planning, analyses, research, advanced concept development, new technology development and prototyping, and systems engineering to support initial and final investment decisions;
- Execute the corporate research, engineering and development planning, and budget process for the Administrator;
- Ensure that the laboratories, facilities, and support services of the WJHTC are available to meet the requirements of the ATO and external customers;
- Ensure that new NAS systems and equipment undergo test, evaluation, verification, and validation services throughout their lifecycle;
- Ensure that ATO planning activities are synchronized with internal and external partners in support of future requirements; and
- Develop, enhance, and validate fast-time modeling tools to simulate and analyze airport/airspace capacities and overall NAS performance.

Our partners and stakeholders include:

- ATO Business Units, Service Units, and Offices.
- Other FAA Offices and Lines of Business.
- Other Federal agencies.
- International Civil Aviation Organization (ICAO).
- Airlines and other aircraft operators.

This request includes funding for the WJHTC Operations ($26.5 million). This program is in place to protect and maintain the WJHTC infrastructure and systems in order to foster safe, efficient, and sustainable daily Center operations.

The program consists of several line items for services, and the most significant ones are for: Center Operations and Maintenance Services (COMS), Security Guard, and Janitorial services. The COMS contract provides contractor personnel to service the plumbing, heating, air conditioning and power systems, and maintain a healthy and safe work environment for approximately 1.5 million square feet of space. The Security Guard services represent funding for armed contractor personnel to provide 24-hour shift coverage to patrol the Center's perimeter and secure the Center's technical laboratories. The Janitorial services provide contractor personnel to maintain a clean and healthy work environment at the WJHTC.

Additionally, this program item provides funding for the FAA's WJHTC utility costs which includes: electric, natural gas, and water/sewer.

By the end of FY 2012, the accomplishments for NextGen include:

- Publish the annual NextGen Implementation Plan reflecting agency and aviation community ATC modernization priorities.
- Provide the management discipline and infrastructure for tracking, monitoring, and reporting milestone completions for NextGen programs across Lines of Business.
- Strategically link funding requests with the acquisition of research and development products or services that support FAA's transition to NextGen.
- Provide for facility maintenance, engineering, and support services for all properties located at the WJHTC including land, buildings, and infrastructure.

By the end of FY 2013, the anticipated accomplishments of NextGen include:

- Publish the annual NextGen Implementation Plan reflecting agency and aviation community ATC modernization priorities.
- Provide the management discipline and infrastructure for tracking, monitoring, and reporting milestone completions for NextGen programs across Lines of Business.
- Strategically link funding requests with the acquisition of research and development products or services that support FAA's transition to NextGen.
- Provide for facility maintenance, engineering, and support services for all properties located at the WJHTC including land, buildings, and infrastructure.
- Utilize the SE-2020 contract vehicle to facilitate effective, innovative, and economical solutions to the advancement of air transportation, accomplished through efficient contract management and the delivery of NextGen products and services.

3. Why Is This Particular Program Necessary?

NextGen is our evolutionary blueprint for modernizing air transportation with revolutionary technologies. It represents a wide-ranging transformation of the entire national air transportation system to meet future demand and support the economic viability of aviation while improving safety and protecting the environment.

FAA's ATO handles 50,000 flights per day and helps transport over 700 million passengers per year, contributing to 5.6 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

NextGen supports the FAA strategic plan initiatives by performing activities aimed at aligning ATO revenues with costs. We focus on reducing the number of ATO plans and updating the NextGen Implementation Plan. We oversee plans and activities aimed at reducing management and overhead expenses associated with the Research, Engineering, & Development activities. We complete the Strategic Management Process through the Executive Level, and link performance plans to operations planning and strategic plan goals.

4. How Do You Know The Program Works?

NextGen sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including hiring and training. To measure our progress, we employ a set of metrics. The success of a particular program is determined by assessing its cost, schedule and performance.

We have already begun to deploy several of NextGen's transformational programs. ADS-B represents the move from a ground-based radar system to one based on a global positioning system. To date, ADS-B has been implemented in South Florida, Louisville, Philadelphia, the Gulf of Mexico, and Juneau. System Wide Information Management Segment 1 is in implementation with its second segment in the investment phase. Collaborative Air Traffic Management, Work Package 3, is also in implementation and will continue to improve the management of operations when there is disruption, especially due to weather. The latest implementation program, Optimization of the Airspace and Procedures in the Metroplexes (OAPM), is bringing new, near-term benefits by leveraging the increasing navigational capability of today's modern aircraft to fly more efficiently.

In March 2011, the former ATO NextGen and Operations Planning Services Unit published the NextGen Implementation Plan (which can be found at: http://www.faa.gov/nextgen/media/ng2011_implementation_plan.pdf). This annual update provides an overview on how NextGen will transform the NAS, describing key benefits to airports, the environment, and international air transportation, and highlights critical milestones that have been achieved in this transition to NextGen. It includes the status of the NextGen transformational and implementation programs and a comprehensive listing of the projects underway this fiscal year that support NextGen.

The SE-2020 contract vehicle facilitates effective, innovative, and economical solutions to the advancement of air transportation, accomplished through efficient contract management and the delivery of NextGen products and services.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

NextGen provides the FAA with strategic and tactical planning which results in a well-defined picture of where we want to go and a roadmap showing how to get there. Nearly 45 percent of NextGen's Operations budget is for payroll. Our non-pay costs are primarily for the operations support of the WJHTC.

In addition to maintaining the NextGen Implementation Plan, the NextGen Segment Implementation Plan, and the NAS Enterprise Architecture, we also engage with other NextGen member agencies, and keep internal and external FAA customers aware of NextGen status. Our organization transfers technology from research programs to federal agencies and the private sector in order to optimize safety, capacity, and security, and reduce negative environmental impacts. Another significant component of this Office unit is the operation and maintenance of the WJHTC. This program provides for facility maintenance, engineering, and support services for all properties located at the WJHTC including land, buildings, and infrastructure.

The FY 2013 request will pay the salaries of the personnel assigned to NextGen. Additionally, this funding provides for the operating costs associated with the WJHTC. These costs include: operation and maintenance support services, custodial, security, and utilities. Without the requested level of funding, NextGen staffing could be impacted and non-pay reductions would be necessary resulting in the erosion of our physical infrastructure.

NextGen supports DOT's Strategic Plan goals by providing executive direction and infrastructure support for NextGen. NextGen initiatives are embedded in the goals of Safety and Economic Competitiveness. We support the FAA's strategic plan initiatives with activities such as aligning ATO revenues with costs, reducing the number of ATO plans, updating the NextGen Implementation Plan, reducing management expenses associated with the Research, Engineering, & Development program, measuring and reporting ATO performance, completing the Strategic Management Process, and linking performance plans to Operations Planning and strategic plan goals.

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Explanation of Funding Changes

	Dollars ($000)	FTE
NextGen (ANG)	**-$70**	
Overview: The Office of the Assistant Administrator for NextGen is requesting $60,064,000 and 202 FTP / 202 FTE to meet its mission in FY 2013 of satisfying the increased need for the National Airspace System to deliver expanded service and capacity with increasingly greater fuel efficiency and reduced environmental impact. NextGen includes new systems, technologies, and procedures that will help reduce delays, expand air traffic capacity, and mitigate aviation's impact on the environment, while ensuring the highest levels of safety. NextGen executes the mission of the FAA: establishing goals, system safety and security, long-term strategies, budgets, and priorities and resource allocations that support continuous improvement of service value, and achievement of performance targets.		
Unavoidable Adjustments	**+$196**	
Pay Inflation: This increase is required to provide for costs associated with base salary increases. The factor used is 0.5 percent.	+97	
One Additional Compensable Day: This increase is needed to provide for one additional compensable day in FY 2013.	+99	
Uncontrollable Adjustments		
Discretionary Adjustments	**-$266**	
Administrative Efficiencies: Cost reductions will be realized through staffing attrition and avoidance in contractual services, supplies and travel.	-266	

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Human Resource Management (AHR)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$98,858**	**599**	**32**	**620**
Unavoidable Adjustments	**+$551**			
FTE Annualization				
Pay Inflation	+272			
One Additional Compensable Day	+279			
Uncontrollable Adjustments		**+2**		**+1**
Contract Pay Raises				
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing		+2		+1
Discretionary Adjustments	**-$665**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-665			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$98,744**	**601**	**32**	**621**

Executive Summary: Human Resources (AHR)

1. What Is the Request and What Will We Get for the Funds?

The FY 2013 budget request of $98,743,000 and 621 FTEs will support the Office of Human Resource Management program. This request provides for salaries and benefits as well as estimated non-pay AHR activities including implementing the comprehensive system of policies, procedures and systems necessary for managing FAA's most important asset: its people. The realignment allocates resources to meet AHR costs for FY 2013. The AHR WCF projected bill is now $21,088,942 except for fee-for-services printing and conference center usage. Also, this request includes an adjustment of one FTE with no additional funding associated to support the additional responsibility assumed from DOT for eLMS (electronic learning management system) management.

2. What Is the Program?

The Office of Human Resource Management supports the DOT Strategic Plan goal of Organizational Excellence, specifically contributing toward initiatives that result in a diverse and collaborative DOT workforce outcome. AHR provides funding for salaries and benefits, contractor support, and administrative funds to support staff located in FAA headquarters and 11 regional offices and centers throughout the United States. We manage a complex network of policies, programs, and systems designed to address all issues related to people such as compensation, hiring, performance management, safety, wellness, benefits, and training.

3. Why Is This Particular Program Necessary?

The AHR organization is responsible for the following:

- Guidance on strategically managing FAA's human capital.
- Administering an array of employee relations programs.
- Managing the relationships between FAA and its unions.
- Defining requirements, setting quality standards and training.
- Fostering a workplace free of harassment and inappropriate of employee misconduct.
- Overseeing and managing automation systems while meeting information security requirements.

4. How Do You Know the Program Works?

We are audited by OPM every two years to ensure our personnel system is a merit-based, legally defensible system. In FY 2011, we once again were successful in meeting all auditable requirements. In addition, AHR expanded FAA efforts to tap into the potential of our full performance, non-supervisory employees who seek managerial positions. To date, 1,702 applications have been submitted for the Program for Emerging Leaders (PEL) and of those, 339 participants received placement into six PEL cohorts and 45 participants have received promotions to frontline managers.

5. Why Do We Want/Need to Fund the Program at the Requested Level?

The AHR organization provides human resource services to all operating lines of business and staff offices (LOB/SOs) at the headquarters and to all the FAA regions including the two centers and overseas. The AHR program delivers the comprehensive system of policies, procedures and system necessary for managing FAA's most important asset: its people. Funding at the requested level is critical to continue providing basic personnel services to all FAA employees.

Detailed Justification for - Office of Human Resource Management (AHR)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Office of Human Resource Management (AHR)
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Human Resource Management	$99,165	$98,858	$98,743	-$113

The FY 2013 budget request of $98,743,000 and 621 FTEs will support the Office of Human Resource Management program. This request provides for salaries and benefits as well as estimated non-pay AHR activities including implementing the comprehensive system of policies, procedures and systems necessary for managing FAA's most important asset: its people. The realignment allocates resources to meet AHR costs for FY 2013. The AHR WCF projected bill is now $21,088,942 except for fee-for-services printing and conference center usage. Also, this request includes an adjustment of one FTE with no additional funding associated to support the additional responsibility assumed from DOT for eLMS (electronic learning management system) management.

Funding at the requested level allows FAA to create and operate innovative, flexible and efficient personnel systems designed to acquire, develop and retain talented employees. The FAA workforce is the backbone of the agency's success in providing the safest, most efficient aerospace system in the world. Civil aviation contributes $1.2 trillion annually to our nation's economy and nearly 11 million jobs and our dedicated, talented workforce is fundamental to ensuring the safety of the flying public.

The AHR request covers our daily work in providing human resource services to the more than 48,000 FAA employees. We will support five high priority objectives: hiring reform, human capital management, leadership development, employee engagement and labor management relations. AHR plans to continue implementing the current Administration's flagship personnel policy reform initiative. We will continue to fund the strategic management of human capital, which helps ensure FAA has the skilled workforce needed to transform to NextGen. In FY 2013, we will continue implementing leadership development programs to build a new generation of leaders and employees to achieve FAA's mission. We will develop and implement a series of immediate and long-term strategies to improve the engagement, commitment and satisfaction of FAA's workforce, which is a significant factor in enabling the Department of Transportation to advance the multi-modal transportation system of the future. Lastly, AHR will implement a corporate strategy that fosters effective, positive and collaborative labor management relations.

Funding in FY 2013 will support the following outputs:

- Ensuring the agency rates in the top 25 percent of places to work in the federal government by employees.
- Streamlining hiring practices to achieve the performance target set by DOT in meeting OPM's 80-day hiring standard.

Funding in FY 2013 will result in the following outcomes:

- Implementation of President Obama's hiring reform agenda. Social networking tools will be used to identify, connect and recruit top talent. Our streamlined end-to-end hiring process will allow us to select high-quality candidates efficiently and quickly, and comply with OPM's 80-day hiring model.
- Successfully transition to NextGen. Effecting this transition will involve a systematic approach to getting the right number of people with the right skills, experience and competencies in the right jobs at the right time. AHR evaluates and identifies changes to the qualification requirements for air traffic controllers in the emerging NextGen system.
- Increased leadership competence within FAA. The development of our executive corps is grounded in creating a culture of accountability and making FAA more effective while the Senior Leadership

Development Program enhances the pipeline of highly qualified FAA senior managers who can fill projected executive vacancies.

- Becoming an employer of choice. DOT and FAA consider improving the linkage of employee performance to strategic goals a critical step in improving employee satisfaction, reducing turnover and attracting a high performance workforce.
- Improved FAA's corporate labor-management relationships. AHR will provide advice and guidance to all FAA managers and labor relations practitioners about collaboration efforts and techniques as well as offer training that include approaches to building trust, effective communications and interest-based problem-solving techniques.

2. What Is This Program?

The Office of Human Resource Management supports the DOT Strategic Plan goal of Organizational Excellence, specifically contributing toward initiatives that result in a diverse and collaborative DOT workforce outcome.

AHR provides funding for salaries and benefits, contractor support, and administrative funds to support staff located in FAA headquarters and 11 regional offices and centers throughout the United States. We manage a complex network of policies, programs, and systems designed to address all issues related to people such as compensation, hiring, performance management, safety, wellness, benefits, and training. Compensation alone requires skill in navigating the intricacies of 29 collective bargaining agreements.

Anticipated FY 2012 accomplishments include:

- Providing corporate agency guidance and consultation as necessary to monitor and assess the implementation of the agency Employee Engagement Action Plan.
- Providing oversight for ongoing workforce planning and annual plan updates by providing workforce data, updated guidance/requirements, tools and consultation to Lines of Business and Staff Offices.
- Managing the operation and maintenance of personnel and payroll automated processing by the Federal Personnel and Payroll System, and expanding and enhancing the Selections within Faster Times automated suite to all mission-critical positions and those positions that cross-organizational lines, i.e., finance, budget, human resources, and information technology.
- Providing day to day operational support and services to FAA managers on compensation, staffing, labor and employee relations, employee safety and workers' compensation programs, employee assistance programs, benefits, awards, training and human resources automation.
- Managing oversight and compliance of all bargaining with FAA unions. AHR will monitor and ensure compliance of all bargaining with FAA unions in accordance with FAA Order 3710.18, Internal Coordination Requirements for Negotiating Term and Mid-Term Agreements with FAA Unions, and the Federal Service Labor-Management Statute.

The services AHR provides to FAA lines of business and staff offices include:

- Giving guidance on strategically managing FAA's human capital by analyzing and interpreting results of employee surveys, improving workforce planning processes, conducting competency assessments and skill gap analyses for mission critical occupations.
- Administering the broad array of employee relations programs related to conduct, benefits and work-life issues.
- Managing the relationships between FAA and its unions, representing the agency in all national and headquarters negotiations, unfair labor practices proceedings and arbitrations.
- Defining requirements, setting quality standards and monitoring the effectiveness of corporate training, addressing training and development needs of the full range of FAA employees.
- Fostering a workplace free of harassment and inappropriate behavior by investigating and adjudicating allegations of employee misconduct.
- Overseeing and managing automation systems regarding time collection, labor reporting, personnel and payroll for every agency employee while meeting all information systems security requirements.

3. Why Is This Particular Program Necessary?

Congress challenged FAA to meet the demanding productivity, service and efficiency expectations of the public and the aviation industry by designing and implementing independent human resources and acquisition systems. They later amended that authority to require FAA follow the Federal Service Labor-Relations Statute with exception to impasse proceedings. Congress was clear that FAA's Personnel Management System would replace the former Title 5 system that governs most Federal agencies. The FAA Personnel Management System is an FAA-wide system. The FAA HR system by law, definition, rule, order and practice includes recruitment and placement, employee benefits, employee relations, labor relations, compensation, performance management, HR information systems, and the necessary policies that support the HR operational function. AHR's mandated responsibilities impact all FAA employees across all lines of business and staff offices, bargaining/non-bargaining units and geographic areas. Without the men and women of FAA, the agency cannot achieve its mission to provide a safe, efficient aerospace system for the American public. AHR is the office that manages the comprehensive system of policies, procedures and systems necessary for acquiring, developing, and retaining the right people for the right job at the right time.

Within FAA, AHR oversees and manages automation systems regarding time collection, labor reporting, personnel and payroll for every agency employee while meeting all information systems security requirements. Using an iterative approach, our integrated enterprise solutions and IT infrastructure allow us to enhance our HR processes, enabling efficient and cost-effective delivery of services and supports our hiring reform effort.

One challenge facing FAA is building the workforce of the future to meet the transition to NextGen. Effecting this transition will involve a systematic approach to getting the right number of people with the right skills, experience and competencies in the right jobs at the right time. AHR evaluates and identifies changes to the qualification requirements for air traffic controllers in the emerging NextGen system. Workforce planning for mission critical and key occupations will benefit FAA managers as they make staffing decisions to achieve program goals based on a rigorous analysis of their organization's work, workforce and expected technological advances. AHR will supply workforce demographics and employment data, facilitating the identification of issues such as growing retirement eligibility and anticipated turnover. AHR will provide tools for identifying competencies needed in the future and solution analyses on recruiting, reassigning, retaining and retraining employees. State-of-the-art recruitment and marketing programs will be implemented to attract high performing and highly qualified candidates. The flying public will benefit from a better prepared, trained and safer workforce.

Another challenge is building leadership competence within FAA. AHR manages and delivers programs that build leadership capabilities, support professional development and promote continuous learning at executive, manager and employee levels. The development of our executive corps is grounded in creating a culture of accountability and making FAA more effective. Development activities feature well-known speakers and presenters on topical issues and current events. The Senior Leadership Development Program (SLDP) enhances the pipeline of highly qualified FAA senior managers who can fill projected executive vacancies. Our Program for Emerging Leaders (PEL) offers non-supervisory employees opportunities over an 18-month period for assessment, mentoring, formal online and classroom training, and developmental assignments. Building stronger leadership within the agency helps FAA achieve strategic goals and manage people and resources effectively while driving continuous improvement.

Becoming an employer of choice is a high priority objective for the DOT and FAA. The Employee Engagement Steering Committee, spearheaded by HR, is charged with implementing strategies to get employees excited about working for FAA and strengthening their commitment to the mission and shared values of the agency. HR will update managerial and executive development and training to reflect emerging challenges and deliver activities designed to make the leadership team more visible to the workforce. Using the on-boarding process for new hires will build employees' affiliation and strengthen engagement and commitment to FAA and accelerate the time-to-productivity for new hires. AHR will market the value of using work plans to supplement generic performance standards, providing another opportunity to establish clear performance expectations and provide feedback and coaching. DOT and FAA consider linking employee performance to strategic goals a critical step in improving employee satisfaction, reducing turnover and attracting a high performance workforce.

AHR will implement FAA's corporate labor-management engagement plan. Transitioning to NextGen will pose challenges that, if not effectively managed, will result in strained labor-management relationships throughout FAA. AHR will provide advice and guidance to all FAA managers and labor relations practitioners about collaboration efforts and techniques as well as offer training that includes approaches to building trust, effective communications and interest-based problem-solving techniques.

4. How Do You Know The Program Works?

We are audited by OPM every two years to ensure our personnel system is a merit-based, legally defensible system. In FY 2011, we once again were successful in meeting all auditable requirements.
Building on the success of the executive and senior leadership programs, AHR expanded FAA efforts to tap into the potential of our full performance, non-supervisory employees who seek managerial positions. To date, 1,702 applications have been submitted for the Program for Emerging Leaders and of those, 339 participants received placement into six PEL cohorts and 45 participants have received promotions to frontline managers.

Anticipating a retirement bubble and addressing competition for attracting a skilled workforce, the FAA adopted the challenge of the Administration's end-to-end hiring initiative. Measuring hiring time remains a critical step in improving the efficiency in our hiring process. To date, AHR has met the Department of Transportation's FY 2011 performance target of filling external hires within 120 days.

In FY 2011, AHR realized a cost avoidance of $6,900,000 through resolution of workers' compensation claims, a significant contribution to the agency's cost control effort. Because we have the subject matter experts, the FAA is in the process of undertaking management of all Workers' Compensation payments for the Department of Transportation. This transfer of responsibility will help the entire Department of Transportation realize a cost avoidance in the future.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Funding at the requested level is critical to continue providing basic personnel services to all FAA employees. For example, in FY 2011, the cost of receiving electronic leave and earnings statements through Employee Express doubled. Also, we received a 20 percent increase in the interface with USAJobs. While AHR has absorbed rising costs such as these examples, if this trend continues, we will be unable to meet future demands with stagnant funding.

Deeper cuts would result in losing our ability to maintain our employee engagement effort, which is critical to hiring and retaining the talent we need to manage the air transportation system of the future. We would be constrained in identifying skill sets and assess competencies (the first steps in developing career paths) as we prepare to hire the NextGen workforce.

We would reduce our participation in recruiting events, limiting our ability to support DOT and FAA's goals of maintaining a diverse workforce, and hiring veterans and persons with targeted disabilities. Also, we would be unable to develop and update information used for different types of recruiting media, limiting FAA's ability to reach candidates of all ages and hire the right person for the right job at the right time. As more federal employees become eligible to retire in FY 2013, the competition for talent will increase and the time to fill positions will lengthen.

Although employees look for ways to balance the increasing demands of work and personal time, we would be forced to reduce access to the online health and wellness program now available to every FAA employee and the suite of online services that assists employees with issues such as geriatric care and legal and financial concerns. With reduced funding, we would be unable to implement enhancements to AVIATOR, the FAA's online application system, to include the FAA's interface with USAJobs. Also, although supporting the President's hiring reform agenda is mandated, all HR IT solutions will have to be deferred for improvements such as maintaining centralized pools of applicants for mission critical occupations.

Without adequate funding, we would reduce contractor and intern support of the Employee Safety Program. The reduced funding would impact our effort to deliver a comprehensive safety program aimed at reducing workplace injuries and illnesses.

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Explanation of Funding Changes

	Dollars ($000)	FTE
Human Resource Management (AHR)	**-$114**	**+1**
Overview: The FY 2013 budget request will support the Office of Human Resource Management program. This request provides for salaries and benefits as well as estimated non-pay requirements. The AHR request covers our daily work in providing human resource services to the more than 48,000 FAA employees.		
Unavoidable Adjustments	**+$551**	
Pay Inflation: This increase is required to provide for costs associated with base salary increases. The factor used is 0.5 percent.	+272	
One Additional Compensable Day: This increase is needed to provide for one additional compensable day in FY 2013.	+279	
Uncontrollable Adjustments		**+1**
AHR eLMS Staffing: This increase reflects a technical adjustment to accommodate anticipated program execution.		
Discretionary Adjustments	**-$665**	
Administrative Efficiencies: Cost reductions will be realized through staffing attrition and avoidance in contractual services, supplies and travel.	-665	

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Staff Offices
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$200,286**	**1,093**	**25**	**1,050**
Unavoidable Adjustments	**+$1,171**			
FTE Annualization				
Pay Inflation	+569			
One Additional Compensable Day	+602			
Uncontrollable Adjustments	**+$111**			
Contract Pay Raises	+111			
Staffing Adjustment				+5
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$1,515**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-1,515			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$200,053**	**1,093**	**25**	**1,055**

Executive Summary: Staff Offices

1. What Is the Request and What Will We Get for the Funds?

The request of $200,053,000 and 1,055 FTEs allows the FAA Staff Offices to provide executive leadership, policy and planning, legal counsel, security services, and other administrative activities in support of the FAA's mission.

2. What Is the Program?

The Staff Offices include the Office of the Administrator, Chief Counsel and seven assistant administrators who provide mission support services to the four lines of business, including legal counsel, economic trend analysis, diversity leadership, government and industry liaisons, communications, and public relations. The Office of Audit and Evaluation performs audit and investigative review functions primarily for internal safety disclosures and concerns, including the FAA Whistleblower Protection Program. The Office of Civil Rights advises, represents, and assists the FAA Administrator on civil rights and equal opportunity matters. The Office of Government and Industry Affairs serves as the Administrator's principal adviser and representative on matters concerning relationships with the Congress, aviation industry groups, and other governmental organizations, developing and reviewing plans and strategies involving these groups to enhance aviation safety. The Office of Communications is responsible for the policy, direction, and management of the agency's communications programs for the news media and FAA's employees nationwide. The Office of the Chief Counsel provides legal support services providing legal advice, reviewing agency action for legal sufficiency and conformity, and representing agency interests in various administrative and court forums. The Office of Policy, International Affairs, and Environment serves as the principle advisor to the Administrator on international matters and the Office of Security & Hazardous Materials Safety develops and implements policy to protect FAA employees, contractors, facilities, and assets.

3. Why Is This Particular Program Necessary?

Collectively, the Staff Offices perform vital, complementary functions that support FAA's operational organizations. Without these services, Agency lines of business would not have the resources needed to fulfill their mission responsibilities.

4. How Do You Know the Program Works?

Through the leadership of the Administrator, the FAA successfully manages the most complex and safest aviation system in the world. By executing their mission responsibilities and providing management, leadership, and oversight, the FAA's Staff Offices have contributed to the overall success of the FAA.

5. Why Do We Want/Need to Fund the Program at the Requested Level?

Reductions below the requested level would hinder our ability to provide key support services. Our request is the funding level needed to continue supporting Agency lines of business.

Office of the Administrator (AOA)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$4,135**	**20**	**4**	**22**
Unavoidable Adjustments	**+$24**			
FTE Annualization				
Pay Inflation	+12			
One Additional Compensable Day	+12			
Uncontrollable Adjustments				
Contract Pay Raises				
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$29**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-29			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$4,130**	**20**	**4**	**22**

Detailed Justification for – Office of the Administrator (AOA)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Office of the Administrator
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Office of the Administrator	$4,013	$4,135	$4,130	-$5

In FY 2013, the Office of the Administrator requests $4,130,000 and 22 FTEs to meet its mission. This is a decrease of $5,000 (0.4 percent) below the FY 2012 enacted level. This decrease consists of administrative efficiency. Throughout FY 2013, AOA will continue to lead FAA toward achieving the agency's performance goals and targets.

2. What Is This Program?

This program provides mission support to all DOT goals. The Office of the Administrator and Deputy Administrator leads the agency in its mission to provide the safest, most efficient airspace in the world. This office leads the overall planning, direction, coordination, and control of agency programs, and represents FAA in its relations with the Department of Transportation, the White House, Congress, other agencies, the aviation community, and the general public.

3. Why Is This Particular Program Necessary?

In leading FAA, the Administrator oversees the agency's employees in maintaining, operating, and overseeing the largest and most complex aviation system in the world. The agency determines the regulatory and operational standards for the United States, and effectively sets the benchmark for aviation safety around the world.

4. How Do You Know The Program Works?

The FAA has a strong track record of achieving the vast majority of the agency's performance goals and targets. The Office of the Administrator provides the cohesive leadership instrumental in achieving our performance goals.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

This request provides for staffing and other resources needed to sustain efforts in leading the agency. The requested funding level provides for no inflationary adjustments and is below the FY 2012 Enacted level. A level of funding not meeting this request would inhibit the leadership capacity of this complex agency.

Office of Audit and Evaluation (AAE)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$2,790**	**19**		**19**
Unavoidable Adjustments	**+$18**			
FTE Annualization				
Pay Inflation	+9			
One Additional Compensable Day	+9			
Uncontrollable Adjustments				
Contract Pay Raises				
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$22**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-22			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$2,786**	**19**		**19**

Detailed Justification for – Office of Audit and Evaluation (AAE)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Audit and Evaluation (AAE)
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Audit and Evaluation Office		$2,790	$2,786	-$4

Pursuant to Congressional direction, the Office of Audit and Evaluation was moved from the Office of the Chief Counsel and realigned as an independent organization reporting to the Administrator during FY 2012. The FY 2013 budget request reflects the transfer of related resources from the Office of the Chief Counsel and an additional base transfer of positions and funding to bring the Office to 19 FTE/FTP and $2.786 million for FY 2013.

The office was initially created to enhance agency accountability for internally identified safety concerns and highlight the agency's commitment to providing an independent, vital and effective mechanism for addressing and resolving safety-related employee disclosures, whistleblower contributions and employee workplace conflicts. The realignment of the office in FY 2012 augmented the visibility of the office for both employees and external stakeholders.

The mission of the Office directly supports the Departmental goal of increased safety, but also supports the goal of building and enhancing our high performance work place. The FY 2013 funding will support the operation and management of consolidated safety hotlines and provide a centralized focus for internally and externally generated safety-related complaints, critical audits and investigations. Additionally, the office provides an impartial agency venue for investigation and early resolution of safety disclosures.

2. What Is This Program?

The Office of Audit and Evaluation has three primary functions: safety audit and investigation review and analysis, intervention and evaluation, and hotline operations and reporting. The audit and analysis staff perform audit and investigative review functions primarily for internal safety disclosures and concerns, including the FAA Whistleblower Protection Program. It is also coordinates and evaluates for completeness FAA responses to DOT- OIG, GAO and OSC generated audits, investigations and evaluations. The second function is an intervention function: providing conflict mitigation services and training for FAA employees and managers to ensure workplace conflicts are resolved in a manner beneficial to the organization and the employee. The final function is a reporting and data function that provides for analysis of hotline submissions, coordination of AAE investigations, and reviews for completeness investigations conducted by appropriate FAA organizations. The office also operates and manages several administrative and safety hotlines. While AAE coordinates and provides independent quality control evaluations of certain investigations conducted by the lines of business, the Office does not determine the technical merits of safety-related issues or make recommendations for resolution of particular safety-related cases. Such determinations remain the ultimate responsibility of the appropriate safety office.

The direct beneficiaries of AAE's services are the agency and the flying public. AAE embodies FAA's commitment to a vibrant and evolving internal safety culture based on continuous review, evaluation, objective analysis and measured change. AAE provides agency employees and external stakeholders with an independent and highly visible forum to openly, safely and constructively raise, address and resolve safety complaints, concerns or whistleblower contributions. AAE critical supporting activities include:

- Operating and managing the agency's hotline system, including the Safety Hotline, the Administrator's Hotline, the Public Inquiry Hotline, the Safety Issues Reporting System (SIRS) and other programs that

offer employees and others avenues to report safety-related and other concerns and make safety contributions.
- Coordinating and providing independent quality control evaluations of certain investigations conducted by the lines of business and analyzing data from a broad range of sources.
- Providing intervention assistance to managers and employees.
- Serving as primary interface and maintaining a continuous liaison with GAO, OSC, and the DOT OIG investigations/audit staffs concerning safety-related investigations.
- Recording, tracking, reviewing, and confirming implementation of FAA responses to DOT OIG, OSC, and GAO audits and investigations that are under the purview of AAE.
- Managing the Whistleblower Protection Program established under 49 U.S.C. § 42121.
- Analyzing data from the Safety Hotline, the Administrator's Hotline, the Public Inquiry Hotline, the SIRS, whistleblower contributions to identify trends.
- Serving as an alternative point of contact for receipt of safety-related contributions or allegations of retaliation against whistleblowers in general.
- Conducting initial reviews of contributions and investigations received, including an immediate assessment (in consultation with appropriate parties), and review responses for accuracy, thoroughness and internal consistency of handling.
- Assessing and reviewing investigations and resolutions of matters that come under its purview for fairness, impartiality and conformance with established processes; providing guidance to lines of business and staff office on how to conduct investigations thoroughly and impartially.
- Serving as a new venue to receive disclosures from FAA employees or former employees, certificate holders, related to possible violation of the an FAA regulation or order, acts or omissions that pose a high level of risk to aviation safety, or gross misconduct of agency employees involving a matter of aviation safety.

Anticipated FY 2013 accomplishments include:

- Complete an analysis of FY 2012 hotline data and whistleblower contributions by the end of the first quarter and prepare a report on significant items for the Administrator by the end of the second quarter.
- Monitor milestones so that 75 percent of corrective actions developed by agency offices in response to internal or external audits and investigations are met.
- Improve timeliness for FAA responses to GAO, OIG and OSC audits and investigations such that 90 percent are delivered in accordance with established schedules.
- Improve access portals for hotline call-in directly to provide more usable information and efficient processes for contributions and ensure that 90 percent of call-ins receive a "call-back" within 10 business days.
- Increase agency awareness of AAE's services and successfully provide a fair and impartial venue for investigation and early resolution of safety disclosures so that OSC investigations of FAA employee whistleblower disclosures are reduced by 20 percent.

3. Why Is This Particular Program Necessary?

Since its establishment in 2008, AAE has become a vital and effective organization productively addressing and resolving safety-related whistleblower disclosures and employee workplace conflicts. Significantly, the visibility and accomplishments of AAE have generated a critical awareness and recognition that employees can bring their safety sensitive disclosures to an internal organization and have them objectively reviewed by an unbiased entity.

AAE clearly demonstrates FAA's commitment to creating a strong internal safety culture firmly anchored in a robust, responsive, and formalized process for addressing safety issues raised by employees, conducting internal reviews, ensuring corrective action and protecting employees who report safety concerns. Although other organizations could be tasked to address such safety matters, an independent organization evokes the highest level of integrity and objectivity. Both are critical to the effectiveness of AAE.

The need for such an office within FAA was echoed in a Department of Transportation Inspector General's recommendation. In its June 30, 2008, report, *Review of FAA's Safety Oversight of Airlines and Use of Regulatory Partnership Programs*, the Inspector General recommended the FAA "[e]stablish an independent organization (that reports directly to the FAA Administrator or Deputy Administrator) to investigate safety issues identified by FAA employees."

4. How Do You Know The Program Works?

AAE was established as an independent organization during the first quarter of FY 2012. At that time it received its first full complement of staff and designated funding. While AAE had previously established itself as a viable forum for raising and addressing internal safety concerns, it is now positioned to start developing standards to measure its successes. Currently, the success of the program can be gauged by its ability to timely process hotline matters, complete investigations, validate the completeness of agency responses to identified safety concerns, and ensure agency compliance with corrective actions.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Congress directed FAA to realign AAE as an independent organization reporting to the Administrator and provided for a defined staffing and funding level. AAE enhances agency accountability for internally identified safety concerns by providing an independent, vital and effective mechanism for addressing and resolving safety-related employee disclosures, whistleblower contributions and employee workplace conflicts. Reductions to the requested funding level would significantly reduce its effectiveness and disrupt the progress made in generating awareness and recognition that employees can bring their safety sensitive disclosures to an internal entity and have them reviewed in an objective and non-threatening forum. The safety benefits of an effective internal reporting program are well-accepted. A disruption or reduction in funding would limit AAE's progress in developing this critical safety tool.

Office of Civil Rights (ACR)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$10,651**	**79**	**4**	**79**
Unavoidable Adjustments	**+$71**			
FTE Annualization				
Pay Inflation	+35			
One Additional Compensable Day	+36			
Uncontrollable Adjustments				
Contract Pay Raises				
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$84**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-84			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$10,638**	**79**	**4**	**79**

Detailed Justification for – Office of Civil Rights (ACR)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Office of Civil Rights
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Office of Civil Rights	$10,901	$10,651	$10,639	-$12

The request of $10,639,000 and 79 FTE supports the FAA's Office of Civil Rights. This is a decrease of $12,000 below the FY 2012 enacted level.

ACR takes actions that challenge, assist, and support our customers to create an environment where all are able to contribute meaningfully to the mission. Additionally, ACR advises, represents, and assists the FAA Administrator on civil rights, diversity, and equal opportunity matters.

Funding in the FY 2013 request will allow us to meet these milestones:

- Assist agency efforts to become more effective with a stronger, more knowledgeable, more accountable leadership and a better prepared, better trained, diverse workforce in the area of Equal Employment Opportunity (EEO).
- Assist in the preventing discrimination by implementing agency-wide EEO policies, practices, and procedures.
- Continue our efforts on the EEO Action Committee, which meets on a quarterly basis, to identify innovative recommendations regarding EEO and diversity within the FAA workplace.
- Implement a Model EEO Program that stresses the prevention of discrimination before it occurs.
- Take proactive measures to provide EEO training to agency managers and employees.
- Increase the effectiveness of the EEO Outreach Program to minority groups with lower than expected employment rates in the agency.
- Assist agency efforts to address discrimination by addressing EEO complaints through the National Intake Unit, EEO counseling, and EEO consultation services.
- Provide oversight regarding civil rights laws and regulations by administering the agency's Internal Civil Rights and the External Civil Rights (Airports) Programs.

Anticipated outputs/outcomes:

- Develop the annual EEO Plan in conjunction with FAA lines of business and staff offices to identify and eliminate EEO barriers and agency deficiencies.
- Conduct evaluations to ensure organizations are complying with EEO mandates.
- Establish standardized processes for EEO training design, evaluation, and delivery
- Deliver high quality EEO training sessions utilizing available technology.
- Augment agency recruitment efforts by reaching out to groups with lower than expected rates by attending career fairs and events tailored to targeted groups.
- Identify the best practices for the four focus areas of Leadership Commitment, Human Capital, Agency Communication, and Supplier/Diversity by consulting with federal agencies and private industry entities that have been recognized as top leaders in diversity.
- Ensure the highest level of EEO pre-complaint processing services by establishing an EEO Counselor Certification Program to increase subject matter proficiency for all full-time EEO Counselors.
- Issue revised ADA and Title VI Orders that will set forth the standards and operating procedures for FAA enforcement.
- Establish training programs to improve the travel experience for all people but especially those underserved, underrepresented, and historically underutilized.

2. What Is This Program?

The Office of Civil Rights supports the DOT Strategic Plan's Aviation Access and Workplace of Choice initiatives by providing services that develop a diverse and collaborative workforce. We advise, represent, and assist the FAA Administrator on civil rights and equal opportunity matters that ensure the elimination of unlawful discrimination on the basis of race, color, national origin, sex, age, religion, creed, sexual orientation, and individuals with disabilities in federally operated and federally assisted transportation programs. Further, we work to ensure a positive working environment in the FAA by valuing, using, and managing the differences that individuals bring to the workplace.

The Office of Civil Rights works in conjunction with FAA managers to ensure EEO awareness and adherence to EEO policies and guidelines. FAA employees are trained in respectful and equitable treatment of one another. Every FAA organization, in turn, plays a role in implementing an effective EEO program where individuals are treated with equity and respect regardless of differences.

The Civil Rights Program's key activities include:

- Conducting Disadvantaged Business Enterprise (DBE) compliance reviews and ensuring small and disadvantaged business enterprises are able to compete with larger companies for airport construction projects and concessions.
- Adjudicating external complaints from the public and other customers.
- Managing and ensuring compliance with Title VI, Limited English Proficiency (LEP), Environmental Justice (EJ) and other civil rights policy and regulations at airports
- Improving the timeliness of processing EEO pre-complaints unless the employee agrees to an extension or alternative dispute resolution is engaged.
- Ensuring airport compliance with the American Disabilities Act.
- Conducting trend analysis to determine if there is any evidence of disparate treatment of applicants or employees based on race, sex, national origin, or other protected categories.
- Managing the National Federal Women's Program, Hispanic Employment Program and the People with Disabilities Program to ensure equal opportunity.
- Ensuring strong leadership and a well-trained, efficient workforce to enhance ACR's ability to provide a full complement of EEO services for customers as well as increase the efficiency of ACR services through the use of information technology.
- Ensuring an EEO discrimination process that can process 100 percent of the allegations and inquiries regarding EEO complaints by having adequate counseling, mediation and consulting services.
- Managing the FAA EEO Formal Complaint Process and ensuring the formal EEO Complaint process is administered in accordance to policy and regulations by reviewing reports of investigations, providing consultation, and overseeing the alternative dispute resolution process.
- Providing leadership, policy and direction on EEO to the agency in the area of the alternate dispute resolution program and through EEO evaluations.

Anticipated accomplishments include:

- Providing training, coaching, technical assistance, and/or consultations to 75 airports on civil rights obligations and requirements based on current policy and guidance
- Developing and maintaining an online FAA Disadvantaged Business Enterprise (DBE)-connect system to allow DBEs to find relevant airport opportunities, and allow airports to find certified DBEs in areas of work needed to support their DBE goals. To increase the diversity in DBE participation, ACR will enhance the system with job opportunity and training functions.
- Ensuring compliance with ADA/Section 504, Title VI, and Environmental Justice regulations by conducting a minimum of 10 reviews and consultations at various airports throughout the nation.
- Establishing a partnership with at least two external organizations to enrich and market EEO efforts in various minority communities.
- Establishing at least five educational partnership initiatives with colleges/universities, technical schools, and/or high schools as an outreach tool to build the FAA workforce of the future.
- Conducting two mission critical occupation barrier analyses and collaborate with the LOB/SO to provide recommendations and actions for improvement with regard to the barriers identified. ACR will also work toward eliminating a minimum of two agency deficiencies identified in the agency self-assessment to ensure compliance with Management Directive 715.

- Visiting 10 percent of FAA facilities to offer EEO consultations, conduct training, and address workplace issues from managers and employees, the goal being to further establish FAA as a workplace of choice.
- Managing an Equal Employment Opportunity (EEO) Discrimination Pre-Complaint Program that can process 98 percent of the allegations and inquiries regarding EEO complaints through counseling, mediation, and consulting services.

3. Why Is This Particular Program Necessary?

The FAA Office of Civil Rights provides leadership and direction with regard to civil rights, diversity, and equal opportunity matters. Internally, the ACR mission is to aid in preventing unlawful discrimination on the basis of race, color, national origin, sex, age, religion, creed, sexual orientation, and individuals with disabilities employed by the FAA. There are four major internal programs; Equal Employment Opportunity (EEO) complaint services and Alternative Dispute Resolution services; Model EEO Program; EEO Outreach; and EEO Training.

Externally, the ACR mission is to provide airport oversight with regard to civil rights laws and regulations. ACR works to ensure all beneficiaries of federally assisted transportation programs are offered equal opportunity for participation and are free from discrimination. There are three major external programs; Disability Airport Compliance; Airport Non-discrimination Compliance; and DBE Compliance. It includes airport compliance with the Americans with Disabilities Act, Title VI, Limited English Proficiency, Environmental Justice and other civil rights regulations.

Some of the yearly measurable benefits to our customers and beneficiaries include:

- Address all EEO complaints in a timely and professional manner.
- Provide quality EEO training to FAA managers and employees to reduce EEO complaints.
- Consult with almost 800 airport grant recipients on developing Part 26 goal methodologies.

The FAA Office of Civil Rights has oversight of internal and external EEO policy, which if not properly funded or staffed, could cause serious dissatisfaction in the workplace. If FAA personnel are not properly trained on EEO matters and complaints are not addressed in a timely and effective way, there is a further risk of losing quality employees to other agencies that place an emphasis on EEO and diversity.

Without the requested level of funding, ACR will be ill-equipped to successfully execute our mission and support DOT's Workplace of Choice initiative. ACR needs adequate resources to further promote diversity and EEO within the agency and to improve employee morale for years to come.

4. How Do You Know The Program Works?

Over the past several years, ACR has made significant progress in numerous areas including:

- **EEO Complaint Activity**: ACR has helped the FAA to reduce the "complainant to total employment" ratio for formal complainants to 0.52 percent, which is below the government-wide average. The EEO Commission government wide formal complainant ratio is 0.54 percent. Additionally, the participation rate for mediations for informal EEO complaints has almost doubled from 14 percent to 27.7 percent in recent fiscal years.
- **People with Disabilities Strategic Initiative**: FAA has hired a total of 31 people with targeted disabilities (PWTD). This constitutes 0.99 percent of all new hires, less than the goal of 3 percent, but improvement is being made each year. ACR also developed and presented an Aviation Training Network Broadcast to approximately 150 managers and supervisors entitled "Let's Talk: Know the Facts about Hiring & Obtaining Reasonable Accommodations for "Persons With Disabilities " to further support this initiative.
- **EEO Training Institute**: The ACR EEO Training Institute, the Civil Rights Directors, and staff delivered 463 briefings to a total of 6,337 managers and employees. Out of 1,197 Air Traffic Controllers and Technical Operation students hired, the EEO Training Institute trained 1,151 or 96 percent. Additionally, the Institute created a video on "EEO Responsibilities and Accountability."

- **EEO Outreach Plan**: FAA participated in 139 outreach events, targeting minorities, women, and people with disabilities. This resulted in 10,122 e-mails from candidates with specific job areas of interest. FAA also published advertisements in magazines such as the Black Employment and Entrepreneur Journal, the Professional Woman's Magazine, the Hispanic Network Magazine, as well as in the Hispanic, Arab and African American Yearbooks.
- **EEO Action Committee**: The Administrator has sanctioned the EEO Action Committee, which is comprised of an executive from each LOB/SO. The committee meets quarterly to strategically address challenges and work towards compliance in accordance with EEO Commission Management Directive 715.
- Consulted with 781 airport grant recipients on developing Part 26 goal methodologies. ACR reviewed 67 goal methodologies, exceeding the target of consulting with approximately sixty-five airport sponsors on developing concession programs under the Disadvantaged Business Enterprise (DBE) Concessions Rule.
- ACR DBE staff conducted seven joint venture compliance reviews. Staff also conducted over 70 consultations with airport staff and provided technical assistance to 1,062 airport recipients, DBEs, and other stakeholders.

As part of a marketing initiative, ACR enlisted the services of an independent contractor to interview several focus groups and rate the perception and success level of the organization. The groups consisted of a sampling of managers and employees throughout FAA as well as airport representatives who deal with the external program. The general consensus is that ACR has been extremely successful in the areas of outreach and training. The new proactive approach to conflict resolution is appreciated and received well by the entire agency.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The FAA Office of Civil Rights is committed to providing a workplace that promotes equal opportunity, is free of harassment, and is an environment where employees can focus on productivity, not conflict. The FAA Administrator has also shown his commitment by forming the EEO Action Committee. ACR will be needed for advice, guidance, and problem-solving as the agency moves forward with this initiative. The funding that is requested will allow ACR to provide a well-trained, well-informed staff to assist FAA Management with EEO matters.

Over the past several years, ACR has taken a very proactive approach to conflict management. Alternative dispute resolution (ADR) is a means for employees and managers to resolve disputes before they become formal EEO complaints. Formal complaints cost the agency numerous resources in terms of employee productivity as well as funding. ACR will continue this proactive approach with the funds requested and increase the savings realized by the agency.

In order to do an effective job of marketing the use of ADR to employees and managers and to reduce the number of formal complaints, we are planning a major campaign in FY 2013 of face-to-face training as well as a presence at major organizational conferences and meetings around the country reaching all levels within the FAA. We will increase the use of media such as ATN broadcasts, teleconferencing, and brochures to educate managers and staff on the innovative techniques that are available to resolve workplace disputes. It is also imperative to have highly trained Civil Rights personnel who are able to conduct mediations around the country for difficult and highly visible cases. The use of ADR/mediation will result in dispute resolution in the early stages thus reducing the number of formal EEO complaints. This will be a tremendous cost savings to the FAA. ACR with the assistance of the Office of Aviation Policy and Planning conducted a study on Labor Costs for Processing an EEO Complaint. The study concluded the labor cost associated with a successful ADR at the informal stage is less costly than the labor cost associated with a formal complaint. By enhancing the ADR program, FAA management will gain an increased knowledge of the mediation process and the associated increase in participation will equate to agency-wide cost savings. Using the figures from the study, the labor costs associated with a formal complaint can run as high as $18,300 per case while the labor costs associated with a successful mediation top out at approximately $5,000. Successful mediations represent a more than 70 percent cost savings per case to the FAA.

As mentioned above, ACR has shifted our focus from just processing EEO complaints to becoming involved in true conflict resolution and training. Without adequate funding, ACR will not be able to train and provide skilled mediators to resolve workplace issues. The result will be additional monetary costs to the agency if disputes are not settled before becoming formal complaints. Additionally, morale could suffer if FAA employees are not adequately trained on EEO issues.

In order to effectively perform barrier analysis to eliminate barriers to employment for minorities, women and people with disabilities and conduct successful outreach, ACR must have sufficient staff to perform these functions. ACR must conduct barrier analysis with regard to merit promotion, awards, and training to determine if there are barriers in these areas. In addition, FAA must identify where applicants are failing in the hiring process e.g. testing, medical, security, interview, etc. If adequate funding is not provided, we will have to decrease our barrier analysis efforts, possibly resulting in little or no change to the FAA demographics.

Other potential results of not funding the program at the requested level include:

- Congress and EEOC will continue to view our EEO efforts as ineffective.
- EEO Complaints will continue to rise.
- ADR will not be viewed as an effective tool for resolving complaints.
- Barriers to EEO will continue to go unnoticed.
- Reducing the amount of resources devoted to EEO Outreach activities potentially sending a negative message to women, minorities, and people with disabilities and causing a decrease in the diversity of the FAA applicant pool.

Government and Industry Affairs (AGI)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$1,572**	**12**		**11**
Unavoidable Adjustments	**+$12**			
FTE Annualization				
Pay Inflation	+6			
One Additional Compensable Day	+6			
Uncontrollable Adjustments				
Contract Pay Raises				
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$13**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-13			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$1,571**	**12**		**11**

Detailed Justification for Government and Industry Affairs (AGI)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Government and Industry Affairs (AGI)
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Government and Industry Affairs	$1,562	$1,572	$1,571	-$1

The FY 2013 budget request of $1,570,000 and 11 FTEs will support the Office of Government and Industry Affairs program. The following core activities represent the FY 2013 budget request:

- Communicate to Congress on behalf of the Administrator and management board.
- Enhance AGI's daily interaction with LOB and SO, and senior management officials by proactively soliciting LOB and SO information sharing in order to improve communication on areas of interest or concern to congress.
- Inform key members of Congress and their staff on FAA safety policies and initiatives.
- Manage the Reports to Congress program, and function as the agency's Report to Congress liaison with congressional authorizing and appropriations staffs to clarify definitions of congressional intent. Also manage the coordination process between FAA, OST, and OMB, and encourage timely LOB and SO responses to targeted deadlines.
- Assist in preparing agency officials for congressional meetings and briefings.
- Provide OST Governmental Affairs with factual, concise, and complete information from significant AGI congressional contacts and activities.
- Serve as focal point for congressional follow-up on written agency responses.
- Foster strong partnerships with key industry stakeholders.
- Meet with aviation industry representatives to strengthen industry relationships.
- Communicate the administration's position on key aviation issues.

2. What Is This Program?

The Office of Government and Industry Affairs (AGI) serves as the Administrator's principal adviser and representative on matters concerning relationships with the Congress, aviation industry groups, and other governmental organizations. In concert with other agency organizations, AGI develops and reviews various plans and strategies involving these groups enhancing the promotion of aviation safety. These activities are conducted in close coordination and consultation with the Assistant Secretary for Governmental Affairs.

3. Why Is This Particular Program Necessary?

AGI represents the first impression and indeed, sometimes the only contact members of Congress and their staffs have with FAA. This customer-oriented office, small by comparison to most other FAA organizations, works directly for the Administrator and is the principal linkage between the agency and the legislative branch of government.

AGI works with other staff organizations to coordinate and present FAA's legislative message. AGI works with other organizations within FAA to facilitate their relations with Congress. AGI consistently monitors and gauges the interest and needs of the Members and leadership on Capitol Hill. This relationship also extends to coordinating our legislative initiatives and responses with the Department of Transportation.

This vigorous outreach is not limited to Congress. AGI also serves as liaison with the aviation industry, from manufacturers to carriers, and with other aviation related organizations. Additionally, AGI serves as the principal point of contact for state and local governments.

4. How Do You Know The Program Works?

AGI office engages and fosters productive relationships with key Members of Congress and Congressional Committees of jurisdiction to further awareness about and manage expectations surrounding FAA's principal mission—safety.

While we seek the resources to continue to improve the quality, timeliness, and usefulness of our core business functions, we know the program works through several indicators:

- Ensured continuance of FAA authorization for four years through 19 extensions
- Serves as FAA's focal point to coordinate agency actions relating to Congressional oversight of FAA programs.
- Manages the Reports to Congress program within the FAA. Serves as the FAA Reports Control Officer and is responsible for providing the DOT Congressional Reports Officer all information to disseminate to Congress and interested parties; approximately 30 reports were submitted to Congress in FY 2012.
- Coordinates with Departmental officials to ensure consistency in furthering policies relating to Congressional and intergovernmental relations issues.
- Keeps FAA Associate Administrators and the offices and services informed of Congressional and public concerns which may influence their operational responsibility;
- Coordinates all incoming Congressional Correspondence.
- Congressional Hearings and Briefings Coordination:
    - Ensures witnesses are well-prepared to answer questions at hearings

AGI solicits information from program offices within the Agency to better understand and communicate potential areas of interest or concern to the United States Congress. AGI strives for inter-agency coordination by providing Congress with timely and quality responses to all Congressional inquiries (i.e. briefings, calls, outreach events, etc).

The work of this office enables the Administrator, Deputy Administrator, and Associate Administrators, etc. to effectively interact and communicate the policies and positions of the FAA before the United States Congress. Our established congressional relations are vital to advancing the aviation priorities of the Agency, Department, and the Administration.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

FAA needs to have one office whose mission it is to provide high quality, timely communications to Congress. When we communicate well, the FAA gets heard. It is essential that public policy gets debated on its merits so that the best outcomes can result. Without this office, too much of the debate would be consumed by process instead of policy.

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Office of Communications (AOC)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$5,774**	**34**	**1**	**34**
Unavoidable Adjustments	**+$43**			
FTE Annualization				
Pay Inflation	+21			
One Additional Compensable Day	+22			
Uncontrollable Adjustments				
Contract Pay Raises				
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$50**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-50			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$5,767**	**34**	**1**	**34**

Detailed Justification for -- Office of Communications (AOC)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 - Office of Communications (AOC)
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Office of Communications	$6,775	$5,774	$5,767	-$7

This request is for $5,767,000 and 34 FTEs to support AOC's critical outreach to news media, FAA-licensed individuals, the flying public, and the FAA's more than 48,000-member workforce. AOC works with news media and stakeholders to provide the public with accurate, timely, useful and important information about the agency's goals, policies, activities and operations. AOC serves as the internal voice of the FAA, providing employees with daily, weekly, and periodic communication vehicles and news programs. AOC manages an agency-wide employee collaboration program that enables employees to share ideas, participate in conversations, and support the FAA's safety mission through online communities that enable innovation and collaboration. AOC also oversees the FAA branding program, multimedia (broadcast and video) services and all web content for the agency at large.

Our FY 2013 Key Outputs and Outcomes Include:

- Increase awareness and understanding of FAA safety, NextGen initiatives and National Airspace System efficiency and capacity enhancements through press conferences, media briefings, roundtables, direct outreach to reporters, press releases, websites, social media, and other communication channels.
- Increase awareness of the FAA's role as a world leader on aviation issues.
- Use multiple communications channels to promote key FAA safety initiatives (e.g. child safety, laser awareness, runway safety, etc).
- Respond to media calls about safety and other issues within 24 hours with accurate information and ensure the delivery of urgent, time sensitive information to key audiences.
- Continue improvements to FAA websites to increase online customer satisfaction.
- Ensure the efficient online delivery of aviation safety related regulatory documents including flight safety, airworthiness directives, and pilot and aircraft licensure.
- Support open government initiatives to make data available, improve online services, and increase collaboration with citizens, stakeholders and other government agencies.
- Improve frequently asked questions knowledge base to help public website customers find answers to common questions via a web self-service interface.
- Use external social media channels to engage with and educate the flying public and aviation industry professionals about key FAA safety initiatives (e.g. FAA official Facebook, Twitter, YouTube properties).
- Use new media technologies to extend the FAA's reach to delivery aviation safety information to targeted pubic audience.
- Increase employee understanding of agency programs and activities.
- Lead the DOT/FAA IdeaHub program to leverage employee ideas to help accomplish the FAA mission, make the organization a better place to work, and improve morale through engagement.
- Use a variety of internal communications vehicles to increase employee understanding of agency strategic goals, programs and activities. Obtain feedback that helps the FAA meet those goals.

2. What Is This Program?

The Office of Communications (AOC) is responsible for the policy, direction, and management of the agency's communications programs for the news media and FAA's employees nationwide. The Office of Communications is both the external and internal spokesperson for the FAA. The AOC mission is to disseminate accurate and timely aviation and aviation-related information affecting FAA licensed individuals, employees, and the flying public.

Media Relations
AOC works closely with FAA's lines of business and staff offices to provide timely, accurate information on FAA programs and activities under FAA's five strategic goals. AOC advises all agency officials on communication strategy and prepare them for media interviews and other public appearances. Office activities also support the Department of Transportation (DOT) goal of Organizational Excellence by facilitating clear, timely, consistent, and inclusive communications. AOC also coordinates the activities of the regional and center public affairs officers.

Employee Communications
AOC coordinates with the agency's lines of business and staff offices to provide more than 48,000 FAA employees with pertinent, accurate, and timely information on agency programs and activities. In addition, through FAA employee websites, AOC provides information and resources employees need to do their jobs. Through agency-wide employee engagement programs, AOC enable employees to share ideas, participate in conversations, collaborate together and support the FAA's safety mission through online communities that increase innovation, efficiency, and productivity. AOC manages the FAA's internal and external websites as well as internal web-based publications, social media platforms, video, audio and information-sharing programs. The FAA's external web pages inform FAA-licensed individuals and the flying public on issues involving aviation and aviation-related programs. Together these websites receive more than four million visits per month.

Anticipated Accomplishments Include:

- Increase positive coverage of FAA safety programs, NextGen initiatives, National Airspace System efficiency and capacity enhancements and reinforce FAA's role as a world leader on aviation issues.
- Ensure that at least seven articles, news stories or editorials appear in national publications or television coverage that positively highlight agency safety initiatives.
- Ensure that at least seven articles, news stories or editorials on NextGen appear in national publications or television coverage that positively highlights agency technology or procedural advances that will enable NextGen.
- Ensure at least four articles, news stories or editorials on separate topics appear in national publications or television coverage that positively highlight agency international leadership initiatives and when appropriate, communicate the FAA's role as a world leader on aviation issues in responses to day-to-day media inquiries.
- Ensure rapid response to media requests and provide critical information to the public in the event of an aviation emergency.
- Provide monthly web traffic, satisfaction, and usage reports including social media for FAA.gov and Employees.FAA.gov visitor usage, email subscriptions, and downloads.
- Achieve an average ACSI customer satisfaction score of 73 or better on the FAA public website for FY 2012 and FY 2013.
- Deliver more than 6 million FAA safety and regulatory documents online instead distributing in print.
- Publish daily broadcast email messages to employees that promote FAA programs and HR information as well as raise awareness of coverage of FAA in the press.
- Welcome more than 4 million visitors to FAA public and employee websites every month.
- Launch mobile device optimized FAA public website.
- Publish more than 250 employee news articles in Focus FAA that increase employee understanding of agency programs and activities.
- Deliver over 6 million FAA safety and regulatory documents online instead distributing in print.
- Receive more than 500 comments from employees on employee ideas to improve the FAA.
- Promote at least 10 FAA leadership messages to the workforce.
- Provide audio/visual support for more than five FAA/DOT employee town hall events.
- Answer 98 percent of questions received through the FAA Frequently Asked Questions knowledge database on the FAA public website.
- Reach a total external social media audience of at least 300,000 on child restraint system safety awareness and an audience of at least 500,000 on the dangers of pointing lasers at airplanes.

3. Why Is This Particular Program Necessary?

The Office of Communications, as FAA's internal and external voice, is responsible for the policy, direction, and management of the agency's communications programs for the news media, FAA employees nationwide as well as the flying public and key stakeholders. These programs and services are vital to AOC's mission to drive communications in support of the FAA and the DOT.

AOC coordinates with lines of business and staff offices to provide employees with pertinent, accurate, and timely information on agency programs and activities using audio/video services, a web-based employee newsletter and other communication channels.

Benefits of these communication services - With more than 48,000 employees working in offices and in the field, around the country and abroad – the FAA intranet, employee news, daily broadcast, and audio/video production services are a vital part of ensuring employees are connected with the vision, mission and values of the agency. These vital communications vehicles ensure that employees get information about everything from HR benefits to changes in programs that may directly impact them. Strong internal communications generate a more engaged, productive, and loyal workforce. AOC measures the benefits of these programs through the direct feedback received from employees on a regular basis and measures effectiveness through the number of visits to the news sites and video products as well as the online engagement that these products is generate.

Readership and engagement have increased significantly through these communications channels. Employees have come to expect the information that AOC delivers via these services. Other offices have come to expect the communications services that AOC provides for them which help convey important information about the agency programs they are responsible for.

4. How Do You Know The Program Works?

AOC has a variety of tools that help it ensure that FAA communications are effective. Consistent high survey feedback from users indicates that AOC is meeting its goal to provide information that is readily available, timely, accurate, and is understandable by the traveling public. AOC's corporate web management program has increased its annual American Customer Satisfaction Survey (ASCI) score from a 66 to a 73 in the last three years. This puts the FAA above the Federal Government average and well above the regulatory agency average.

An internal communications e-newsletter called Focus FAA receives more than 60,000 visits per month, has high readership and enables robust employee interaction. AOC also monitors the number of visits and time spent reading newsletter content and audio video content. AOC receives positive feedback and a high-level of response via online feedback channels for these publications. AOC also holds frequent media training sessions for FAA Leadership and takes advantage of new media technologies to deliver its message to a wide-range of audiences.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

FAA employees, external stakeholders and the flying public expect unprecedented access to information from the FAA and more interaction about that information. AOC must continue to accurately and in a timely fashion provide critical information about FAA operations, safety oversight, efficiency initiatives and other programs to the media, employees and the flying public, to effectively accomplish the FAA's mission.

Without adequate funding, the FAA will not be able to respond to media requests, communicate information to the public about agency programs and initiatives or correct inaccurate information. Employees will lose timely access to critical HR information, messages from leadership, news about agency programs and policies, and the ability to engage with each other. Other FAA LOBs and Staff Offices would have to find the funds to pay for their own communications services these types of services using outside vendors which could cost the agency more money and lead to inconsistent messaging and in the quality of the message and the brand of the message itself.

Office of General Counsel (AGC)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$47,005**	**262**	**9**	**252**
Unavoidable Adjustments	**+$293**			
FTE Annualization				
Pay Inflation	+136			
One Additional Compensable Day	+157			
Uncontrollable Adjustments	**+$111**			
Contract Pay Raises	+111			
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$458**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-458			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$46,951**	**262**	**9**	**252**

Detailed Justification for – Chief Counsel (AGC)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Chief Counsel
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Chief Counsel	$48,128	$47,005	$46,950	-$55

The Office of the Chief Counsel requests $46,950,000 and 252 FTE's to enable AGC to provide necessary legal services to the FAA. This funding will provide a means to ensure the FAA meets its mission obligations consistent with legal requirements and that agency action and employees are vigorously represented in administrative and judicial forums. The request will also permit timely and responsive legal services needed to support FAA lines of business with critical program responsibilities, and all agency organizations worldwide. Our attorneys serve as advisors and counselors to senior managers on matters of significance to the agency.

Funding at the FY 2013 requested level will provide for legal services, including representation, in support of FAA functions related to:

- Rulemaking, including critical safety rules and regulatory aspects of NextGen.
- Enforcement of safety regulations.
- Acquisition of operational safety systems and equipment, including acquisition aspects of NextGen development, and compliance with commercial and fiscal requirements.
- Airports capacity enhancement and grants, environmental streamlining for airport projects, and environmental aspects of NextGen development.
- Personnel and labor matters.
- International agreements and harmonization of safety requirements.
- International technical assistance agreements and safety assessments.
- Dispute resolution services and/or administrative adjudication of acquisition related disputes; administration of the Civil Penalty Program and services of the DOT Administrative Law Judges; and FAA's public rulemaking docket.
- Freedom of Information Act and Privacy Act compliance, and compliance with Government-wide ethics requirements.
- Representation of agency interests and choice of actions before United States federal courts and various administrative forums, including the National Transportation Safety Board (NTSB), the Merit Systems Protection Board, and the Equal Employment Opportunity Commission.

In order to advance the DOT goals of achieving the next level of safety, maximizing access to the aviation system, advancing global collaboration and building and enhancing our high performance workforce, the Office of the Chief Counsel anticipates producing the following key outputs and outcomes in FY 2013:

- Send 85 percent of significant critical safety rules approved by the Rulemaking Council to DOT within 90 days of the planned date and issue 85 percent of the non-significant rules approved by the Council within 90 days of the scheduled date.
- Provide regulated community with timely guidance in responses to public requests for interpretations of FAA regulations by responding to 60 percent of requests for interpretation within 120 days of receipt and provide timely legal review of grants and denials of exemptions generally within 30 days of receipt for 70 percent of the exemptions submitted.
- Prosecute enforcement actions timely and efficiently in support of agency safety activities by taking the first legal action on 80 percent of the number of cases received during 12 months; timely conducting 50 percent of informal conferences within 90 days of receipt of a respondent's request and 75 percent within 180 days; avoid case backlog such that the percentage ratio of cases completed is at least 60 percent of the number of cases received.

- Provide representational legal services on all phases of tort litigation, investigations, claim processing and monitor and report on the agency's contingent liability.
- Provide timely draft civil penalty appeal decisions to the FAA Administrator by completing draft decisions in 50 percent of appeals within 180 days of the receipt of the last brief.
- Analyze capacity and congestion policy implications of NextGen near-term and mid-term improvements as required by program offices and provide legal drafting, analysis, and technical assistance.
- Maintain scheduled progress for Southern Nevada Supplemental Airport and Houston-George Bush Intercontinental Airport Environmental Impact Statement.
- Provide legal advice needed to avoid unanticipated cost growth on major system acquisitions such that 90 percent are within 10 percent variance of their current base-lined total budget estimate at completion (BAC).
- Review all acquisition document son average within 10 calendar days of receipt.
- Support deployment of automatic dependent surveillance broadcast (ADS-B) to key sites in support of the Satellite and Broadcast Service (SBS) national program baseline by completing legal review necessary to complete activity targets for FY 2013.
- Support agency real estate disposal efforts to achieve 90 percent of the $1.2 million projected year end savings.
- Draft and negotiate international agreements as required by the agency on safety oversight, air traffic, airworthiness, technical assistance and other aviation issues; prepare agency position on matters before the International Civil Aviation Organization (ICAO); and provide legal guidance on registration and recordation of property rights in aircraft.
- Serve as legal counsel to the Crisis Response Working Group and Crisis Response Steering Group established for the purpose of responding to potentially hostile threat situations, natural or man-made disasters or crisis.
- Meet all EEOC, MSPB, and federal courts employment case deadlines. Respond to 80 percent of agency requests for opinions or advice within 10 working days.

2. What Is This Program?

AGC provides mission critical legal support services across each of the Department of Transportation (DOT) goal areas and is both a key partner to each line of business and staff office within FAA and an integral contributor to the success of every major agency program and function. Across every line of business and every agency program, AGC provides legal advice, reviews agency action for legal sufficiency and conformity, represents agency interests in various administrative and court forums, defends agency choice of action, and enhances risk management by proactively seeking to identify and mitigate risk. Also, AGC is responsible for two distinct internal FAA adjudicative functions: the Office of Dispute Resolution for Acquisition serves as the Administrator's adjudicatory body in acquisition-related matters and provides alternative dispute resolution services; and, a discrete unit within the office supports the FAA's civil penalty adjudication function by serving as a confidential advisor to the FAA Administrator in his capacity as the Civil Penalty Program decision-maker.

AGC principle legal practice areas provide services in support of DOT goals in the following manner:
1) enhancing Safety, through its activity in regulatory enforcement, rulemaking, acquisition and commercial law, aircraft and other tort litigation, and the Office of Audit and Evaluation; 2) maximizing Economic Competitiveness through its rulemaking activity, environmental legal services, airport legal services which support airport expansion and capacity, and acquisition of technologies that support increased capacity and efficiency; advancing global collaboration through international activity and harmonization of safety rules) enhancing Livable Communities and ensuring Environmental Sustainability through its rulemaking activity and environmental legal services; and) building Organizational Excellence by enhancing our high performing workforce, supporting numerous agency-wide strategic initiatives, and providing legal services in support of agency administrative functions including employment and labor law, ethics counsel, FOIA and Privacy Act services and legislative services.

The direct beneficiaries of our services are the agency organizations that have operational and programmatic responsibility for carrying out FAA's mission. The flying public is the overarching beneficiary of increased safety and a modern and efficient air transportation system. AGC is a key partner supporting the agency's success in various program areas and our goals of increased safety, mobility and economic competitiveness, environmental sustainability, and organizational excellence. Our critical supporting activities include:

- Ensuring FAA's rules meet legal standards, assisting the agency in completing critical safety rules on schedule, and providing regulatory interpretations to internal staff, agency officials and member of the public.
- Prosecuting all manner of enforcement cases referred by the Flight Standards Service, Aircraft Certification Service, the Office of Aerospace Medicine, the Office of Security and Hazardous Materials, the Office of Airports and the Office of Commercial Space Transportation.
- Representing the FAA on safety matters before the NTSB, the FAA Decision-maker and the Federal courts.
- Advising agency employees and management during aircraft accident investigations and defending the agency in associated litigation; evaluating tort claims; assisting Department of Justice in defending wrongful death, personal injury and property damage lawsuits.
- Advising the FAA Administrator, in his capacity as decision-maker on cases appealed from decisions issued by Administrative Law Judges.
- Advising program offices on the legal and environmental implications of programs that enhance airport and airspace capacity and defending the agency's choice of action.
- Providing legal advice, litigation support, policy and regulatory guidance, and legal sufficiency reviews related to environmental review of airport capacity and capacity-related projects, administration of the airport improvement program, funding of runway expansion and safety projects, redesign of the airspace surrounding airports in major metropolitan areas and streamlined environmental review and compliance.
- Providing acquisition and commercial law expertise to assist clients in acquiring safety and capacity enhancing equipment and services.
- Ensuring legal sufficiency on all high value agency procurement activities; advising on grants, cooperative agreements, and other transaction agreements; and representing FAA in acquisition related litigation and disputes.
- Providing fiscal and commercial law services needed to support the agency's information security requirements, export control compliance, bankruptcy cases, antitrust issues, real estate activity and appropriations matters.
- Representing the agency before various administrative and federal courts on personnel, labor, civil rights and equal employment opportunity matters.
- Counseling how to minimize the legal risks relating to employment decisions and policy.
- Providing an administrative adjudicatory body in acquisition-related matters and ensuring acquisition conflicts are resolved through alternative dispute resolution processes or are promptly adjudicated.

Anticipated FY 2012 accomplishments include:

- Supporting agency rulemaking activities by submitting to DOT 80 percent of significant ("A") rules approved by the Rulemaking Council within 90 days of the scheduled date and issuing 80 percent of certain non-significant rules approved by the Rulemaking Council within 90 days of the scheduled date.
- Responding to 50 percent of public requests for interpretations within 120 days of receipt.
- Prioritizing and efficiently prosecuting legal enforcement cases by taking the first legal action on 80 percent of cases received during a 12 month period.
- Conducting 50 percent of informal conferences in legal enforcement actions within 90 days of receipt of a respondent's request, and 75 percent within 180 days.
- Monitoring and reducing backlog of enforcement actions by maintaining a ratio of cases closed to cases received to greater than 60 percent office wide.
- Streamlining the coordination and approval of significant enforcement actions by submitting 70 percent of safety alerts to the program office for concurrence within 45 days of receipt in AGC headquarters.
- Completing legal review of all procurement documents within 10 days.
- Providing legal services relating to drafting and negotiation of international agreements and provide legal support for the Aviation Insurance Program.

3. Why Is This Particular Program Necessary?

We provide critical support to each and every function and program within FAA's mission. Legal support ensures agency actions are consistent with legal requirements and risks are assessed and mitigated where appropriate. The legal office both defends agency choice of action, as well as agency employees, and vigorously prosecutes regulatory violations that imperil safety.

AGC's principal legal practice areas are integrally linked to the success of FAA's mission. AGC directly supports the agency's safety mission by: timely and efficiently prosecuting violations of the federal aviation regulations, as well as, providing legal support of voluntary compliance programs; ensuring that critical safety rules are both legally sufficient and completed timely; providing timely and accurate agency responses to public requests for interpretations of the regulations; assisting in FAA accident investigation activities; and vigorously representing the agency and agency personnel in air crash and other tort litigation. In support of economic competitiveness and enhancing access to aviation, AGC plays a significant role by providing critical legal advice so that program milestones are maintained and providing legal sufficiency reviews and advice to bolster and sustain program office actions regarding the legal and environmental implications of runway expansions, terminal improvements, and redesign of the national airspace. Our environmental legal work also serves the related goals of ensuring livable communities and enhancing environmental sustainability. Further, AGC legal advice, risk management expertise, and sufficiency reviews in the acquisition and commercial law practice areas are essential to development, acquisition and deployment of the safety and capacity enhancing equipment and technology needed to support the national airspace system. AGC advice and risk management efforts assisted the agency in keeping major acquisitions within acquisition cost and schedule baselines in most cases. Moreover, AGC supports the agency efforts pertaining to global collaboration by developing the agency position on international law issues and supporting FAA international aviation efforts. Finally, in support of the overall goal of organizational excellence and enhancing our high performance workplace, AGC provides advice and guidance to key agency officials on personnel, labor law, and civil rights matters and the various general law disciplines applicable to all federal agencies.

Our most important contributions can be found in our timely and efficient support of safety and access:

- Complete 80 percent of critical safety rules within 90 days of DOT scheduled due date.
- Over 50 percent of public requests for interpretations are provided within 120 days.
- Regulatory exemptions are usually acted upon in 30 days.
- Legal enforcement cases are prosecuted such that initial legal action is taken on 80 percent of cases filed during a 12 month period, 75 percent of informal conferences are held within 180 days of request and caseload is monitored to avoid a backlog.
- Major acquisitions systems that support the safe and efficient air transportation system are completed within striking distance of their cost and schedule baseline over 80 percent time and contract document are cleared through the legal office within 10 days.

4. How Do You Know The Program Works?

AGC is a support organization that contributes to the overall success of FAA programs and functions that reside with the various lines of business and staff offices with programmatic responsibility. Our contribution cannot be assessed through a single measure. Rather AGC contributes on many fronts to many programs to ensure overall FAA actions are consistent with legal requirements, risks are defined and managed to the extent practicable with the interests of the agency and flying public are strongly represented.

The multi-faceted contribution made by AGC is apparent in the NextGen program. NextGen is the future of air transportation, designed to promote efficiencies in air transportation, promote safety, and reduce costs to carriers. Our acquisition attorneys provide key support in the development, acquisition, and deployment of satellite base systems and technologies. The rulemaking attorneys play a critical role in establishing regulatory requirements and certification of new avionics equipment. The environmental attorneys are critical to ensuring environmental assessments are timely completed for new systems and airspace redesigns. The employment lawyers have a significant role in addressing the staffing and labor implications of a system where air traffic is managed rather than controlled. There is no single measure to assess AGC's contribution to the NextGen program, but the contribution is significant. The same is true for the many FAA programs and functions that AGC supports.

While there is no single or overall measure to assess the legal program, it merits saying that over the years AGC has consistently met the specific performance measures for its key practice areas.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

AGC's funding level is primarily consumed by personnel costs and our staffing level drives our service level. Reductions to the requested funding level would significantly affect our delivery of services and would have a compounding effect on the vast array of program offices that require legal services to meet agency mission critical programs and strategic initiatives. Essentially, every mission critical program and/or initiative requires, either by law, congressional mandate, agency policy and/or sound business judgment, a legal office sign off or review for legal sufficiency at prescribed stages. Any reduction funding will hinder AGC's ability to deliver legal services would result in a bottleneck of required legal work. This decline would ultimately slow down the entire office response time to regulatory issues, enforcement cases, and litigation and personnel cases and have an overall impact of the safety of the aviation community.

A reduction in funding could also impair the agency ability to vigorously defend tort and personnel cases, thereby significantly increasing the government's exposure to loss. AGC litigation losses consistently have been small compared to its potential tort liability. Similarly, pending class action employment cases carry an exceeding large potential liability, but AGC attorneys have successfully defended the cases to date.

A reduction or disruption in AGC's ability to deliver timely legal services likely would impair efforts to accelerate development and implementation of the NextGen Air Traffic Control System and related safety enhancements, and would interfere with initiatives related to maintaining scheduled progress of environmental reviews for airport development projects and airspace redesign efforts. If these programs are delayed due to a bottleneck in AGC, the safety and efficiency improvements these programs hold for the traveling public will be similarly delayed.

Office of Policy, International Affairs, and Environment (APL)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$34,952**	**163**	**7**	**145**
Unavoidable Adjustments	**+$197**			
FTE Annualization				
Pay Inflation	+97			
One Additional Compensable Day	+100			
Uncontrollable Adjustments				
Contract Pay Raises				
Staffing Adjustment				
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$238**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-238			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$34,911**	**163**	**7**	**145**

Detailed Justification for – Office of Policy, International Affairs, and Environment (APL)

1. What is the Request and What Will We Get for the Funds?

**FY 2013 – Office of Policy, International Affairs, and Environment (APL)
($000)**

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Policy, International Affairs and Environment	$35,310	$34,952	$34,911	-$41

The FY 2013 budget request of $34,911,000 and 145 FTEs allows FAA to identify, develop and implement the domestic and international policy and environmental goals of the agency. This is a decrease of $41,000 over the FY 2012 enacted level. This funding reflects the estimated pay and non-pay inflation increases for personnel compensation and benefits, and other objects that support program activities including program travel, training, communications, support services requirements, contract support, and supplies and equipment to support continuing operations. This funding level also includes an administrative efficiency savings of $266,000.

Funding in FY 2013 will support the following key outputs and outcomes:

Policy and Plans

- Identify and initiate resolution of policy issues associated with NextGen implementation that cut across traditional FAA lines-of-business and offices.
- Complete economic analyses of agency rulemaking and regulatory projects, provide criteria and performance analysis of FAA investments in aviation infrastructure, and evaluate airport benefit-cost analyses and competition plans.
- Implement congestion management solutions for the New York area while continually updating projections on which metropolitan areas will have the greatest impact on total system delays and developing options and recommendations to address.
- Develop and publish the annual FAA aerospace activity forecast and terminal area forecasts by March of each year.
- Work with the Administration, Congress, and stakeholders to develop and implement FAA reauthorization legislation and to develop and analyze forecasts of Aviation Trust Fund revenues and expenditures at least twice a year.
- Develop and manage a continuous, end-to-end strategic planning and performance process for the agency to include transparent reporting of performance outcomes via multiple web-based initiatives.
- Manage processes of the new Strategy, Budget and Performance Committee and its three subcommittees to support the Agency's new governance process.

International Affairs

- Advance global interoperability with NextGen, facilitating improved air traffic efficiencies, reducing duplicative requirements, and saving resources for FAA and industry alike.
- Enhance aviation safety through the promotion of proven safety programs and procedures with civil aviation authorities, regional organizations, industry and other stakeholders.
- Support government and industry partnerships to facilitate the transfer of aeronautical products, services, and technologies to China, India, Brazil and Mid-Americas and Caribbean.
- Provide global strategic analysis and policy development on international aviation issues.
- Mitigate aviation's environmental impact through promotion of improved ATM efficiencies, adoption of advanced aviation technologies, including sustainable alternative fuels for aviation, enhanced cooperation in environmental research, and improved environmental data reporting to the International Civil Aviation Organization (ICAO).

<u>Environment and Energy</u>

- Support activities to reduce aviation's environmental impacts, including reducing the number of people exposed to significant aircraft noise, health impacts associated with aviation emissions, and aviation's carbon dioxide (CO_2) emissions
- Support activities to improve aviation fuel efficiency and augment the use of sustainable aviation fuels
- Continue activities to support NextGen infrastructure and FAA Greening Initiative
- Implement policy for application of environmental analysis tools for screening and compliance needs
- Explore implications for potential revision of the threshold for community noise levels
- Continue activities to update FAA order 1050.1E for National Environmental Policy Act (NEPA) compliance
- Provide policy and guidance support for aircraft noise and engine emissions certification
- Coordinate tracking and reporting of FAA's environmental sustainability performance
- Review, refine and implement NextGen environmental policy
- Support activities to achieve U.S. environmental and energy objectives at ICAO.

2. What is the Program?

APL supports the DOT goals of Safety, State of Good Repair, Livable Communities, Environmental Sustainability, and Organizational Excellence through multiple programs and projects designed to minimize exposure to aircraft noise and to reduce aviation emissions, two of several FAA and DOT performance measures and to foster the continued development of competent civil aviation authorities worldwide to meet international safety oversight standards. As more Americans travel worldwide, the development of competent civil aviation authorities has become a cornerstone for providing technical assistance, building capacity and transferring technologies for public benefit. Incumbent on the Environmental Sustainability is a vision of the environment as a global responsibility, requiring the coordinated development and implementation of best practices, standards, and regulation, including international leadership and assistance. Climate change, in particular, is a global issue. Working at ICAO and with international partners, APL is providing U.S. leadership on reducing international aviation's carbon footprint and developing a new CO_2 emissions standard for aircraft.

All APL offices support FAA and DOT Organizational Excellence strategic goals, ensuring continuously-improving, secure, efficient, and transparent exchanges of critical information, organizational performance management including performance reporting, and maximizing output/outcome oriented efficient planning and business processes

APL serves multiple international functions: principle advisor to the Administrator on international matters; management of agency international outreach, cooperation, and technical exchanges with a view to enhanced safety, capacity, and sustainability; development and coordination of international civil aviation policies and positions; provision of support to the U.S. Mission at the International Civil Aviation Organization; and technical assistance (over 1.500 cooperative agreements with 150 countries).

DOT and FAA participate in international standards setting and harmonization activities in transportation, and engage in implementing programs that provide technical assistance for transportation capacity building to developing countries. DOT and FAA are engaged in advancing U.S. transportation policy and advocating worldwide adoption of harmonized standards and global technical regulations through participation in bilateral and regional forums or international organizations at the ministerial and working levels.

Our organization is also very active in working with ICAO, International Air Transport Association (IATA), the Joint Planning and Development Office (JPDO) and international partners to develop global and domestic standards and recommended practices as well as guidance materials that support implementation of harmonized aviation policies and programs such as NextGen and NextGen Technologies, by ICAO members worldwide and in setting global aircraft noise and engine emissions standards.

As FAA's policy office, APL is responsible for developing broad-based, novel, and crosscutting policy initiatives. The office works to identify, develop, and resolve policy issues related to increased safety, greater capacity, maintaining international leadership, and sustainability of the global and domestic civil aerospace system in an environmentally sound manner. This work requires outreach to domestic and international customers and stakeholders, extensive research and development efforts, data collection and analysis, economic analysis, and policy development It also provides leadership to the agency's strategic policy and planning efforts, coordinates the agency's reauthorization before Congress, and is responsible for national aviation policies and strategies in the environment and energy arenas, including aviation activity forecasts, economic analyses, aircraft noise and emissions analyses and mitigation, environmental policy, and aviation insurance.

In the area of environment, APL is responsible for improving environmental protection and addressing the energy and sustainability needs. APL is responsible for developing broad based approaches and coordinating agency responses to limit and reduce future aviation environmental impacts to levels that protect public health and welfare, ensure energy availability, and enhance sustainability of FAA operations. This work requires addressing environment, energy, and sustainability issues that will influence the future capacity and flexibility of the national airspace system (NAS), aircraft noise, air quality, global climate effects, energy availability and efficiency, water quality and sustainability of FAA operations.

The organization consists of the following offices:

Aviation Policy and Plans improves the FAA's effectiveness with strategic planning and management; makes coordinated and well-informed policy decisions for crosscutting and novel civil aerospace issues using independent economic, quantitative and qualitative analysis, information and tools; and positions the FAA for the future by identifying, researching, and projecting emerging issues and trends.
International Affairs is responsible for coordinating all of FAA's international efforts and advancing the nation's longstanding leadership on the international front including engaging in dialogue with counterparts across the world.
***Environment and* Energy** is responsible for developing, recommending, coordinating, and implementing national and international standards, policy and guidance, research and technology goals, and analytical capabilities on aviation environmental and energy matters.

The base budget request covers the following:

- Leading FAA's strategic planning effort that will impact NextGen implementation, future airport congestion and system delays, the ability of agency rulemaking to address future risks, and development of more robust forecasting products.
- Collaborating globally to advance harmonization of aviation standards and practices through representation in key international bodies and provision of training and technical assistance around the world.
- Leading or facilitating agency reauthorization efforts to include development of reauthorization proposals and implementation of enacted reauthorization initiatives.
- Aviation environment and energy policy, programs, and operational activities to:
  - Reduce aircraft noise.
  - Reduce aviation emissions and climate impacts.
  - Improve National Airspace System energy efficiency and develop sustainable alternative aviation fuels.
  - Integrate environmental considerations into NextGen through Environmental Management Systems and National Environmental Policy Act compliance.
- Supporting FAA's strategic sustainability through cross cutting coordination and performance tracking activities.

Anticipated accomplishments for Policy, International Affairs, and Environment include:

<u>Policy and Plans</u>

- Identify and initiate resolution of novel and crosscutting NextGen policy issues as well as analyze capacity and congestion policy implications of NextGen near and mid-term improvements. Work across the agency to incorporate NextGen metrics and performance measures in the agency's strategic and business planning.
- Support the executive-level Strategy, Budget and Performance Committee and its three subcommittees as they work to identify, develop and resolve cross-Agency policy issues.

- Provide timely economic analysis to enable the agency to send critical safety rules to the Office of the Secretary of Transportation within 90 days of the planned date.
- Implement congestion management solutions for congested areas including the New York area with analysis of proposed infrastructure projects for air traffic and airport improvements.
- Lead development of agency reauthorization proposals, facilitate implementation of FAA reauthorization statutory provisions, and develop and analyze forecasts of Aviation Trust Fund.
- Support the Administrator by staffing the Management Advisory Council and other similar advisory bodies as directed by Congress.

<u>International Affairs</u>

- Advocate globally full interoperability with NextGen to ensure a safe, efficient, sustainable world-wide air transportation system and reduce costs for the FAA and industry alike. Collaborate with international partners and stakeholders to promote new technologies, enhanced procedures, safety and airports requirements and environmental considerations.
- Provide leadership in establishing and expanding Aviation Cooperation Programs in India, China, Brazil and Mid-Americas and Caribbean. These public-private partnership programs are designed to consolidate U.S. technical cooperation to improve aviation safety and efficiency in a collaborative manner with aviation interests in foreign countries. The overall strategy fosters cooperation between the U.S. government and corporate aviation members in the delivery of technical programs and assistance, thereby avoiding duplication and maximizing financial benefits for both sides.
- Strengthen civil aviation authorities and global safety by creating and promoting targeted developmental opportunities to civil aviation leaders to enhance management, technical, and organization skills.
- Leverage private and government expertise and resources and global assistance programs by identifying and securing external funding for international aviation development projects to assist civil aviation authorities improve safety, efficiency, and sustainability.

<u>Environment and Energy</u>

- Provide implementation guidance on the use of the Aviation Environmental Design Tool (AEDT) for demonstrating environmental compliance
- Conduct research and analysis and explore options for potential revisions in community noise threshold levels
- Coordinate U.S. positions to ICAO on more stringent aircraft noise and new aircraft CO_2 emissions standards
- Support international activities to address aviation emissions influence on climate, through ICAO and other venues
- Coordinate an update to FAA Order 1050.1E towards improving our efficiency for meeting NEPA requirements and supporting NextGen implementation
- Coordinate an update to FAA's annual Strategic Sustainability Performance Plan and Greenhouse Gas Sustainability Data Report
- Track and report on FAA's sustainability performance
- Assess NAS-wide environmental performance for exposure to significant noise and improved fuel efficiency

Beneficiaries

As the number of international passengers and aviation activities across the globe increase every year, it becomes even more important for the U.S. to continue to be the gold standard for aviation safety. To make this happen, FAA actively builds partnerships and shares knowledge to create a safe, seamless, and efficient global aviation system. Our premise is simple: national boundary lines should not be impediments to safety. The global aviation system moves more than 6.2 million people and tons of cargo to their destinations every day. APL collaborates with our domestic and international partners to improve aviation safety, efficiency and the environment. The American traveling public and industry—and many others around the world—benefit from the work we do.

The public at large benefits from reduced aviation noise and emissions impacts. The aviation industry also benefits because lower impacts reduce environmental constraints on aviation operation and growth. Improvements in fuel burn and energy efficiency improve emissions, including greenhouse gas emissions, reduce the economic burden imposed by high fuel costs, and contribute to U.S. energy conservation. Advancing sustainable alternative aviation fuels contributes to energy independence.

Work on critical safety rules directly contributes to aviation safety benefiting the general public and the aviation industry. The public and industry both also benefit from APL's work to identify and resolve crosscutting policy issues affecting NextGen implementation. Work on system congestion and delay benefits the flying public, operators, and the U.S. economy in general as air transportation can be operated more reliably and efficiently.

Role of partners in implementing this program

APL works closely with other Federal agencies on national and international policy, environmental and energy issues, as well as with industry partners, other civil aviation authorities, academia, non-governmental organizations, and community representatives. Our organization is also very active in working with ICAO, IATA, the JPDO, and international partners to develop global and domestic standards and recommended practices as well as guidance materials that support implementation of harmonized aviation policies and programs such as NextGen, by ICAO members worldwide and in setting global aircraft noise and emissions standards.

3. Why is this particular program necessary?

APL is responsible for leading the agency's domestic and international policy initiatives and strategic planning, facilitating reauthorization, and advancing an environmentally sustainable aviation system. APL plays a key role in ensuring that agency policies, forecasts, programs, and assistance support and improve national and international civil aviation, and that the U.S. continues to operate the world's safest and most efficient aviation system with adequate capacity and environmental integrity, and retains its leadership role around the world. We ensure that agency decisions are based on sound science and solid analysis and that we consider the views and needs of the many varied interests of stakeholders. Our work translates into a truly global and environmentally sustainable aviation system while meeting the needs of the U.S. aviation community.

Environmental and energy concerns are rising. Aircraft noise and emissions, including greenhouse gases, will grow and constrain the mobility and flexibility of NextGen unless they are adequately mitigated. Increased aviation noise and emissions would also undermine U.S. domestic and international environmental interests. Reducing aviation's environmental footprint will allow the achievement of both U.S. air transportation goals and environmental protection for improved public health and welfare. Measurable benefits and outcomes include:

- Reductions of significant aviation noise and air quality impacts below current levels, notwithstanding aviation growth.
- Limitations of the impact of aircraft CO_2 emissions on the global climate by achieving carbon neutral growth by 2020, compared to 2005 levels.
- Improvements in NAS energy efficiency by 2 percent annually, and development and deployment of sustainable renewable aviation fuels.
- Improvements in the environmental and energy performance of global aviation, including reducing greenhouse gases by applying an aircraft CO_2 standard and other measures.
- Integration of environmental and energy goals and targets into NextGen and FAA facilities through Environmental Management Systems and Greening Initiatives.

The U.S. has a tradition of global leadership in aviation. Our office works directly with ICAO and other international bodies to further global harmonization of aviation standards and practices focusing on economics, forecasting, environment, and technical assistance. The U.S. is the largest contributor of technical and financial support to ICAO, in which authorities from 190 countries participate. We lead international discussions on economic principles impacting how US carriers operate around the world. We play a key role in the development of international aviation forecasts used by many of ICAO's member states. We continue to be a driver in setting global environmental standards and practices through our leadership role in ICAO's Committee on Aviation Environmental Protection and other international bodies. Our office facilitates direct or indirect technical assistance to 150 countries around the world to help them improve their aviation systems. APL leads the expansion and coordination of all aspects of global outreach for the NextGen activities within FAA and around the world to harmonize standards and recommended practices for new technologies, enhanced procedures, safety and airport requirements, as well as environmental considerations.

Whether we are referring to regulatory oversight, the development of air commerce, the development and deployment of new technologies, or advancing aviation related environmental initiatives, we are ultimately concerned with promoting the safety, efficiency, and environmental integrity of U.S. aviation interests worldwide. Any failures or lapses in implementation of these programs will adversely impact U.S. interests domestically and abroad.

Our collaboration with other countries fulfills the President's commitment to bilateral and multilateral cooperation and maintains a robust international program which is too extensive and important to be omitted. When we promote U.S. best practices to further global transportation safety, we not only promote compliance with international safety standards but also foster multimode transportation practices that advance our mutual interest in a lasting economic recovery and a clean energy future.

4. How Do We Know the Program Works?

The measures of program effectiveness for the agency are laid out in the FAA and DOT Strategic Plans, as well as in individual business plans for each organization. This office directly influences how agency goals, targets, and initiatives are set in each, and directly influences the agency's success in meeting them through our direct support in the specific program areas. We literally work across the agency and provide the necessary "honest broker" aspect to policy decisions that impact everything the agency does.

This office has been instrumental in the agency's success in five DOT goal areas – Safety, State of Good Repair, Livable Communities, Environmental Sustainability, and Organizational and is instrumental in many aspects of NextGen implementation. These include its work in policy, forecasting, metrics, environmental, and international. Our programs in economic analysis, forecasting, and environmental modeling are recognized as contributors and standard-bearers with ICAO and technical workgroups through publishing and speaking at critical forums.

<u>APL Targets</u> – APL maintains six specific planning targets. Efforts were reported as 100 percent successful for FY 2011. These include:

- Noise Exposure: Reduce the number of people exposed to significant noise by 4 percent compounded annually through FY 2013 from the calendar year 2005.
- Aviation Fuel Efficiency: Improve aviation fuel efficiency by 2 percent per year, through FY 2015, as measured by the calendar year 2010 fuel burned per revenue mile flown, relative to the calendar year 2000 baseline. The FY 2011 Target: -9 percent
- International Aviation Development Projects Outreach – Work with FAA Lines of Business to develop international aviation projects, arrange external funding for these projects, and conduct outreach activities to transfer aviation development knowledge.
- NextGen Technology – By FY 2014, expand the use of NextGen performance-based systems and concepts to five priority countries. FY 2011 Target: 1 country
- Aviation Leaders – By FY 2014, work with at least 18 countries or regional organizations to develop aviation leaders to strengthen the global aviation infrastructure. FY 2010 Target: 4 countries/regional organizations
- Global Safety Enhancements: Work with the Chinese aviation authorities and industry to adopt 27 proven Commercial Aviation Safety Team (CAST) safety enhancements by FY 2011. This supports China's efforts to reduce commercial fatal accidents to a rate of 0.030 fatal accidents per 100,000 departures by FY 2012. FY 2011 Target: 3 CAST Safety Enhancements

Additional indicators of our success include:

- Implementation of FAA's Sustainability Policy and Strategic Sustainable Performance Plan In collaboration with LOBs/SOs.
- Reported FAA's energy management performance to DOT.

- Developed and provided NEPA policy and guidance to facilitate efficient environmental analysis of NextGen actions.
- Completed the Annual Aviation Commercial and General Aviation Forecast and ensuing conference.
- Conducted a successful Commercial Aviation Alternative Fuels Initiative (CAAFI) international conference
- Worked directly with multiple international and domestic governing bodies including ICAO, IATA, JPDO to formalize and foster Green Aviation Practices.
- Developed Optimized Profile Descent, in collaboration with air traffic management and industry, to reduce fuel burn, emissions, and noise from arrival procedures.
- Achieved approval of the first biojet fuel specification, working through the Commercial Aviation Alternative Fuels Initiative.
- Continued development of a certification framework for aircraft CO_2 emissions.
- Delivered cost-benefit analyses on FAA safety and operational rulemakings enabling the agency to meet its scheduled delivery dates to OST.
- Established the initial stages of FAA policies on financial and operational incentives for NextGen avionics equipage.
- Supported NextGen implementation by enhancing data gathering capabilities and developing NextGen-unique performance metrics and measurement.
    - Implemented 6 additional Safety Enhancements (SE) in China. These SE are designed to mitigate major known causal factors of accidents, focusing on the most disastrous accidents, Controlled Flight into Terrain (CFIT) and mid-air collisions, and enhanced China's ability to maintain its excellent safety record as it expands its aviation system in the future.
- Arranged 11 external funding commitments for International Aviation Development Projects. Projects included infrastructure and capacity-building projects related to aviation safety, air traffic management, human resource development, and airports.
- Worked with countries and regional organizations in developing Aviation Leaders that will strengthen global aviation infrastructure. For FY 2011, FAA exceeded its goal to work with at least three countries by working with eight countries and two regional organizations.
- Successfully expanded the concepts and trials of NextGen supporting operational efficiency-enhancing procedures to the North Pacific and to Central and Southeast Asia environment.
- Created a performance-based budget that links resource requirements to the DOT and Strategic Plans.
- Achieved 90 percent of U.S. objectives at the 37th Session of the ICAO Assembly in fall 2010.

5. Why do we want/need to fund the program at the requested level?

To achieve the performance goals outlined in the FY 2013 as well as the long-term goals into FY 2015, we will depend on the maximization of resources through the leveraging of partnerships, technology, and expertise. We will continue to strive to meet the demands and requirements placed by the Administration and the Department in connection with various domestic and international initiatives. Reductions to the requested level will negatively impact NextGen implementation, the continued leadership of the United States in international aviation, advancement of critical environmental programs, and our ability to influence aviation policy both domestically and internationally.

Any reductions to APL's funding will have the following impact:

- We will limit our efforts on Greening Initiative and energy conservation that are critical towards meeting DOT's sustainability goals.
- We would be unable to develop and release refined policies and guidance that are critical towards meeting NEPA regulatory requirements.
- We would need to reduce our economic and policy efforts to find the most cost effective safety and operational regulations and policies.
- We would be unable to properly assess NAS-wide aviation environmental performance
- Reduced participation in ICAO environmental programs, hindering our ability to provide U.S. leadership to harmonized worldwide environmental aviation standards.
- Reduced participation in ICAO runway safety programs around the world. Improving runway safety around the world is a key component of the FAA's goal to reduce the worldwide accident rate by 10 percent. Reducing our efforts in this area will hinder our ability to reach this goal.

- Decreased efforts to promote NextGen adoption internationally. Decreasing NextGen adoption efforts works against our goal to have 40 percent of the fleets of top 25 most active states using NextGen-compatible technologies.
- Reduced initiatives to assist countries in developing aviation environmental capacities. Reducing our international environmental mitigation and capacity-building efforts will impact the likelihood of success in getting ICAO states representing 85 percent of international aviation emissions to develop action plans to meet global ICAO environmental goals.

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Office of Security and Hazardous Materials Safety (ASH)
($000)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2012 Enacted	**$93,406**	**504**		**488**
Unavoidable Adjustments	**+$513**			
FTE Annualization				
Pay Inflation	+253			
One Additional Compensable Day	+260			
Uncontrollable Adjustments				**+5**
Contract Pay Raises				
Staffing Adjustment				+5
Workforce Attrition				
AHR eLMS Staffing				
Discretionary Adjustments	**-$621**			
Operational Safety Oversight				
Spaceport Grants				
Performance Based Navigation (PBN)				
Administrative Efficiencies	-621			
Contract Towers				
Base Transfers				
Hangar 6				
FY 2013 Request	**$93,298**	**504**		**493**

Detailed Justification for – Security and Hazardous Materials Safety (ASH)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Security and Hazardous Materials Safety
($000)

Program Activity	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request	Change FY 2012 – FY 2013
Security and Hazardous Materials Safety (ASH)	$86,901	$93,406	$93,298	-$108

The FY 2013 request of $93,298,000 and 493 FTEs will support the ASH program. This is a decrease of $108,000 below the FY 2012 enacted level and includes savings from administrative efficiencies. The requested amount will also provide for inflation and an additional compensable day.

Funding in the FY 2013 request will allow us to meet these milestones:

- Support the implementation of the Facility Security Management Program and the Personnel Security Program that protect critical FAA infrastructure and personnel in the National Airspace System (NAS).
- Enhance emergency operations network capability to meet increased user needs and ensure continued situational awareness of daily and emergency events. The planned capabilities include fully integrating the WOCC and Regional Operations Centers (ROC) with the emergency notification system.
- Procure and deploy satellite phones requested by Air Traffic Organization (ATO) users to meet their emergency mission needs.
- Provide a fully operational 24/7 Intelligence Watch supporting the Washington Operations Center Complex (WOCC) and the Air Traffic Security Coordinators who manage the Domestic Events Network. Continue the development of a Counterintelligence program for FAA Lines of Business and decision-makers, and fulfilling requirements in compliance with executive orders and federal directives regarding system auditing and an insider threat program.
- Provide support and assistance to federal, state, local, territorial, and tribal law enforcement agencies that investigate and interdict illicit use of aircraft in narcotics, weapons, and human trafficking, as well as attacks on aircrafts using lasers.
- Enhance and provide regulatory oversight of shippers, air carriers and repair stations in accordance with the Hazardous Materials Regulations (49 C.F.R. Parts 171-180), and hazardous materials-related requirements in 14 C.F.R. and the International Civil Aviation Organization (ICAO) Technical Instructions.
- Continue studies with FAA's Office of Aviation Research (Tech Center) and external professional testing organizations to test select critical commodities such as lithium batteries and packaging to identify potential regulatory changes and develop and coordinate guidance useful for setting national policy and industry standards.
- Support the development of a Safety Management System (SMS) oversight program that will provide the Hazardous Materials Safety Program with resources to participate in air carrier surveillance activities in coordination with FAA Office of Aviation Safety certificate management teams.

Anticipated outputs/outcomes:

- Maintain a level of service commensurate with 100 percent of the targets of key hazardous material (HAZMAT) and internal security work plan activities.
- Provide notifications on over 6,000 significant aviation events.
- Distribute over 12,000 letters for HAZMAT objects found during airline passenger screening.
- Process over 8,000 employee and contractor investigations.
- Conduct no fewer than 350 FAA facility inspections and assessments.
- Provide FAA subject matter expertise and analysis to more than 1,000 daily Intelligence Community secure video teleconferences.

2. What Is This Program?

The Office of Security & Hazardous Materials Safety develops and implements policy to protect FAA employees, contractors, facilities, and assets, provides crisis management support, supports the national security responsibilities of the FAA and protects the flying public through the safe air transport of hazardous materials.

Our program supports the Department of Transportation (DOT) strategic goal of Safety and the goal outcome of Reduction in Transportation-Related Injuries and Fatalities. More specifically it supports the DOT Pipeline and Hazardous Materials Safety Administration's proposed Performance Measure: "Reduce the number of hazardous materials transportation incidents - involving death or major injury". It also supports the Defense Mobility and Emergency Preparedness portion of DOT's Organizational Excellence Goal.

The program's objectives are to achieve the lowest possible accident and incident rate and constantly improve aviation safety while decreasing any unnecessary risks to the traveling public as well as to cargo aircraft operations. This can be achieved by preventing hazardous materials accidents and incidents aboard aircraft before they occur by decreasing all unnecessary risks. Our program is responsible for the agency's critical infrastructure protection, personnel security investigations for federal and contract employees of the FAA, investigations of allegations of misconduct by FAA employees and violations of federal statutes and aviation regulations by FAA-certified airmen, emergency operations, contingency planning, and the development and implementation of national policy on hazardous materials through inspections, training, and outreach to those involved in the hazardous materials industry worldwide.

Anticipated accomplishments include:

- Coordinate efforts to educate domestic and international passengers on the safety ramifications of transporting undeclared hazardous materials in baggage through the use of public service announcements and placement of signage at strategic locations at domestic airports.
- Partner with other agencies such as Customs & Border Patrol, and with other modes, to capitalize on technology to gain data and information for quantitative and qualitative analysis of trends useful for targeting compliance, enforcement and outreach activities.
- Ensure that FAA executives and continuity personnel have priority access on landlines and cellular phones by managing the Government Emergency Telephone Service cards and the Wireless Priority Service programs.
- Ensure FAA executives and Lines of Business have real-time access to and analysis of intelligence and threat information during crisis and security incidents.
- Conduct Counterintelligence awareness briefings for all FAA employees and targeted travel pre-briefings for executives and employees traveling to high-threat locations.
- Coordinate national surveillance of carriers, shippers, and aviation repair stations to assess and enforce regulations through coordination with other transportation modes and other agencies. This includes pursuing an SMS pilot program that results in coordination of safety-related efforts with FAA's Office of Aviation Safety over surveillance of air carriers' hazardous materials transportation-related activities.
- In partnership with the Pipeline and Hazardous Materials Safety Administration, assist with the finalization of the lithium battery and air-specific packaging rules, assess options for possible rulemaking for the safe transport of flammable aerosols and harmonize the Hazardous Materials Regulations with international requirements.

3. Why Is This Particular Program Necessary?

We develop and implement policy to protect FAA employees, contractors, facilities, and assets, provide crisis management support, ensure availability of continuity of operations/continuity of government facilities and communications, support the national security responsibilities of the FAA and protect the flying public through the safe air transport of hazardous materials. Any failures or lapses in implementation of these programs directly impact the safety and security of the NAS and FAA's ability to execute its functions as one of the key components of our country's transportation infrastructure. These are some of the yearly measurable benefits to our customers and beneficiaries:

- Conduct 6,000+ suitability and background checks
- Perform approximately 8,000 HAZMAT activities
- Issue more than 20,000 Personal Identity Verification cards
- Review more than 500 cables from Intelligence, Law Enforcement, Defense, and Homeland Security agencies each day to identify possible threats to U.S. civil aviation, FAA personnel and physical and cyber infrastructure, and the National Airspace System.
- Provide critical information to Flight Standards and Law Enforcement agencies investigating approximately 50 laser incidents each week.

Our Hazardous Materials Safety Program has oversight of safety related aviation operations, which if not properly funded or staffed has the potential to cause a catastrophic failure to aviation safety and possible loss of life to the traveling public.

Without the requested level of funding, we will be ill-equipped to successfully execute our mission and support DOT's Strategic Plan. ASH must keep pace with increasing costs, as well as increase the numbers of inspectors and investigators, administrative and supervisory support personnel, training and equipment.

4. How Do You Know The Program Works?

There are positive measures of the success of the ASH program, which supports the Defense Mobility and Emergency Preparedness portion of DOT's Organizational Excellence Goal, and DOT's Safety Strategic Goal. ASH has consistently met our projected targets for success each year as well as required cost efficiency and program effectiveness measures. We adhere to all regulations and laws pertaining to our work and ensure this through our internal auditing.

The program has shown our effectiveness by protecting critical infrastructure during Hurricane Katrina, the earthquakes in Haiti and Japan, and during security incidents, including the attempted Christmas 2009 bombing of NW253 and the October 2010 air cargo bomb plot. Additionally, there have been no fatalities due to the air shipment of hazardous materials on passenger aircraft within the United States since the ValuJet crash of May 1996.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Any reduction to our request will have a negative impact on our ability to meet our critical safety-security mission requirements. The requested funding level is needed to maintain base level Security and Hazardous Materials Inspection Programs that protect FAA personnel, systems and facilities and to promote the safety of the flying public. Programs that would be adversely affected by reductions to the request include Emergency Operations and Communications, Investigations, Threat Indication and Warning, Compliance and Enforcement of Hazardous Materials Inspections and Regulations, Facility Security, Communications Security, Personnel Security, and ongoing improvements in the Identification Media Program. This is designed to reduce the vulnerability to terrorist or other hostile penetration of FAA facilities and systems and to improve the protection of individual privacy for members of the FAA workforce.

Receiving less than the amount requested would impact operational travel, mission safety-critical operational/technical training for the Hazardous Materials Compliance and Enforcement Program, and support for the National Security Professional Development program. One example of mission critical safety operational/technical training for hazardous materials compliance and enforcement involves providing all hazardous materials special agents with the tools necessary to implement the change in focused hazardous materials inspection and investigation protocols, which are based on risk assessment priorities. This is a safety critical need and, if not completed, will impact FAA's ability to provide appropriate safety oversight of both passenger and cargo air carriers which offer or accept hazardous materials within their operations.

Reductions to the requested level would force ASH to consider the following actions:

- Re-evaluate the maintenance of all 12 nationwide satellite talk groups which must remain active to support conference calls between ROCs during times of national crisis.
- Reduce staffing to less than 24/7 maintenance and management of the Defense Messaging System (DMS), which provides secure communications capability to FAA Headquarters, all FAA Regions, and to numerous Air Traffic Control facilities. System integrity must be maintained at all times in order to meet DMS operational security requirements.
- Diminish the level of support from contract personnel who respond to equipment failures and outages at the WOCC and other emergency operations facilities, and reduce our ability to conduct routine preventative maintenance.
- Curtail the inspection and assessment of all areas that store, handle, and/or process Classified National Security Information, Communications Security, Export Controlled Information and Sensitive/Controlled Unclassified Information to determine compliance with FAA Orders 1600.2, 1600.8, 1600.75, other applicable FAA or Federal directives and National Security Agency /United States Air Force directives.
- Slow responsiveness of Law Enforcement Assistance Program agents that provide critical support and information to both the Law Enforcement Community and FAA Lines of Business, to include investigation of those that target aircraft with lasers, which is a threat to aviation safety.

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Explanation of Funding Changes

	Dollars ($000)	FTE
Staff Offices	**-$232**	**+5**
Overview: For FY 2013, the Staff Office Assistant Administrators request $200,052,000 and 1,055 FTEs to meet their respective missions. The FY 2013 request corresponds to a decrease of $232,000 and increase of five FTEs from the FY 2012 Enacted level. The FY 2013 request level reflects unavoidable and uncontrollable adjustments and reductions attributable to administrative efficiencies.		
Unavoidable Adjustments	**+$1,172**	
Pay Inflation: This increase is required to provide for costs associated with base salary increases. The factor used is 0.5 percent.	+570	
One Additional Compensable Day: This increase is needed to provide for one additional compensable day in FY 2013.	+602	
Uncontrollable Adjustments	**+$111**	**+5**
Contract Pay Raises: Costs are associated with the National Air Traffic Controllers Association Multi-Unit pay article that was awarded by an arbitrator in January 2011 and will run through December 31, 2014. The contract covers about 1,700 employees across six FAA offices (AVS, ATO, ARC, ARP, AGC, and ABA) and includes engineers, computer specialists, program analysts, budget analysts and other professionals. In FY 2012, the only incremental cost is a lump-sum bonus equal to 1.5 percent of base pay, which was paid in October 2011. In FY 2013 and FY 2014, the primary cost driver is a guaranteed basic pay raise of 3.2 percent in January 2013 and 3.75 percent in January 2014.	+111	
Staffing Adjustment: This increase reflects a technical adjustment to accommodate anticipated program execution.		+5
Discretionary Adjustments	**-$1,515**	
Administrative Efficiencies: Cost reductions will be realized through staffing attrition and avoidance in contractual services, supplies and travel.		

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FACILITIES AND EQUIPMENT
(AIRPORT AND AIRWAY TRUST FUND)

For necessary expenses, not otherwise provided for, for acquisition, establishment, technical support services, improvement by contract or purchase, and hire of national airspace systems and experimental facilities and equipment, as authorized under part A of subtitle VII of title 49, United States Code, including initial acquisition of necessary sites by lease or grant; engineering and service testing, including construction of test facilities and acquisition of necessary sites by lease or grant; construction and furnishing of quarters and related accommodations for officers and employees of the Federal Aviation Administration stationed at remote localities where such accommodations are not available; and the purchase, lease, or transfer of aircraft from funds available under this heading, including aircraft for aviation regulation and certification; to be derived from the Airport and Airway Trust Fund, $2,850,000,000, of which $480,000,000 shall remain available until September 30, 2013, and of which $2,370,000,000 shall remain available until September 30, 2015: Provided that there may be credited to this appropriation funds received from States, counties, municipalities, other public authorities, and private sources, for expenses incurred in the establishment, improvement, and modernization of national airspace systems: Provided further, That upon initial submission to the Congress of the fiscal year 2014 President's budget, the Secretary of Transportation shall transmit to the Congress a comprehensive capital investment plan for the Federal Aviation Administration which includes funding for each budget line item for fiscal years 2014 through 2018, with total funding for each year of the plan constrained to the funding targets for those years as estimated and approved by the Office of Management and Budget.

Program and Financing
(in millions of dollars)

Identification code: 69-8107-0-7-402		FY 2011 Actual	FY 2012 Enacted	FY 2013 Estimate
	Obligations by program activity:			
	Direct program:			
0001	Engineering, development, test and evaluation	432	475	510
0002	Procurement and modernization of (ATC) facilities and equipment	1,390	1,465	1,450
0003	Procurement and modernization of non-ATC facilities and equipment	143	156	160
0004	Mission support	382	194	213
0005	Personnel and related expenses	468	475	480
0100	Subtotal, direct program	2,815	2,765	2,813
0801	Reimbursable program	63	70	70
0900	Total new obligations	2,878	2,835	2,883
	Budgetary resources available for obligation:			
1000	Unobligated balance brought forward, Oct 1	1,380	1,356	1,340
1021	Recoveries of prior year unpaid obligations	61	.....	.....
1050	Unobligated balance	1,441	1,356	1,340
	New budget authority (gross), detail:			
	Discretionary:			
1101	Appropriation (trust fund)	2,736	2,731	2,850
1132	Unobligated balance of appropriations temporarily reduced	-5	.....	.....
1160	Appropriation, discretionary (total)	2,731	2,731	2,850
1700	Spending authority from offsetting collections: collected	50	88	88
1701	Change in uncollected payment, Federal sources	21	.....	.....
1750	Spending auth from offsetting collections, disc (total)	71	88	88
1900	Budget authority (total)	2,802	2,819	2,938
1930	Total budgetary resources available	4,243	4,175	4,278
	Memorandum (non –add) entries:			
1940	Unobligated balance expiring	-9	.....	.....
1941	Unexpired Unobligated balance, end of year	1,356	1,340	1,395
1951	Special and non-revolving trust funds: Unobligated balance expiring	9	.....	.....
1952	Expired Unobligated balance, start of year	125	124	124
1953	Expired Unobligated balance, end of year	115	124	124
1954	Unobligated balance canceling	23	.....	.....
	Change in obligated balances:			
3000	Unpaid obligations, brought forward, Oct 1 (gross)	2,011	1,979	1,893
3010	Uncollected pymts, Fed sources, brought forward, Oct 1	-88	-75	-75
3020	Obligated balance, start of year (net)	1,923	1,904	1,818
3030	Obligations incurred, unexpired accounts	2,878	2,835	2,883
3031	Obligations incurred, expired accounts	22	.....	.....
3040	Outlays (gross)	-2,818	-2,921	-3,005
3050	Change in uncollected pymts, Fed sources, unexpired	-21	.....	.....
3051	Change in uncollected pymts, Fed sources, expired	34		
3080	Recoveries of prior year unpaid obligations, unexpired	-61		
3081	Recoveries of prior year unpaid obligations, expired	-53		
3090	Unpaid obligations, end of year (gross)	1,979	1,893	1,771
3091	Uncollected pymts, Fed sources, end of year	-75	-75	-75
3100	Obligated balance, end of year (net)	1,904	1,818	1,696
	Budget Authority and outlays, net:			
4000	Budget authority, gross	2,802	2,819	2,938

4010	Outlays from new discretionary authority	1,038	1,228	1,268
4011	Outlays from discretionary balances	1,761	1,688	1,737
4020	Outlays (gross)	2,799	2,916	3,005
	Offsets:			
	Against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-67	-26	-26
4033	Non-Federal sources		-62	-62
4040	Offsets against gross budget authority and outlays (total)	-67	-88	-88
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pymts, Fed sources, unexpired	-21	. . . . .	. . . . .
4052	Offsetting collections credited to expired accounts	17	. . . . .	. . . . .
4060	Additional offsets against gross budget authority only (total)	-4	. . . . .	. . . . .
4070	Budget authority, net (discretionary)	2,731	2,731	2,850
4080	Outlay, net (discretionary)	2,732	2,828	2,917
	Mandatory:			
	Outlays, gross:			
4101	Outlays from mandatory balances	19	5	
4170	Outlay, net (mandatory)	19	5	
4180	Budget authority, net (total)	2,731	2,731	2,850
4190	Outlay, net (total)	2,751	2,833	2,917

Funding in this account provides for the deployment of communications, navigation, surveillance, and related capabilities within the National Airspace System (NAS). This includes funding for several activities of the Next Generation Air Transportation System, a joint effort between DOT, NASA, and the Departments of Defense, Homeland Security and Commerce to improve the safety, capacity, security, and environmental performance of the NAS. The funding request for 2013 supports FAA's comprehensive plan for modernizing, maintaining, and improving air traffic control and airway facilities services.

Object Classification
(in millions of dollars)

Identification code: 69-8107-0-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Direct obligations:			
	Personnel compensation:			
1111	Full-time permanent	318	320	322
1113	Other than full-time permanent	3	3	3
1115	Other personnel compensation	7	11	11
1119	Total personnel compensation	328	334	336
1121	Civilian personnel benefits	87	88	89
1210	Travel and transportation of persons	34	37	38
1220	Transportation of things	2	2	2
1232	Rental payments to others	. . . . .	. . . . .	. . . . .
1233	Communications, utilities, and miscellaneous charges	50	67	68
1240	Printing and reproduction	. . . . .	. . . . .	. . . . .
1252	Other services from non-federal sources	1,998	1,881	1,918
1260	Supplies and materials	22	31	31
1310	Equipment	168	186	189
1320	Land and structures	121	130	133
1410	Grants, subsidies, and contributions	5	9	9
1990	Subtotal, obligations, Direct obligations	2,815	2,765	2,813
	Reimbursable obligations:			
	Personnel compensation:			

Identification code: 69-8107-0-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
2111	Personnel compensation: Full-time permanent	5	5	5
2121	Civilian personnel benefits	1	1	1
2210	Travel and transportation of persons	2	2	2
2252	Other services from non-federal sources	23	26	26
2260	Supplies and materials	11	11	11
2310	Equipment	20	20	20
2320	Land and structures	1	5	5
2990	Subtotal, obligations, Reimbursable obligations	63	70	70
9999	Total new obligations	2,878	2,835	2,883

Employment Summary

Identification code: 69-8107-0-7-402	FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
1001 Direct civilian full-time equivalent employment	2,907	2,907	2,907
2001 Reimbursable civilian full-time equivalent employment	7	7	7

EXHIBIT III-1

FACILITIES and EQUIPMENT
SUMMARY BY PROGRAM ACTIVITY
Appropriations, Obligations Limitations, and Exempt Obligations
($000)

	FY 2011 Actual*	FY 2012 Enacted	FY 2013 Request	Change FY 2012-2013
Engineering, Development, Test and Evaluation	522,802	435,600	522,830	87,230
Air Traffic Control Facilities and Equipment.	1,351,187	1,406,731	1,467,770	61,039
Non-Air Traffic Control Facilities and Equipment.	148,858	173,100	161,500	(11,600)
Facilities and Equipment Mission Support	233,834	240,300	217,900	(22,400)
Personnel and Related Expenses	474,050	475,000	480,000	5,000
TOTAL	**2,730,731**	**2,730,731**	**2,850,000**	**119,269**
FTEs				
Direct Funded	2,907	2,907	2,907	0
Reimbursable	7	7	7	0

Program and Performance Statement

This account provides funds for programs that improve operational efficiency, constrain costs, modernize automation and communication technology and systems, and deal with aging facilities. Particular emphasis is placed on en route and terminal air traffic control, satellite navigation and landing systems, and communications.

Funding is organized within the following activity areas of FAA:

Activity 1: Engineering, development, test and evaluation;

Activity 2: Procurement and modernization of air traffic control facilities and equipment; procurement and modernization on non-air traffic control facilities and equipment;

Activity 3: Procurement and modernization of non-Air Traffic Control facilities and equipment; and

Activity 4: Facilities and equipment mission support.

*Facilities and Equipment amounts for FY 2011 reflect the decision to apply $39.9 million of one-year funding to ERAM project and travel costs. Of this amount, $34.9 million is applied to Air Traffic Control Facilities and Equipment (Activity 2) and $5 million to Personnel and Related Expenses (Activity 5).

EXHIBIT III-1a

FACILITIES and EQUIPMENT
SUMMARY ANALYSIS OF CHANGE FROM FY 2012 TO FY 2013
Appropriations, Obligations Limitations, and Exempt Obligations
($000)

Item	Change FY 2012 to FY 2013 ($)	Change FY 2012 to FY 2013 (FTE)
FY 2012 Base (Enacted)	**$2,730,731**	**2,907**
Annualized FY 2012 FTE	0	0
FY 2013 Pay Raise	1,580	
One More Compensable Day	1,620	
Non-Pay Inflation	0	0
Subtotal, Adjustments to Base	**$3,200**	**0**
New and Expanded Programs		
Engineering, Development, Test and Evaluation	87,230	
Air Traffic Control Facilities and Equipment	61,039	
Non-Air Traffic Control Facilities and Equipment	(11,600)	
Facilities and Equipment Mission Support	(22,400)	
Personnel and Related Expenses	1,800	
Subtotal New or Expanded Programs	**$116,069**	**0**
FY 2013 Request	**$2,850,000**	**2,907**

Activity 1, Engineering, Development, Test and Evaluation

Activity 2, Procurement and Modernization of Air Traffic Control Facilities and Equipment

a. En Route Programs

b. Terminal Programs

2B05	Terminal Automation Program	$2,500,000	150
2B06	Terminal Air Traffic Control Facilities – Replace	$64,900,000	152
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve	$25,200,000	154
2B08	Terminal Voice Switch Replacement (TVSR)	$4,000,000	156
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$26,000,000	158
2B10	Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$6,400,000	160
2B11	Terminal Digital Radar (ASR-11) Technology Refresh	$8,200,000	163
2B12	Runway Status Lights (RWSL)	$35,250,000	166
2B13	National Airspace System Voice Switch (NVS)	$10,250,000	168
2B14	Integrated Display System (IDS)	$4,200,000	170
2B15	Remote Monitoring and Maintenance System (RMLS) Technology Refresh	$4,700,000	172
2B16	Mode S Service Life Extension Program (SLEP)	$4,000,000	174
2B17	Surveillance Interface Modernization (SIM)	$2,000,000	176
2B18	Tower Flight Data Manager (TFDM)	$37,600,000	178
	c. Flight Service Programs		
2C01	Future Flight Service Program	$8,000,000	180
2C02	Alaska Flight Service Facilities Modernization (AFSFM)	$2,900,000	182
2C03	Weather Camera Program	$4,400,000	184
	d. Landing and Navigational Aids Program		
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$2,500,000	186
2D02	Instrument Landing System (ILS) – Establish/Expand	$7,000,000	188
2D03	Wide Area Augmentation System (WAAS) for GPS	$96,000,000	190
2D04	Runway Visual Range (RVR)	$4,000,000	194
2D05	Approach Lighting System Improvement Program (ALSIP)	$3,000,000	196
2D06	Distance Measuring Equipment (DME)	$5,000,000	198
2D07	Visual Navaids – Establish/Expand	$3,500,000	200
2D08	Instrument Flight Procedures Automation (IFPA)	$7,100,000	202
2D09	Navigation and Landing Aids – Service Life Extension Program (SLEP)	$8,000,000	204
2D10	VASI Replacement – Replace with Precision Approach Indicator	$4,000,000	206
2D11	Global Positioning System (GPS) Civil Requirements	$40,000,000	208
2D12	Runway Safety Areas – Navigational Mitigation	$30,000,000	210
	e. Other ATC Facilities Programs		
2E01	Fuel Storage Tank Replacement and Monitoring	$6,600,000	213
2E02	Unstaffed Infrastructure Sustainment	$18,000,000	215
2E03	Aircraft Related Equipment Program	$10,100,000	218
2E04	Airport Cable Loop Systems – Sustained Support	$5,000,000	221
2E05	Alaskan Satellite Telecommunications Infrastructure (ASTI)	$6,800,000	223
2E06	Facilities Decommissioning	$5,000,000	225
2E07	Electrical Power System – Sustain/Support	$85,000,000	227
2E08	Aircraft Fleet Modernization	$2,100,000	231
2E09	FAA Employee Housing and Life Safety Shelter System Service	$2,500,000	233
	Total, Activity 2	**$1,467,770,000**	

Activity 3, Procurement and Modernization of Non-Air Traffic Control Facilities and Equipment

a. Support Programs			
3A01	Hazardous Materials Management	$20,000,000	237
3A02	Aviation Safety Analysis System (ASAS)	$15,800,000	239
3A03	Logistics Support System and Facilities (LSSF)	$10,000,000	243
3A04	National Air Space Recovery Communications (RCOM)	$12,000,000	246
3A05	Facility Security Risk Management	$14,200,000	249
3A06	Information Security	$14,000,000	251
3A07	System Approach for Safety Oversight (SASO)	$23,000,000	259
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$12,800,000	261
3A09	Data Center Optimization	$1,000,000	265
3A10	Aerospace Medical Equipment Needs (AMEN)	$3,000,000	268
3A11	Aviation Safety Information Analysis and Sharing	$15,000,000	272
3A12	National Test Equipment program	$2,000,000	275
3A13	Mobile Assets Management Program	$1,700,000	277
3A14	Aerospace Medicine Safety Information System (AMSIS)	$3,000,000	279
b. Training, Equipment and Facilities			
3B01	Aeronautical Center Infrastructure Modernization	$12,500,000	282
3B02	Distance Learning	$1,500,000	285
	Total, Activity 3	**$161,500,000**	

Activity 4, Facilities and Equipment Mission Support

a. System Support and Support Services			
4A01	System Engineering and Development Support	$35,000,000	289
4A02	Program Support Leases	$40,900,000	291
4A03	Logistics Support Services (LSS)	$11,500,000	293
4A04	Mike Monroney Aeronautical Center Leases	$17,500,000	295
4A05	Transition Engineering Support	$14,000,000	297
4A06	Technical Support Services Contract (TSSC)	$23,000,000	299
4A07	Resource Tracking Program (RTP)	$4,000,000	301
4A08	Center for Advanced Aviation System Development (CAASD)	$70,000,000	303
4A09	Aeronautical Information Management Program	$2,000,000	308
	Total, Activity 4	**$217,900,000**	

Activity 5, Personnel Compensation, Benefits, and Travel

5A01	Personnel and Related Expenses	$480,000,000	311
	Total, All Activities	**$2,850,000,000**	

Executive Summary – Facilities and Equipment (F&E), Activity 1

1. What Is The Request And What Will We Get For The Funds?

The Facilities and Equipment (F&E) Activity 1 program requests $522,830,000 for FY 2013, an increase of $87,230,000 (20 percent) above our FY 2012 enacted level. Of the $522,830,000 requested for FY 2013, $469,230,000 is requested to continue multiple basic and applied research efforts in support of future Next Generation Air Transportation System (NextGen) technologies and concepts. The remaining $53,600,000 is requested to support basic research activities under the Advanced Technology Development and Prototyping (ATDP) program and to sustain the facility and infrastructure at the William J. Hughes Technical Center at Atlantic City, New Jersey.

Key outputs and outcomes expected to be achieved in budget year with the requested resources:

- DataComm – Provide funding for the Data Comm Integrated Services contract, along with integration and engineering activities, and implementation plans.
- NextGen Future Facilities – Complete initial planning activities, which includes an initial business case investment decision, facilities concepts, requirements and systems engineering for one site.
- System-Wide Information Management (SWIM) - Develop and publish standards that will ensure harmonization with Single European Sky ATM Research (SESAR) SWIM systems.
- Staffed NextGen Towers (SNT) – Requirements, operational procedures, and cost benefit information will be generated and documentation refined in preparation for the initial investment decision.

2. What Is This Program?

Activity 1 includes pre-acquisition NextGen F&E programs, continuing basic research programs, and laboratory support for the Technical Center. Activity 1 programs support the initial design, engineering, development, test and evaluation activities associated with producing end-product systems, technologies, and capabilities for the National Airspace System (NAS). This includes the development of operational concepts and proof-of-concept systems and equipment and their demonstration in the laboratory and limited operational settings. Funding supports initial research through early development to concept demonstration, but ends prior to an investment decision for production and implementation across the NAS.

These efforts contribute to the following DOT Strategic Goals:

- Safety: Reduction in transportation-related injuries and fatalities
- Economic Competitiveness: Maximum economic returns on transportation policies and investments
- Organizational Excellence: Diverse and collaborative DOT workforce

3. Why Is This Particular Program Necessary?

We undertake Activity 1 programs to validate operational concepts and proof-of-concept systems and equipment prior to making decisions about moving forward on capital investments that will be deployed across the NAS. We define operational requirements and provide the system engineering associated with accomplishing these activities. We must also maintain and upgrade the laboratories and other infrastructure at the FAA Technical Center that support these activities. We invest in these programs with the ultimate goal of modernizing and sustaining the NAS.

Some of the basic and applied research performed under Activity 1 includes:

- Technology research to prevent future runway incursions
- Airspace analysis for complementing F&E programs
- Various development projects needed to transition to the next level of F&E development
- Pre-implementation studies, requirements documentation, and initial investment analysis

4. How Do You Know The Program Works?

The objective of performing these activities is to support capital investment decision–making. Based on private sector and federal procurement best practices, we have learned that performing these activities helps us make better investment decisions and reduces risk in the acquisition phase of the system life cycle. To this end, FAA uses industry-benchmarked program management practices and processes. We also comply with guidelines outlined in the Project Management Body of Knowledge (PMBOK).

5. Why Do We Want / Need To Fund The Program At The Requested Level?

If funding were reduced, we would prioritize cuts at the overall F&E account level. We would defer long-term NextGen investments, thereby minimizing risks to near-term NextGen deliverables. In addition, we would reduce other, non–NextGen investments in a manner that enables us to sustain ATC safety and capacity at levels expected by the public, the military and other stakeholders. Further reductions would require larger funding cuts in mission support activities.

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Detailed Justification for - 1A01 Advanced Technology Development and Prototyping

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Advanced Technology Development and Prototyping
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Advanced Technology Development and Prototyping	$25,449	$29,000	$33,100	+$4,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Runway Incursion Reduction Program	---	$2,898.0
2. System Capacity, Planning and Improvements	---	5,600.0
3. Operations Concept Validation	---	4,300.0
4. Airspace Management Program	---	6,100.0
5. ATO Strategy and Evaluation	---	2,029.0
6. Dynamic Capital Planning	---	2,415.0
7. Traffic Collision Avoidance System (TCAS)	---	966.0
8. Operational Modeling Analysis and Data	---	1,449.0
9 Unified Contracting System (UCS)	---	2,898.0
10. Workforce Schedule Optimization Tool	---	3,092.0
11. Safety Analysis Tool	---	484.0
12. In Service Engineering	---	869.0
Total	Various	$33,100.0

For FY 2013, a total of $33,100,000 is requested for the activities shown above.

The FAA's mission is to provide the safest and most efficient aerospace system in the world. As the leading authority in the international aerospace community, FAA is responsive to the dynamic nature of customer needs and economic conditions. A key element of this mission is the safe and efficient use of airspace. To accomplish this mission, FAA's Advanced Technology Development and Prototyping program develops and validates technology and systems that support air traffic services. These initiatives support the goals, strategies, and initiatives of the agency's Flight Plan, including the requirements associated with the evolving air traffic system architecture and improvements in airport safety and capacity.

2. What Is This Program?

a. Runway Incursion Reduction Program (RIRP)

The Runway Incursion Reduction Program (RIRP) will continue research, development, and operational evaluation of technologies to increase runway safety. Consistent with standing National Transportation Safety Board recommendations and initiatives identified in the FAA Flight Plan, research emphasis will remain on technologies that provide for direct safety warnings to pilots and aircrews, as well as those that can be applied cost effectively at small to medium airports. The program will test alternative small airport surface detection technology and the application of these technologies for pilot, controller, and vehicle operator situational awareness tools. Current initiatives include Runway Status Lights technology enhancements such as Runway Intersection Lights (RIL) logic, Light Emitting Diode (LED) technology, Low Cost Ground Surveillance (LCGS) Pilot, and Final Approach Runway Occupancy Signal (FAROS) for high density airports. When appropriate, investment analyses will be performed to support acquisition and implementation of selected solutions.

The requested funding will support delivery of performance targets outlined in the FAA Flight Plan and ATO Safety Business Plan. Specifically, the funds will support (1) the completion of the RIL operational trials; (2) the sustainment of RWSL test beds until replaced by a production program; (3) the completion of LCGS pilot program operational trials; (4) the development of a low cost RWSL system design; and (5) the delivery of PAPI/FAROS modification kits to select sites.

Key Outputs:

- Sustain RWSL test beds, LCGS pilot sites, and other test beds
- Develop all artifacts required under the FAA Acquisition Management System to support investment decision for national LCGS deployment
- Develop RWSL RIL requirements documents
- Develop FAROS requirements documents
- Conduct initial testing of RI prevention logic using LCGS surveillance input at a LCGS pilot site
- Conduct operational evaluation of RWSL LED fixtures at San Deigo
- Conduct in cockpit simulations at MITRE CAASD HITL testing to respond to HF, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based RI indications
- Conduct evaluation and testing of camera, acoustic, and other emerging runway incursion detection and prevention systems proposed for eventual deployment in the NAS
- Test safety logic enhancements to any RI detection and prevention products or procedures
- Support direct to cockpit indication and alerting capability development, demonstration and testing

Key Outcome**:** The above Key Outputs result in Reduced Runway Incursions, which supports the Flight Plan Goal of Increased Safety.

b. System Capacity, Planning, and Improvements

The System Capacity, Planning, and Improvements program identifies, evaluates, and formulates system capacity improvements for the NAS. This program sponsors NAS capacity and airport capacity studies where experts from the FAA, academia and industry collaborate to analyze and develop recommendations for improving capacity and system efficiency, and reducing delays at specific airports in alignment with FAA Flight Plan targets. In conjunction with providing recommendations for airport improvements, procedural updates, and simulation studies, this program delivers performance measurement systems and operations research to quantify the efficiency of the NAS and form the basis of proposals for system improvements. The Performance Data Analysis and Reporting System (PDARS) is a fully integrated performance measurement tool designed to help the FAA improve the NAS by tracking the daily operations of the Air Traffic Control (ATC) system and their environmental impacts. The tracking and monitoring capabilities of PDARS support studies and analysis of air traffic operations at the service delivery or national level. Also, the capacity and efficiency of the NAS is further expanded through capacity modeling which analyzes the impact of Next Generation air transportation system (NextGen) operational improvements. By recording the design and performance of the legacy NAS PDARS establishes a de facto base case for before and after comparisons of NextGen accomplishments.

c. Operations Concept Validation

Developing operational concepts is an Office of Management and Budget (OMB) recommended first step in developing an Enterprise Architecture. This program develops and validates operational concepts that are key to the Air Traffic Organization's (ATO) modernization programs and the Next Generation Air Transportation System (NextGen). This work includes developing and maintaining detailed second level concepts that support validation and requirements development. Second level concepts identify the personnel and functional changes necessary for the ATO to provide customer service in ways that increase productivity and reduce net cost. Recent work includes developing second level concepts for En Route, Traffic Flow Management (TFM), NextGen Towers, and Integrated Arrival and Departure Operations. This information helps the aviation community anticipate what changes are needed in aircraft equipment in order to operate with the new technology being implemented in the NAS and develop new procedures.

The Operational Concept efforts look at the changing roles and responsibilities of the Air Traffic workforce and the design of Advanced Facilities to derive the associated functional requirements imposed on the NAS infrastructure. Concept development includes preparing system specifications, roles and responsibilities, procedures, training, and certification requirements. These development and validation activities support NAS modernization through: (1) concept/scenario development; (2) concept validation; (3) simulation and analysis; (4) system design; (5) metric development; and (6) modeling.

d. Airspace Management Program (AMP)

This program supports increased capacity by funding the physical changes in facilities necessary to accommodate airspace redesign. Redesign projects will take on increased emphasis at both the national and regional levels to ensure that FAA is able to effectively manage the projected growth in demand at FAA facilities and airports.

Implementation of airspace redesign efforts frequently results in changes in the number and shape of operational positions or sectors, including changes to sector, area or facility boundaries. Transition to a new configuration after airspace redesign is implemented requires changes in the supporting infrastructure. These infrastructure changes can include communication modifications such as changes in frequencies, connectivity of radio site to the control facility, controller-to-controller connectivity; surveillance infrastructure modifications to ensure proper radar coverage; automation modifications to the host data processing or flight data processing; interfacility transmission modifications; additional consoles and communications backup needs; and modifications to the facility power and cabling.

e. Air Traffic Organization (ATO) Strategy and Evaluation

The FAA's Office of Systems Analysis is responsible for developing and maintaining mathematical models of the NAS, and using these models to help guide NextGen investments. FAA's modeling suite includes models of varying scope, from systems dynamics models of the entire air transportation system to detailed airport surface models. Several of these models are obsolete and cannot support the analysis of advanced Air Traffic Management (ATM) concepts.

The Strategy and Evaluation program will develop two new computer models to rectify these modeling shortfalls and better support other organizations within FAA with analytical needs.

An Airport Capacity Model will be developed for use in analyzing new airport capacity-related projects. The proposed model will facilitate rapid analysis of airport improvements, demand changes, and ATM technology insertions. In addition to being used by the Office of Systems Analysis, the model will be used by the Office of Performance Analysis and Strategy for runway capacity studies, ATO organization for investment analyses, the Joint Planning and Development Office (JPDO) for NextGen analyses, and the FAA's Office of Airports. The model will also be used by aviation consultants and the academic community, and provide a de facto standard for airport capacity analyses.

A System-Wide NAS Model will be developed to replace the existing National Airspace System Performance Analysis Capability (NASPAC) model. A new system-wide model is required to analyze advanced ATM concepts and aid with NextGen program trade-off studies, investment analyses, and NAS performance analyses. The new model will support the Office of NextGen Implementation and Integration, Office of Performance Analysis and Strategy, Office of Research and Technology Development (concept validation), ATO Finance (investment analysis), and the JPDO. Additionally, FAA and National Aeronautics and Space Administration (NASA) contractors and the academic community may use the model. An initial version of this model, now known as System-Wide Analysis Capability (SWAC), has been delivered to FAA and is undergoing testing.

In FY 2013, FAA will continue developing and maintaining software for the two computer models. The new Airport Capacity Model will be completed prior to FY 2013. A small amount of the requested funds (approximately $250,000) will be used for software maintenance, user support, and training. The bulk of the requested funds will be used to continue development of SWAC.

Specifically, the following work is to be performed on the System-Wide NAS Model with FY 2013 funds:

- Continue development of Graphical User Interface (GUI)
- Continue development (enhanced functionality) of Monte Carlo simulation capability
- Complete parallel computation capability to decrease run time
- Complete software implementation of new en route airspace capacity algorithm
- Enhance probabilistic weather representation
- Enhance congestion re-routing capability
- Implement Miles-In-Trail algorithm
- Integrate with the Aviation Environmental Design Tool (AEDT)
- Verify, validate, and test new software releases
- Maintain software
- Provide user support and training
- Update software documentation

f. Dynamic Capital Planning

The Dynamic Capital Planning tools will allow ATO to make optimal decisions based on best business practices and provide verification that aggressive approval thresholds have been implemented and that disciplined management of capital programs is being carried out. The requirements analysis for selecting Dynamic Capital planning tools is being evaluated and includes tools to address the following focus areas: determining quantitative economic value and internal benefits validation for capital projects; milestone tracking and schedule modeling; performance measurement; auditing and trend analysis; earned value monitoring through program life cycle; field implementation planning; and post implementation analysis for corporate lessons learned results.

The project will allow the initial procurement of financial analysis tools and consultant support to allow a better evaluation of programs through all phases of the acquisition life cycle.

g. Traffic Collision and Avoidance System (TCAS)

Aircraft flying in the NAS began equipping with the Traffic Alert and Collision Avoidance System (TCAS) in 1990. The TCAS display is mounted in the cockpit to warn pilots of collision risks with other aircraft. There are currently two versions of TCAS. TCAS I is a low-cost version of the system that provides traffic advisories only. TCAS II is a more capable version that can provide resolution advisories (RAs) telling the pilot the specific vertical maneuvers that are necessary to avoid potential midair collisions. TCAS II is required in U.S. airspace for all commercial aircraft with 30 or more seats and on all cargo aircraft with a maximum certified take-off weight greater than 33,000 pounds.

In 2004, RTCA reconstituted its TCAS Special Committee (SC-147), as the direct result of a TCAS related crash in Europe and a near mid-air collision which occurred in Japan. The committee examined these events and others to determine the cause and contributing factors. The committee determined in certain encounters between two aircraft, TCAS does not issue a sense reversal (e.g. change a "Climb" command to a "Descend") in a timely manner, if at all, when the aircraft being avoided takes a maneuver opposite to the one indicated on its TCAS. The FAA, in coordination with interested parties, has developed a solution for this problem which is currently being implemented. In addition, the program office has developed a monitoring system to gather data on the performance of TCAS systems and determine whether additional refinements and improvements are necessary. This system is being transitioned to operational use.

The current TCAS design needs to be further refined to become more flexible to adapt to the NAS changes proposed by the Next Generation Air Transportation System's (NextGen) Concept of Operations. Many elements of the current TCAS design date from research performed in the 1970s and 1980s, and reflect older methods of airspace use such as:

- Air traffic control provided separation based on radar data
- Rigid route structures
- TCAS provided pilots with range and altitude but not a target's identity or intent
- Performance-based flight profiles were not issued
- Situational awareness or separation tools were not available in the cockpit

h. Operational Modeling Analysis and Data

The Operational Modeling Analysis and Data program provides a central database of models and corresponding inputs, assumptions, and results of ATO modeling activities. The Air Traffic Organization (ATO) manages the complex NAS, and uses a variety of models of both the entire NAS and its component parts, to analyze and understand NAS performance. Many operational units within the ATO use models for operational and capital investment planning. This program provides support to model users within the ATO by providing a central repository of modeling resources as well as standardization of modeling resources. This program will also provide guidance and assistance in the use of models to answer operational needs.

i. Unified Contracting System (UCS)

The Federal Aviation Administration's procurement system has evolved over time based on the policies and guidelines set in the agency's Acquisition Management System (AMS). The lack of a unified, automated contracting system within FAA has resulted in unmet procurement needs. Some of these needs include having a system-wide automated contract management tool that will provide on-line collaboration tools, the capability to manage workloads and collect metrics, as well as maintain all FAA records to support legal positions.

The UCS will provide full contract lifecycle capabilities by automating contract formulation and execution (pre-award planning, solicitation, negotiation, award, administration and closeouts). UCS will provide validated and timely procurement data, electronic storage and retrieval of contractual documents, and management information reports. Fully operational UCS will automate all FAA procurements in accordance with the FAA Acquisition Management System (AMS) and guidance in the FAA Acquisition Support Tool (FAST).

FAA management recognizes the need to greatly improve procurement actions within the agency in order to increase procurement capacity for NextGen and its ripple effect needs for facilities, equipment and services. UCS will provide an integrated and automated procurement process in place of the largely manual processes. The UCS application will greatly improve the sharing of procurement and contact information through its integration with the document management, email system, other FAA legacy and external systems. UCS will facilitate alignment with agency business goals and enforce enterprise standards and processes to minimize costs.

UCS will normalize and streamline the procurement process by providing an integrated system that uses automated workflow processes, functions and standards, and electronic document management. UCS will enable users and management access to reporting on status, allocation of effort, task durations, and other user and management measurements. UCS will be built upon a foundation consisting of AMS, the ATO's Business Process Management Suite (BPMS) standard, the Knowledge Sharing Network (KSN) or other FAA-approved document management system.

Based on data collected from key stakeholders throughout the acquisition, contracting, and procurement communities, the table below depicts the top-level functional requirements that shall be satisfied within the UCS.

REQUIREMENT	USER IMPACT
Auditing Capability	Auditing capabilities to track workflow, approvals, and resource output.
Automated and Customizable Workflow Capabilities	Automated and customizable workflow capabilities based on user role to improve efficiencies and communication and reduce redundant work effort.
Centralized User Interface and Security	Secure interface for procurement actions based on defined roles.
Compliance with FAA, AMS and Federal Requirements	Adherence to federal and FAA policies, procedures and regulations, and AMS policies and guidelines.
Context Sensitive Help	Context sensitive help, support and guidance through the use of wizards, guided help and template libraries.
Data Validation	Validation of all data as part of the workflow process.
Data Warehousing	Data Warehousing of archived contracting data; electronic storage and retrieval of contractual information.

REQUIREMENT	USER IMPACT
Electronic Contracting and Digital Signature	Standardized electronic templates for contract creation that incorporate digital signatures.
Electronic Document Management System	Interface with searchable, electronic repository of contracts, templates and other contractual materials and tools to assist in the organization, tagging and retrieval of content.
Information Sharing – Internal and External	Internal and external sharing of procurement information based on the user's roles.
Interface with FAA's Financial Management System	Allows sending and receiving of procurement data.
Remote Access	FAA user community and vendors will be able to access UCS via the Internet to perform procurement actions defined by role.
Reporting and Metrics Capability	Reporting and metrics generation capabilities using standardized and ad-hoc reporting.
Robust System Performance	Continuous systems operations outside of maintenance periods independent of interfacing system.

UCS will be implemented in a two segment approach. In the first segment, UCS will automate manual procurement processes (FY 2012/2013). In the second segment, UCS will interface with the FAA's financial system, Oracle 12i (FY 2014/2015), and replace the functionality used in PRISM today.

The UCS program office has completed the planning phase, requirements, alternatives analysis, and business case, and received a conditional Final Investment Decision in April 2011. In addition, the UCS program office has conducted two pilots based on the selected software platform (Business Process Management Suite). Both pilots (Purchase Card Purchasing System and eFAST Planning Module) will be built out as the initial production ready UCS modules in FY 2012 and 2013.

j. Workforce Schedule Optimization Tool

No common scheduling tool exists at the FAA to develop and manage shift schedules by facility over various time horizons (e.g. day of operations, scheduling period, long-term planning). Varying non-standard methods currently in use (WMT Scheduler 1.0, Excel, manual) are insufficient to manage the complex resource management requirements that exist in today's ATO environment. The Workforce Scheduling Tool is an automated resource management tool that provides the ability to develop and maintain efficient schedules over a variety of different time periods (e.g. for a day, month, or a year). Similar to commercial systems available and in use at foreign Air Navigation Service Providers, the system is an off-the-shelf product that is customized to meet ATO requirements (e.g. bargaining unit agreements). Once implemented at facilities nationwide, the tool will provide ATO with a consistent, automated tool which will significantly enhance resource management decision making.

Description

The Workforce Scheduler is a management tool used to create and analyze optimized schedules over variable blocks of time, with viewing capability in days, weeks, months, years, or seasons. The system is able to:

- Calculate optimal shift start and length times
- Accept demand input, utilize system defined shifts, and create optimal daily shift coverage
- Determine configurable shift lengths based on constraints
- Edit, add, or delete shift definitions
- Create standardized reports to more efficiently staff and schedule work centers
- Edit, add, or delete shift optimization used in final scheduling
- Run "what-if" scenarios

Key Elements

In meeting the requirements for fielding the system, FAA reviewed and analyzed available NDI software packages, enhancements to the existing WMT Scheduler 1.0, and government development of a new system. It was determined the best value to the government is an NDI software package.

Alignment to Flight Plan Goals

The program aligns to the following strategic plan goals:

- Safety – The system is flexible and parameter driven, allowing for quick and efficient changes that result from key safety initiatives. For instance, the recommendation to change time between shifts to nine hours (from eight hours) for controllers is a simple parameter change within the system. In addition, the system allows management to analyze various options to determine safe and efficient schedules (e.g. schedule patterns that most reduce the risk of fatigue)
- Economic Competitiveness – The tool generates efficient schedules based on demand, business rule constraints, employee qualification requirements, and available resources. Thus, the tool helps managers distribute employees across different shifts in the safest and most efficient way
- Organizational Excellence – Given that scheduling is a key driver of employee satisfaction, providing a robust and flexible tool that is easy to use and understand is critical in improving employee satisfaction, reducing turnover, and attracting a high performance workforce

k. Safety Analysis Tool

The Air Traffic Organization's (ATO) Safety Analysis System (SAS) provides a prognostic approach in identifying National Airspace System (NAS) wide trends and managing emerging risks before they result in accidents or incidents. This initiative delivers a suite of analytical capabilities and user interfaces not currently available to achieve the next level of safety required to support the introduction of Next Generation Air Transportation System (NextGen) technologies, operational concepts, and procedures into the NAS.

In order to identify emerging risks, the ATO collects and analyzes safety data and then uses the results of these analyses to make data-driven decisions on how to best mitigate the identified hazards. At the core of the Safety Analysis System is a central platform for data distribution, fusion from multiple locations, and warehousing. Also, the Safety Analysis System: (1) Directly supports the ATO Safety core business functions by integrating all ATO domains to identify, create, standardize and disseminate safety data throughout ATO and external organizations; and (2) Integrates with operational NAS systems to ensure that the information required to successfully implement the Safety Management System (SMS) is readily available, not only for component-level safety assessments, but also for an integrated system of systems approach.

Anticipated FY 2013 Accomplishment - Achieve a JRC Initial Investment Decision

l. In-Service Engineering

In-service engineering allows for immediate response to emerging technology solutions. Funding is requested for ongoing engineering support of all prototyping efforts.

DOT Strategic Goals – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

a. Runway Incursion Reduction Program (RIRP)

Multiple RIRP initiatives are currently being formulated as a result of strong interest from Congress, industry and other oversight agencies. Prioritization of those initiatives is likely to evolve during the FY 2010 cycle as a result of "Call to Action" mandates and runway incursion incident trends. All five Low Cost Ground Surveillance prototype sites will be funded under RIRP, along with the documentation to prepare the program for Joint Resources Council 2A decision.

b. System Capacity, Planning, and Improvements

This program will facilitate the modeling and analysis of new runways, airfield improvements, air traffic procedures, and other technological implementations to improve airport capacity and system efficiency. Study Teams evaluate alternatives for increasing capacity at specific airports that are experiencing or are projected to experience significant flight delays. Capacity studies provide recommendations and solution sets for improving airspace and airport capacity.

c. Operations Concept Validation

The FAA is proceeding with NAS modernization based on the NextGen Operational Concept for 2025. Concept development and validation is necessary to investigate specific concept elements, and to drive out operational and technical requirements and implications for human factors, training and procedures. This project assesses the interaction of changing roles and responsibilities of NAS service providers and pilots, airspace changes, procedural changes and new mechanized systems for distributing weather, traffic and other flight related information. It tests the assumptions behind common situational awareness and distributed information processing.

d. Airspace Management Program (AMP)

Airspace Redesign is the FAA initiative that ensures all airspace related capacity benefits facilitated by the Airspace Management Program (AMP), facility changes and automation improvements are achieved. AMP serves as the FAA's primary effort to modernize the nation's airspace. The purpose of this national initiative is to review, redesign and restructure airspace. Modernization of airspace through AMP is characterized by the migration from constrained ground based navigation to the freedom of a Required Navigation Performance (RNP) based system.

Airspace redesign efforts seek to optimize Terminal, En Route and Oceanic airspace by redesigning airspace in NY/NJ/PHL, CAP, Western Corridor, HAATS, and Las Vegas. F&E funding is planned for NY/NJ/PHL, CAP, Western Corridor, and national integration efforts of the program office. Airspace redesign efforts will modernize airspace in support of the new flows associated with the new runway in Chicago (ORD).

e. ATO Strategy and Evaluation

This program provides analytical tools to assist with decision-making throughout FAA. It does not provide an operational system. Thus, it does not directly impact customer metrics such as airline on-time performance, taxi delay, cancellation rate, etc. Rather, the tools being developed will allow FAA to estimate these metrics for future scenarios involving different traffic forecasts and NAS characteristics. Without such tools, FAA cannot perform the cost-benefit analyses required to justify capital investments for all other operational programs.

An alternative to developing these models within the Government is to procure similar models from vendors, or to use other Government-developed models. An extensive Analysis of Alternatives was performed prior to initiating the development of the New Airport Capacity Model (ADSIM+) several years ago (Lucic, et al., Airport Runway Capacity Model Review, CSSI Inc., August 2007). This review documented significant weaknesses in existing Government-owned airport models, which were developed many years ago. Several commercial products satisfied some, but not all, of our requirements. Intellectual property and redistribution issues led us to develop a new model for which the Government would own all rights. We intend to distribute ADSIM+ to Government and industry practitioners free of charge.

Very few system-wide models of the NAS exist. Two alternatives to modernizing NASPAC are to use NASA's Airspace Concept Evaluation System (ACES) model or MITRE's System-Wide Modeler. ACES is extremely complex, requiring a network of computers, with run times of many hours needed to simulate a single day of traffic. Our requirement is for a run time of less than 10 minutes, which the model easily achieves with the Modernized NASPAC. System-Wide Modeler is a proprietary product of the MITRE Corp., and also requires extensive computer infrastructure.

If this program is not funded in FY 2013, the agency will not be able to complete development of SWAC. Several key components will not be finished, including the Monte Carlo capability, software parallelization, and integration with AEDT. Some support for NextGen portfolio analysis will also not be available, as these funds are supporting users engaged in this activity.

One of FAA's 2009-2013 Flight Plan objectives under the Greater Capacity goal is to, "increase capacity to meet projected demand and reduce congestion." A strategy under this objective is to "evaluate existing airport capacity levels and set investment and infrastructure priorities and policies that enhance capacity." The new Airport Capacity Model being developed here will be used to do these airport capacity evaluations.

Another one of the Flight Plan objectives under the Organizational Excellence goal is to, "make decisions based on reliable data to improve our overall performance and customer satisfaction." The FAA's System-Wide NAS Model is being used to support NextGen budgetary decisions, trade studies, and investment analyses, but it has significant shortfalls. Upgrading this model will help the agency make better investment decisions.

In FY 2013, FAA will continue developing and maintaining the software for the two computer models. The new Airport Capacity Model will be completed prior to FY 2013. A small amount of the requested funds (approximately $250,000) will be used for software maintenance, user support, and training. The bulk of the requested funds will be used to continue development of SWAC.

f. Dynamic Capital Planning

The current Planning tool is obsolete, unsupported and in a state of potential system failure. There is no current real-time FAA F&E database to meet FAA managerial requirements. The various FAA Service Units do not follow the same standardized business processes for identifying and tracking requirements. Currently, FAA financial systems are not standardized in the same language and formats. Also it produces several different reports and the terminology is not standardized.

g. Traffic Alert and Collision Avoidance System (TCAS)

As reflected in the Joint Planning Development Office's (JPDO's) Next Generation Air Transportation System (NextGen) Concept of Operations and the Operational Evolution Partnership's (OEP's) NextGen Solution Sets, the current TCAS model may not be compatible with future NextGen envisioned procedures (i.e., continuous descent approaches (CDA), curved Required Navigation Performance (RNP) approaches, closely spaced parallel runways approaches, aircraft-based merging and spacing, closer parallel en route operations, lateral passing maneuvers in non-radar airspace).

h. Operational Modeling Analysis and Data

The monetary benefits of this program will accrue to the individual programs which use it. The 2010 modeling survey identified inefficiencies in current modeling practices due to discrepancies in inputs, assumptions, and modeling practices. The survey also revealed a lack of a central modeling resource to which FAA personnel can refer for guidance. FAA anticipates capital programs using the programs and databases developed here will reach Initial Investment Decision and Final Investment Decision more quickly because they do not have to develop models and assumptions on their own, but rather can rely upon the pre-approved models and inputs developed by this program. In addition, additional benefits will accrue to the agency and ATO because of the standardization of the models and assumptions provided by this program.

i. Unified Contracting System (UCS)

By replacing manual, paper-based methods and document storage, UCS will improve FAA's ability to effectively support the volume and complexity of upcoming FAA procurements, particularly for NextGen and continuing NAS sustainment. In addition, by replacing the existing PRISM procurement data-entry system with its expensive-to-maintain Oracle interface, UCS is projected to provide a net benefit of $8,100,000 over the program's 10-year life.

<u>Quantitative Benefits:</u>
The primary quantitative benefit is the replacement of the FAA's current contracting system, Prism, which has high operations and maintenance costs. It is estimated the UCS will be able to replace PRISM by the

beginning of FY 2015. Operating costs for UCS are estimated to be over $2,000,000 per year less than the operating costs for PRISM, while adding additional functionality and process efficiencies.

In addition, automating the FAA's contracting system will ensure proper transaction approval, complete and viable records retention and effective reconciliation of financial information, thus allowing FAA to increase purchase card usage which has historically been a goal the FAA shied away from due to the lack of oversight within the current system. Increasing purchase card usage is estimated to generate over $3M per year in additional rebates.

Not only will these combined quantitative benefits offset the 10 year lifecycle cost of UCS, through the implementation of UCS the FAA will achieve an $8 million net benefit.

<u>Qualitative Benefits:</u>
Due to the manual nature of the FAA's procurement processes, any benefits related to automating the procurement process, improving accuracy or time cycles, amelioration of legal risk, or increasing visibility into the procurement process is very difficult to quantify. Because concrete measurement data of the FAA's procurement processes are not available, many UCS benefits will be intangible and thus difficult to measure and quantify. Therefore, the majority of the resultant benefits of UCS, although numerous, have not been quantified for the purpose of this analysis.

Procurement Dimension	Description	Qualitative Benefits
Strategy and Governance	▪ UCS will improve efficiency and reduce financial, risk, environmental and ethical aspects aligned to overall FAA acquisitions rules and regulations (AMS)	▪ Provides leadership and oversight across the procurement portfolio, designates authority and accountability at appropriate levels and implements controls where required.
People and Culture	▪ FAA procurement staff will utilize a contracting tool that addresses their procurement and acquisition needs. ▪ Training of new staff, recruitment and retention of skilled contracting staff will improve.	▪ A culture of understanding on the importance of procurement. Improved attitude to work with the attainment of new skills and capabilities.
Sourcing and Category Management	▪ Strategic sourcing aggregates demand and raises the sourcing activity to align with FAA planning, while selecting the appropriate supplier.	▪ Improved decision making through higher visibility and improved understand of spend. ▪ Better management of risk and return across diverse projects by contracting staff.
Technology and Tools	▪ Single integrated system, fully leveraged and automated to provide standard and timely reporting. ▪ Data management and storage with sufficient accuracy to provide reliable expenditure tracking and auditing. ▪ Online document storage.	▪ Enable the development and automatic generation of screening information requests (SIRs), request for proposals (RFPs), and request for information (RFIs), as appropriate ▪ Will identity breaches of procurement policies. ▪ Enable sharing of digital data and information among system users through network enabled information access so that, "the right information is available to the right people at the right time." ▪ Take advantage of FAA information and technology security infrastructure to improve security around the procurement process and associated artifacts.

Procurement Dimension	Description	Qualitative Benefits
Procurement Process - Planning to Close-Out	▪ End to end procurement workflow including PR creation, requisitions management, evaluation and procurement planning, contract writing, creation of SIR's, management and legal review processes, and storage of contracts and associated documents.	▪ Avoids duplication and reduces manual tasks. ▪ Increase efficiency through implementation of standardized contract formats. ▪ Frequent activities are streamlined for efficiency and transparency. ▪ Automated approval process with built-in delegations of authority. ▪ Streamline frequent activities for efficiency and transparency.
Performance Management	▪ Ensure key performance indicators measure the effectiveness of procurement practices and the performance of suppliers. ▪ Monitoring by managers to identify areas of improvement.	▪ Total transparency of all procurement relevant information. ▪ Promote continuous improvement by providing accurate performance metrics and monitoring tools. ▪ Timely reporting providing the necessary planning, procurement performance and management information for executives, and contracting staff.

j. Workforce Schedule Optimization Tool

A critical element in supporting FAA's mission to provide the safest, most efficient airspace system in the world is having the necessary complement of skilled ATCs to manage traffic at the Nation's airports and in its airspace. Providing tools that assist managers to staff optimally is of utmost importance. Currently, no scheduling tool exists at the FAA to develop optimized shift schedules.

Due to this lack of automation and standardization across the enterprise, schedules are not fully optimized. The tool will enable the FAA to better schedule its resources with air traffic volume requirements over a defined scheduling window. By implementing a tool that can both optimize facility schedules, as well as provide strategic resource management information to managers, FAA will be better equipped to make more informed decisions regarding the hiring and scheduling of controllers.

The benefits of the tool include:

- Improves consistency of practices in and across facilities
- Ensures compliance with bargaining unit agreements (including local agreements)
- Enhances decision-making and analysis (e.g. impact of proposed local agreements)
- Aligns long-term employee capacity with business demand
- Reduces time spent on scheduling related tasks
- Increases the quality, reliability and availability of scheduling information
- Improves understanding and management of the effects of changes
- Generates real-time, ad-hoc, and historical reports
- Provides flexibility and convenience (web based) and is easy to use
- Provides the potential capability for use with other labor groups

k. Safety Analysis Tool

Safety-related data analysis today is mostly shared through manual processes, often having to re-enter data that exist in stand-alone systems separated by "air gaps" (not networked) versus a centralized data point. These systems include an array of voice communications, email, point-to-point message exchange services. This leads to delays and inaccurate results for safety decision makers (i.e. ATO Management, AVS, Congress and Field Managers) that rely on that information to make critical safety decisions.

4. How Do You Know The Program Works?

a. Runway Incursion Reduction Program (RIRP)

The demonstration, evaluation and transition of mature runway safety technologies have proven to reduce the incidence of high-hazard (Category A/B) incursions and ultimately reduce the risk of a runway collision. Early development, testing and maturation of viable technologies result in reduced technical, cost and acquisition schedule risk, with early delivery of runway safety benefits.

b. System Capacity

Capacity studies identify the operational benefits and delay-reduction cost savings of capacity enhancement alternatives. Program output includes: flight operational data for use in performance analysis; system safety, delay, flexibility, predictability, and user access performance measures on a daily basis; and travel times within geometric areas and for route segments (arrival fix to runway, runway to departure fix, etc.). Output also includes methodologies and prototypes for measuring the benefits of airport, airspace, and procedural enhancements. PDARS is the Air Traffic Control System Command Center's (ATCSCC) primary tool for accessing radar data and provides an objective tool for operational planning, assessment and support of flow management initiatives. Integration of PDARS with Airport Surface Detection Equipment (ASDE-X); Out, Off, On, and In time (OOOI) data; restrictions data; and playbook scenarios will help to reduce ground delays. These enhancements, which encompass the final phase of PDARS development and are an ATO community requirement, are critical for analyzing surface operations and baselining OEP performance. PDARS is a well-accepted and often used tool at all major ATC facilities. The impact will be realized on assessments of such issues as wake turbulence mitigation, New Large Aircraft (NLA), Very Light Jets (VLJs), reduced separation criteria, and alternative flow management methods.

c. Operations Concept Validation

This program uses a variety of validation techniques to explore, develop, and mature NAS operational concepts. The program undertakes research, study, and analysis to explore new opportunities for service delivery, solve problems with current operations, and define high level operational and performance requirements. The ATDP Operational Concept Validation program is doing the early concept research for advanced operational concepts to ensure they are well understood and are based on valid assumptions. Concepts such as High Altitude Airspace and Integrated Arrival Departure Airspace were researched and validated under this Program prior to transition to NextGen Pre-Implementation Programs to ensure the operational impacts were well understood.

d. Airspace Management Program (AMP)

AMP has successfully managed airspace projects throughout the NAS. Without the coordination of AMP, multiple projects supporting the same airspace could arise. By having a central location all airspace changes and efforts are coordinated, thus ensuring project efficiency and success to the NAS.

e. ATO Strategy and Evaluation

Functioning software is being delivered to the government and is being used to support on-going analyses.

The capabilities of the new system-wide model are continually being improved, even while it is being used to support NextGen analyses. The model has been used to generate all publicly released estimates of future NextGen benefits, including those in the 2009, 2010, and 2011 NextGen Implementation Plans. We anticipate the model will be used to support a similar effort for the FY 2013 budget request. The model is also currently being used to perform the business case analysis for the DataComm program, to support the Satellite and Broadcast Services (SBS) Program Office, and to perform various financial and operational incentive studies. Nonetheless, there are still significant limitations of the model, not least of which is its ability to simulate traffic flow management initiatives and to replicate the airspace system's response to highly disruptive convective weather.

An initial version of the new airport capacity model has been delivered to the Government and is currently undergoing testing. The software is being delivered to "beta" testers for further evaluation.

f. Dynamic Capital Planning

The improved data will:

- Lead to better decisions on program implementation, improvements in ATO's performance, and the resulting higher level of customer satisfaction
- Provide reliable data with an automated tracking and reporting system for F&E projects that will enable decision-makers to enhance the use of agency resources
- Will help keep major acquisition programs on schedule and within costs by maximizing limited resources linked to budget information and processes

These achievements will be reached by providing enhanced program/project management capabilities with cost accounting of F&E expenses to the FAA. Managers and engineers will have up-to-date reliable data on F&E projects through resource tracking program (RTP). Productivity is improved by more than 20 percent when we support a standardized project management process and have the application emulating current operating procedures.

g. Traffic Collision and Avoidance System (TCAS)

This program is focused on correcting emerging safety issues related to collision avoidance systems carried in aircraft; it improves the TCAS system's ability to resolve near-midair encounters; and the pilot's ability to react correctly to TCAS instructions. An independent collision avoidance system for pilots becomes even more essential, when Automatic Dependent Surveillance-Broadcast (ADS-B)-based capabilities enter the NAS and more responsibility for aircraft separation is transferred to the flight deck.

h. Operational Modeling Analysis and Data

A modeling survey conducted from June to December 2010 showed how different organizations within the ATO use different models, data sources, and assumptions to analyze the benefits of airspace and airport capacity initiatives. These differences resulted in inefficiencies due to duplication of efforts, inconsistencies in ATO messaging, and a lack of transparency in benefit and capacity values that were developed. This program will provide a centralized modeling source that will resolve the problems of inefficiency, inconsistency, and transparency. This program will provide modeling guidance and support to ensure that the modeling results used to evaluate capacity-enhancing initiatives can be compared. This program will also provide a central source for models and modeling data. These features of the program streamline the ATO modeling process, resulting in more cost-effectiveness and timeliness for both capacity-related projects and non-capacity-related projects throughout the ATO.

i. Unified Contracting System (UCS)

Although UCS has not been implemented yet, the UCS PMO has conducted two BPMS pilots (PCPS and eFAST Planning)-a small-scale BPMS solution to assess user acceptance, operational efficacy, and overall business value of the BPMS platform before adopting the tool for a full-scale implementation of UCS. The UCS Pilots have enabled FAA to reduce overall risk in the full implementation of UCS using the BPMS:

- Verifying, in an FAA operational environment, that the BPMS platform meets FAA ATO IT requirements as outlined in the Enterprise BPMS Requirements Document
- Conducting a proof of concept that a BPMS can automate a typical procurement process (eFAST, PCPS)
- Providing a learning experience regarding approaches and methods for completing and managing the development
- Building standard, reusable components that form the foundation for ongoing development of UCS
- Establishing and testing interfaces between the BPMS with standard FAA systems (e.g., Knowledge Services Network (KSN))

In addition to the UCS Pilot, the UCS program team completed and updated an FAA Systems Engineering Management-compliant risk analysis for the UCS program. A level of severity for the potential impact a risk may have on the project and a probability of occurrence were assigned to each risk in each category along with a mitigation strategy. Based on these criteria we assigned each risk to one of three categories: high risk, moderate risk, or low risk. Mitigation strategies and status are recorded in the right hand column to demonstrate that the program manages risks.

j. Workforce Schedule Optimization Tool

In FY 2013 the Workforce Schedule Optimization Tool will be enhanced to include accounting for the technical operations and safety workforces. These new requirements will be evaluated for further consolidation of the various workforce scheduling systems. If adopted, this system will result in increased efficiencies and real cost savings.

k. Safety Analysis Tool

The Safety Analysis System (SAS) will significantly increase efficiency and provide an integrated approach for managing safety within the ATO organization. Further, the SAS program will provide a faster, thorough, and more consistent approach to FAA safety reporting for responding to external entities (i.e., GAO, Congress, DOT/IG, etc.). Typically, it takes an average of two weeks to coordinate, establish data access agreements, and formalize a process to conduct an analysis in response queries on a safety issue. The SAS program will significantly reduce the turn-around time. Also, these reports need to be uniform across the organization, eliminating rework when multiple organizations conduct similar analyses but report differing information. Finally, data standardization, enhanced quality checks, and common analysis tools will ensure that reporting across the ATO is accurate, consistent, and reduces the overall time and resources required to produce safety reports.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$33,100,000 is required to continue all activities within the Advanced Technology Development and Prototyping (ATDP) budget line item.

A reduction to ATDP could significantly damage important milestones on which have been established. Any reduction could have the effect of slowing down the progress of precursor programs or the effort of studying technical outcomes in the various solution sets.

Detailed Justification for - 1A02 NAS Improvement of System Support Laboratory

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NAS Improvement of System Support Laboratory
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President' Request	Difference from FY 2012 Enacted
NAS Improvement of System Support Laboratory	$998	$1,000	$1,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Integration/Implementation of NAS Laboratory	---	$1,000.0

For FY 2013, $1,000,000 is requested for continued improvements to the laboratory systems and laboratory infrastructure in accordance with the 20-Year Laboratory Master Plan in order to support critical National Airspace System (NAS) and NextGen programs.

2. What Is This Program?

The Technical Center's System Support Laboratory provides the environment to implement, test, and integrate new systems into the National Airspace System (NAS). Once accepted, the systems become part of the test bed and are used to provide support to the operational field sites over the life-cycle of the operational systems. To maintain a viable test bed, it is periodically necessary to upgrade and enhance those portions of the facilities that support the systems and form an integral part of the test bed. Electronic switching systems are used to permit replication of the myriad-fielded system configurations and to permit multiple parallel testing configurations to run with a minimum of system components. The switching systems must be upgraded, enhanced, and expanded to meet the changing needs of system deliverables.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The program improves FAA's centralized state-of-the-art laboratory environment supporting the implementation, testing, and integration of new NAS systems prior to their delivery to the various FAA field sites. A single, centralized support laboratory will eliminate the cost of establishing and maintaining multiple laboratories for each project, program, Service Unit, and Line of Business. The FAA's centralized set of laboratories located at the William J. Hughes Technical Center provides the infrastructure for research, development, testing, and field support to the FAA's Capital Investment Plan (CIP) programs. It is necessary to modify, upgrade, and reorganize the Laboratory infrastructure as CIP projects and their supporting systems are delivered, installed, and eventually removed. The Technical Center Laboratory infrastructure encompasses approximately 160,000 square feet in the main building and numerous outlying buildings and remote sites.

4. How Do You Know The Program Works?

The goal of this program is to modernize the equipment and infrastructure necessary for FAA's centralized NAS laboratory facilities so they operate safely, reliably and efficiently. Projects funded with this program, such as electrical system upgrades, installation of fire stops, electrical panel board replacements, uninterrupted power system upgrades, etc. help to meet this goal. The 20-Year Laboratory Facility Master Plan developed in FY 2010 cites necessary improvements to the NAS laboratories that this program will fund in the future. Upgrades are necessary to continue providing a safe and reliable laboratory environment for research, development, test, evaluation, and integration of NAS and NextGen systems.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$1,000,000 is required in order to continue improvements to the Laboratory systems and laboratory infrastructure that supports critical National Airspace System (NAS) programs. A reduction in funding will impact the WJHTC Laboratory Modernization - for implementing laboratory improvements outlined in the 20-Year Laboratory Facility Master Plan and completion of the activities targeted for FY 2013. A reduction will limit work completed and delay the activity targets into FY 2014.

Detailed Justification for - 1A03 William J. Hughes Technical Center Facilities

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – William J. Hughes Technical Center Facilities
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
William J. Hughes Technical Center Facilities	$12,974	$14,000	$11,500	-$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Laboratory Support Services – Engineering and Maintenance	---	$9,310.0
2. Laboratory Equipment, Parts and Supplies	---	1,230.1
3. Hardware Sustainment	---	443.6
4. Software Licenses and Support	---	216.3
5. Mandated Pilot Training	---	300.0
Total	1	$11,500.0

For FY 2013, $11,500,000 is requested for continued sustainment of FAA's laboratory test beds and will be used for hardware and software support, licensing fees, support services, and other costs associated with operating and maintaining these multi-user facilities. These laboratories include the En Route and Terminal test beds; Weather, Navigational, Scan Radar, and Automated Tracking sites; Communications switching equipment; Laboratory network; the Flight Program's set of Flying Laboratories; and Aircraft Simulation Systems such as the Target Generation Facility, Cockpit Simulation Facility, Integration and Interoperability Facilities for En Route and Oceanic, and the Human Factors Laboratory.

2. What Is This Program?

The FAA's centralized set of laboratories located at the William J. Hughes Technical Center provides the infrastructure for research, development, testing, and field support to FAA's Capital Investment Plan (CIP) programs. These laboratories provide around the clock operations support to En Route, Terminal, and other Air Traffic Control (ATC) facilities throughout the nation. It is necessary to sustain these laboratory systems in configurations and capabilities that match field sites that currently exist or are planned for the future. CIP programs and field sites depend on these laboratories to fulfill their mission.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The Technical Center laboratories are the only location where it is possible to realistically simulate the National Airspace System (NAS). These laboratories are essential to the FAA's efforts to transition the NAS to the Next Generation Air Transportation System (NextGen). Laboratory integration, test and evaluation activities result in procedures and systems that ensure a safe, secure, efficient, and seamless transition to NextGen. These activities require numerous test beds that can be configured to replicate desired field configuration and traffic scenario, thus providing stakeholders with an understanding of how upgraded systems will perform prior to operational deployment. These test beds serve a second and equally important role by providing direct field support for Operational NAS systems. Problems identified at various field locations are quickly transmitted to the appropriate laboratory where solutions can be developed and tested by second level engineering personnel. This keeps systems operational avoiding service degradation and costly interruptions.

4. How Do You Know The Program Works?

This program provides for the management and support of the Technical Center's NAS laboratories through systems engineering, configuration management, test bed maintenance and enhancement, laboratory scheduling, and computer operations. It also provides technical and engineering services for laboratory customers in support of research and development, system installations, and proof-of-concept studies. This includes advanced concepts exploration, human in-the-loop simulations, real time simulations, cockpit simulations, prototyping and flying laboratory support.

To ensure the highest quality services to the FAA's CIP programs utilizing the Technical Center's NAS laboratories, a Quality Management System (QMS) was implemented to standardize laboratory procedures and processes. The International Organization for Standardization (ISO) standard is the vehicle to validate the efficacy of the QMS and to obtain certification. The FAA's Technical Center's NAS Laboratories passed its ISO 9001 2008 re-registration audit held in May 2009.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$11,500,000 is required to sustain FAA's laboratory test beds and will be used for hardware and software support, licensing fees, and other costs associated with operating and maintaining these multi-user facilities. A stable funding source obviates the need for each program office to establish and sustain the infrastructure needed to support their programs and fielded systems. This has been a proven method to sustain the NAS test beds and to minimize FAA costs. A reduction will impact the level of services provided to the FAA's CIP programs utilizing Technical Center's laboratories.

Detailed Justification for - 1A04 William J. Hughes Technical Center Infrastructure Sustainment

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – William J. Hughes Technical Center Infrastructure Sustainment ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
William J. Hughes Technical Center Infrastructure Sustainment	$7,485	$7,500	$8,000	+$500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Life Safety Improvements to Four Facilities	---	$1,200.0
2. Building 303 Chiller Replacement	---	1,200.0
3. Building 301 Mechanical Remediation	---	2,100.0
4. Mechanical and Electrical Improvements	---	900.0
5. Roof Replacement Three Facilities	---	1,000.0
6. Building 300 Electrical Upgrades	---	700.0
7. Primary Exterior Electrical Cable/Ductbank Replacement	---	900.0
Total	1	$8,000.0

For FY 2013, $8,000,000 of funding is requested for the continued sustainment of FAA's infrastructure at the William J Hughes Technical Center to accomplish the following projects:

a. Life Safety Improvements to Four Facilities.

$1,200,000 is requested for projects involving the design of fire alarm systems for two facilities and the replacement costs for four other life safety concerns as follows:

Building 300 (T & A Building) and Building 301 (Aircraft Maintenance Hangar) Fire Alarm design effort: This project involves replacement of the building fire alarm systems for Building 300 and Building 301. The fire alarm systems in these facilities are Gamewell FCI 7200 fire alarm systems which were installed in the early 1990's. This product line has been discontinued. These are legacy systems that are no longer being manufactured or sold by Gamewell-FCI. This includes all system control panels, detectors and initiating devices, notification appliances, accessories, and power supplies. If any component of the system fails, there are no readily available replacement parts. Since the systems cannot be adequately maintained, each building is at risk of the entire system becoming decommissioned. Therefore, the buildings would have to be evacuated or a 24 hour fire watch instituted until the respective system can be replaced. Vacating these facilities would impact over 1,500 employees. The requested funding will facilitate the design efforts required to replace the existing systems and bring the systems up to current code compliance.

Building 300 (T & A Building): This project involves the replacement of the emergency power feeder for the building emergency generator system. The current feeder is extended from the generators, located in Building 303 (Central Utilities Plant), to the Building 300 emergency distribution system. If this feeder were to fail the building would have no back-up power for the emergency systems, such as egress lighting, fire alarm, elevators, etc. This would put the building at risk of being vacated due to this life safety system failure, which would not meet building code requirements. Vacating Building 300 would impact over 1,200 employees. The over 600 foot run consists of four sets of 500mcm aluminum cable in an underground raceway. The feeders were installed in 1981 and have reached the end of their useful lives (approximately thirty years). The requested funding will support the installation of a new emergency feeder.

Building 306 (Equipment Repair): This project involves the installation of duct smoke detectors in the building HVAC system. It has been discovered that smoke detection was never installed, and in order to bring the system into code compliance this installation must occur. The requested funding will support this installation.

Building 208 (Water Treatment Plant): The backup diesel fire pump is leaking oil and is beyond its useful life. In addition, weekly testing of the pump must be performed after normal business hours, at an increased cost, due to the fumes released and the impact of these fumes on neighboring facilities. The pump is not compliant with EPA smoke opacity regulations. This fire pump provides water pressure for the suppression systems in a multitude of buildings in the Research and Development Area and Federal Air Marshal training complex. The requested funding will support the replacement of this pump with a new back up pump meeting EPA regulations and code requirements.

Investigation and removal of old airfield cabling phase 1: There are miles of abandoned cable in the duct system below the ACY airfield. The system was initially built in the 1940's and has been expanded over the years. There are abandoned cables mixed with live cables and the overall documentation and condition of the system is lacking. This has resulted in unsafe working conditions for electricians attempting to work on the system. Additionally, a failure in this manhole system could cause an unscheduled power outage of the airfield lighting system, navigational aids, or the control tower. The requested funding will support an investigation to identify any life safety concerns and recommendations for remediation.

b. Building 303 Chiller Replacement.

$1,200,000 is requested to initiate the replacement of one of three 1,000 ton centrifugal refrigeration machines in Building 303, the Central Utilities Plant at the WJHTC. This 1,000 ton centrifugal refrigeration machine was installed in 1990. The machine provides chilled water for air conditioning to Buildings 300, 301 and 303, including the Building 300 ATC lab area, which serves as the NAS test bed and supports programs such as TPC, FTI and the Enterprise Data Center. This type of machine typically has a useful life (per American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) standards) of 23 years and has undergone three major teardowns/rebuilds in the past several years. Currently, the machine requires an oil change every two years, versus a normal maintenance schedule of every five years, due to extensive internal rusting. Such maintenance degrades the reliability and availability of the machine itself, and the Central Utilities Plant, as a whole. Additionally, the machine uses R-11 refrigerant which is no longer manufactured. This necessitates using filtered and recycled R-11 refrigerant when performing maintenance operations, as opposed to being able to use more readily available and environmentally friendly refrigerants. The intent of this project is to replace the existing machine in kind with a new dual compressor/variable frequency drive machine complete with maximum modulation capability. This will enable a more precise matching of load versus equipment capacity than that which would be provided with a conventional single compressor refrigeration machine. The new machine will also be able to tolerate a lower incoming condenser water temperature, thereby more readily enabling use of an energy saving, free-cooling option.

c. Building 301 Mechanical Remediation.

$2,100,000 is requested to initiate the replacement of Heating, Ventilation and Air Conditioning (HVAC) equipment in the fourth floor East Mechanical room of Building 301, Aircraft Maintenance Hangar. This equipment services all 4 floors of the administrative wing of the building. The equipment is original to the building (circa 1965) and consists of two 20,000 cubic feet per minute (CFM) air handlers, one 18,000 CFM heating and ventilating unit, chilled water and hot water pumps and piping, pneumatic controls, air compressors, exhaust fans and associated distribution ductwork and accessories. All of this equipment is approaching 50 years of service (well beyond its maximum useful life of 25 years) per American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) standards. Due to the age of the equipment, parts are no longer available, necessitating that replacement parts be custom manufactured in order to keep the equipment operational.

The project also entails the removal and replacement of existing suspended ceilings in all of the 1st, 2nd and 4th floor office areas to facilitate the installation of new distribution ductwork and variable air volume control boxes. Also included is the replacement of existing office lighting fixtures, air registers and diffusers.

Construction of this project will complete the HVAC mechanical upgrades for the administrative wing of this building which were originally started in 2003, but were interrupted due to a construction contract termination in 2004. Consequently, a significant portion of the new equipment needed for the project has already been purchased under the original contract and is currently in storage. This equipment, augmented with the remaining equipment needed, will provide energy savings, reduced maintenance expenses, and improved comfort through the installation of modern, efficient equipment and updated environmental controls. Design for the project has already been completed (early 2011). Funding will enable construction award.

d. Mechanical and Electrical Improvements to Five Facilities.

$900,000 is requested for the replacement of electrical and mechanical equipment beyond their life cycle in five facilities as follows:

Building 201 (Simulator Facility) and Building 212 (Fuel Pump House): These buildings were constructed in 1963 and the lightning protection systems are well beyond their 25 year useful lives. Since these buildings contain extensive computer systems requisite for the generation of virtual cockpits or large amounts of fuel, proper lightning protection needs to be provided to prevent a catastrophic event. The requested funding will support the replacement costs associated with this project.

Building 305 (Technical Support Facility), and Building 306 (Equipment Repair): These buildings were constructed in 1985 and 1986 respectively. The electrical equipment in these buildings, which includes but is not limited to switchboards, panel boards, and transformers, are beyond their useful lives and are in need of replacement. The requested funding will support the replacement costs associated with this project.

Building 206 (Recycling Facility): This building is a 9,000 square foot facility and was constructed in 1962. A 10,000 cubic feet per minute gas furnace air handling unit serves the main processing area.. This system is original to the facility and is well beyond its 25 year useful life. The requested funding will replace the existing unit with one that is more energy efficient and will also include a variable frequency drive, electronic dampers and state of the art electronic controls.

This mechanical and electrical project mitigates cost burdens incurred by system failures due to systems that are beyond their respective usual life cycles. Deferring these system replacements will compound potential problems such as emergency replacement escalation costs, increased maintenance expenses, inconvenience to building occupants and potential delays in the execution of mission critical programs.

e. Roof Replacement at Three Facilities.

$1,000,000 ($700,000 for design services and $300,000 for construction activities) is requested for the replacement of approximately 154,000 square feet of roofing on three facilities as follows:

Building 203 (Fire Safety R&D Laboratory): This project involves the replacement of approximately 5,000 square feet of roofing. The current roofing system consists of the building's original (circa 1963) four ply built up roof, which was overlaid with a single ply ballasted and mechanically fastened membrane in 1987. The existing overlay roofing system is out of warranty and is in poor condition; with 6 service calls for roof repair work (leaks) having been made within the last year. Several of these leaks have occurred over electrical panel boards and switches, causing life safety and facility fire hazards. Leaks have also damaged recent interior upgrades to laboratory equipment within the facility. Numerous maintenance repairs have been unsuccessful in sustaining a weather tight building. This project will remove the entire existing roofing system and replace it with a new roofing and insulation system carrying a 20 year total system warranty. Removed materials will be recycled wherever possible. The new roof system will be designed to be environmentally friendly, reduce energy costs through improved insulation, and reduce maintenance expenses associated with constant repair of the existing roof system. In addition, upgrades and/or replacement of rooftop mounted lightning protection system components will be completed in conjunction with the roof replacement. The FY 2013 requested funding will support both the design and construction costs associated with this project.

Building 301 (Aircraft Maintenance Hangar): This project involves the replacement of approximately 77,000 square feet of roofing over the entire building. In 1976, the building's original (circa 1968) built up roof system was replaced with an inverted built up roof membrane system. The current roof system dates back to 1989, when a new four ply built up roofing and insulation system was installed over the 1976 inverted built up roof. This current roof system is well beyond its useful life (over 20 years old), is out of warranty and is in poor condition. Over 23 service calls for roof repair work (leaks) have been made within the last two years and maintenance repairs have been unsuccessful in maintaining a weather tight building. This project will remove the entire existing roofing system and replace it with a new roofing and insulation system carrying a 20 year total system warranty. Removed materials will be recycled wherever possible. The new roof system will be designed to be environmentally friendly, reduce energy costs through improved insulation, and reduce maintenance expenses. In addition, upgrades and/or replacement of rooftop mounted lightning protection system components will be completed in conjunction with the roof replacement. The FY 2013 requested funding will support costs associated with the design for this project. Request for funding for construction costs will not be made until FY 2014 so that the rooftop HVAC construction work associated with requested Project #3 can be completed prior to commencing replacement of the roof.

Building 316 (Advanced Automation Systems Laboratory): This project involves the replacement of approximately 72,000 square feet of roofing over the entire building, over half of which is over critical electronic laboratories. The current roof system is a fully adhered EPDM membrane system and is the building's original roof installed circa 1992. The roof system is out of warranty and is in poor condition. Fourteen (14) service calls for roof repair work (leaks) have been made within the last two years and maintenance crews are finding it increasingly difficult to maintain a weather tight building. This project will remove the entire existing roofing system and replace it with a new roofing and insulation system carrying a 20 year total system warranty. Removed materials will be recycled wherever possible. The new roof system will be designed to be environmentally friendly, reduce energy costs through improved insulation, and reduce maintenance expenses. In addition, upgrades and/or replacement of rooftop mounted lightning protection system components will be completed in conjunction with the roof replacement. The FY 2013 requested funding will support costs associated with the design for this project. Due to the scale of the project and the time necessary to complete the necessary design documents, request for funding for construction costs will be made in future budget submission.

All of the requested roofing systems for this project are at the end of their useful lives, have expired warranties, and have been maintenance headaches. Impacts have already been encountered in damages to interior building equipment and finishes, increased maintenance expenses, inconvenience to building occupants and potential delays in executing mission critical programs. Deferring these roof replacements will only further compound these problems as well as potentially increase the risk of consequential damage to other facility systems and equipment due to roof systems which would continue to deteriorate.

f. Electrical Upgrades to Building 300.

$700,000 is requested for the replacement of electrical equipment beyond their life cycle in the Technical Center's largest facility, Building 300. The building was constructed in 1980. The electrical equipment in this building, which includes but is not limited to switchboards, panel boards, automatic transfer switches, motor control centers, and transformers, are beyond their useful lives and are in need of replacement. Furthermore, much of the equipment was primarily from a manufacturer named Federal Pacific Electric Company (FPE). FPE has been out of business since 1988 which makes finding replacement parts for this equipment difficult and costly. The requested funding will support the replacement costs associated with this project.

Construction of these projects will complete critical electrical upgrades for the building resulting in increased system reliability, especially for those electrical systems servicing the laboratory portions of the facility. The new equipment will provide energy savings, reduced maintenance expenses, and improved reliability through the installation of modern, efficient equipment and updated controls. Deferring these system replacements will compound potential problems such as emergency replacement escalation costs, increased maintenance expenses, inconvenience to building occupants and potential delays in the execution of mission critical programs.

g. Primary Exterior Electric Cable / Ductbank Replacement.

$900,000 is requested to replace damaged, exterior, high voltage electrical feeders and supporting ductbank serving numerous facilities such as Substations A and B as well as Buildings 27, 28, and 270. These cables, and the infrastructure supporting them, have all exceeded their respective useful lives. This project improves the power reliability to the affected facilities which support the NAS Test Bed, BCP and eventually NextGen.

2. What Is This Program?

The WJHTC owns and operates test and evaluation facilities, research and development facilities, administrative and storage facilities, and numerous project test sites. The Technical Center must keep the Central Utilities Plant (CUP), utility distribution systems, and the building infrastructure in operating order. The WJHTC must also comply with International Building Codes, the National Fire Codes (NFC), the Americans with Disabilities Act (ADA) and current energy policies.

The WJHTC had recognized the need for a comprehensive, efficient, fiscally prudent, multi-year plan for its infrastructure sustainment program and contracted with a private consultant to develop a twenty year facility master plan. This plan evaluated 34 Center facilities, incorporated previous Center facility plans, and was completed in July of 2008. The plan included significant site surveys of the listed buildings' mechanical and electrical systems. Equipment data were recorded as needed to assess the condition, operation, and repair options for each piece of equipment. Life safety issues observed during the surveys were reported. Operational issues were discussed with FAA personnel familiar with the equipment. Visual, non-intrusive observations of each system were performed. Drawings and data were reviewed. Any observed building code deficiencies were noted, with compliance with the New Jersey edition of the International Building Code 2006 (IBC 2006) requirements as the standard. Additionally, compliance with the codes current at the time of installation was considered. Once the condition and operations of the systems were evaluated, a priority for the needed replacement or modifications based on the estimated condition and remaining lifespan was prepared. Replacement strategies were presented based on Condition Codes and Importance Factors. The Condition Codes indicated the operability or need for replacement for the particular project. The Importance Factors addressed in a relative manner the importance to the Center's mission of each building and project.

The Master Plan was completed in July of 2008 and was developed based upon the consultant's consideration of code compliance issues, equipment age, life expectancy, replacement part availability, and general condition for each system. The consultant also considered how the total costs of projects falling within each 5-year segment could be arranged to help "levelize" overall costs throughout the 20-year period. Early years' proposed projects reflected the highest priority due to the critical issues of remediation, safety, code compliance and/or mission criticality issues.

As a result program accomplishments over the past year included the completion of the Building 300 Roof and Skylight Replacement design; completion of approximately 80 percent of the Underground Primary Electric Cable Replacement Contract; completion of approximately 65 percent of the first Building 300 Substation Replacement Contract (involving 4 of 6 substations); and award of the Phase 1 (of 2) contract for the Building 300 Roof and Skylight Replacement construction.

DOT Strategic Goal - Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

The William J. Hughes Technical Center (WJHTC) owns and operates approximately 1.6 million square feet of test and evaluation facilities, research and development facilities, administrative facilities and numerous project test sites. The value of the buildings and infrastructure is about $190.1 million (FY 2003 figure). This value is considered to be extremely low and it does not include the environmental funding (in excess of $100 million), received via a national program, which has been expended to clean up hazardous sites on Center, replace aged and monitor new underground storage tanks and implement the Center's OSHA and Energy Programs. Additionally the value does not include the worth of the land itself, estimated to be approximately $3 million (FY 2003 figure). These facilities require an annual program of capital improvements and modernization. Example projects include: (1) replacing old heating, ventilation, and air-conditioning systems; (2) upgrading the electrical distribution systems; and (3) upgrading fire-suppression systems to current fire safety codes.

Infrastructure sustainment at the WJHTC will improve operational efficiency and effectiveness. This budget line item will also update facilities and facility support systems; and reduce energy consumption on a per square foot basis, thus supporting Executive Orders 13423 and 13514 concerning Federal Energy Management. This Capital Investment Plan (CIP) program is the only available funding stream to sustain the 1.6 million square feet of space together with the required utility and roadway support systems. What this translates to is an FY 2013 expenditure of approximately 4.2 percent of the Center's capitalized (FY 2003) value to sustain the investment that the FAA has made in the WJHTC. This expenditure would equate to a sustainment value of only approximately $5.00 per square foot. Good business practices would seem to support a sustainment mechanism at the projected rate considering the magnitude of monetary investment at the Technical Center.

The establishment of an infrastructure necessary for providing and sustaining a suitable, reliable environment (i.e. power, cooling, etc.) for the Technical Center's 24x7x365 operations enables the mission critical systems hosted at the Technical Center such as Traffic Flow Management Production Center (TPC), FAA Telecommunications Infrastructure (FTI), Business Continuity Plan (BCP), and the Enterprise Date Centers that support FAA IT operations to provide increased capacity with enhanced reliability. In addition to these operational systems, the Technical Center must provide 24x7 support for current system monitoring capabilities such as Reduced Vertical Separation Minimum (RVSM), Wide Area Augmentation System (WAAS) and Automatic Dependent Surveillance Broadcast (ADS-B) and future systems such as System Wide Information Management (SWIM) as well as the continual second level support provided to operational NAS systems (ERAM, STARS, ATOP) so that they will perform in a proper environment and hence provide enhanced safety and reliability to the greater NAS/FAA system.

The Technical Center's infrastructure was not designed to provide 24x7x365 reliability and availability. The infrastructure has single points of failure, insufficient monitoring, is aging, and has limited remaining capacity to support these critical NAS/FAA systems. In order to meet current and future requirements the Technical Center needs to upgrade its current infrastructure or build an infrastructure that meets the availability/reliability requirements for these mission critical systems.

4. How Do You Know The Program Works?

The modifications have already begun and will continue to ensure the continued reliable operation of the WJHTC by replacing aged mechanical, electrical, and life safety equipment and required utility and other support systems before serious problems occur. The work will also improve life cycle infrastructure planning; update certain facilities, facility support systems and utility distribution systems; reduce energy consumption on a per square foot basis; and enable the Center to support changing FAA programs and missions. The program incorporates best business practices and adopts industry standards such as American Society of Heating, Refrigerating and Air-Conditioning Engineers, Incorporated (ASHRAE), National Electrical Code (NEC), National Electrical Manufacturers Association (NEMA), American National Standards Institute (ANSI) and Institute of Electronic and Electrical Engineers (IEEE).

Again, the Center's Master Plan was logically and comprehensively developed based upon the consultant's consideration of code compliance issues, equipment age, life expectancy, replacement part availability, and general condition for each system. The consultant also considered how the total costs of projects falling within each 5-year segment could be arranged to help "levelize" overall costs throughout the 20-year period. Early years' proposed projects reflected the highest priority due to the critical issues of remediation, safety, code compliance and/or mission criticality issues.

Specific Benefits of funding the FY 2013 Program:

a . Life Safety Improvements to Four Facilities: a) implements the recommendations of a consultant's 20 year master plan prepared for the Center in FY 2008 and revalidated by a Center planning team in early 2011; b) corrects all noted building deficiencies results in compliance with International Building Code 2009 (IBC 2009) and the National Fire Codes (NFC), the current facility standards; c) provides fire detection and annunciation designs for systems that are beyond their useful lives and are no longer commercially supported; and d) restores certain existing Building Fire Alarm Panels to current UL Standards.

b. Building 303 Chiller Replacement: a) machine has undergone three major teardowns in the past several years; b) machine uses R-11 refrigerant which is no longer manufactured; c) machine requires a complete oil change every 2 years, versus a normal 5 year duration, due to internal rusting; d) necessary to maintain the reliability of chilled water supply to the ATC Lab Area, which serves as the NAS test bed and supports TPC, FTI and the Enterprise Data Center; e) good business case - pays for itself through the elimination of just one ATC Lab shutdown due to a lack of cooling.

c. Building 301 Mechanical Remediation - remedies the following: a) final project resulting from an existing contract termination that had occurred in December, 2004; b) all of the equipment in the remaining (of two) existing mechanical rooms is over 45 years old and well beyond its useful life; c) a temporary mechanical unit, installed on the roof, has been servicing approximately thirty percent of the Building 301 office area since June, 2004; d) the Center purchased a significant amount of heating, ventilating and air conditioning equipment under the contract prior to its termination - this equipment , including electronic control panels and devices (with a projected seven year useful life), has been in storage ever since.

d. Mechanical/Electrical Improvements to Five Facilities: a) implements the recommendations of a consultant's 20 year master plan prepared for the Center in FY 2008 and revalidated by a Center planning team in early 2011; b) replaces mechanical systems and equipment beyond their useful lives, per ASHRAE; c) American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) consider average transformer (and associated equipment) life to be 20 to 25 years. Existing transformers and equipment are circa 1970; d) replaces all deficient systems and equipment before serious operation and maintenance problems occur; e) energy savings opportunity as the replacement systems/equipment will be more (in some cases 20 percent) energy efficient; f) improves the reliability of the mechanical and electrical systems within the buildings.

e. Roof Replacement at Three Facilities: a) replaces roofs that are beyond both their useful lives and their respective warranties; b) provides each facility with a roofing system that is more energy efficient and more appropriate; c) implements the recommendations of a consultant's 20 year master plan prepared for the Center in FY 2008 and revalidated by a Center planning team in early 2011; d) significantly reduces roof maintenance costs since as many as 10 leaks have occurred after a single, heavy rainstorm and identifying the source of one leak can be both labor intensive and difficult to pinpoint; e) improves employee productively and morale, and reduces equipment and property damage through the elimination of roof leaks in an occupied facility.

f. Electrical Upgrades to Building 300: a) implements the final portion of the first year electrical recommendations of a consultant's 20 year master plan prepared for Building 300 in FY 2008; b) American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) consider average electrical equipment life to be 20 to 25 years. Existing equipment is circa 1980; c) improves the reliability of building electrical power to the entire building, especially the laboratory portion; d) good business case - pays for itself through the elimination of just one power loss due to electrical equipment failure, a possible timeframe of 36 hours; e) essential to the success of NextGen, BCP and the Technical Center's evolving mission.

g. Primary Exterior Electric Cable/Ductbank Replacement: a) American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) consider average high voltage cable life to be 20 to 25 years. Existing cables are 30 to 40 years old; b) rectifies the following - an electrical investigation during a 2007 construction contract revealed that the high voltage electrical cables and associated ductbank serving Center facilities were in marginal condition; c) improves the power reliability to the affected Center facilities; d) good business case - pays for itself through the elimination of just one power loss due to cable failure, a timeframe of at least 72 hours; e) essential to the success of the Business Continuity Plan (BCP) and NextGen.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$8,000,000 is required to complete life safety improvements to four facilities; Building 303 Chiller Replacement; Building 301 Mechanical Remediation; Mechanical and Electrical Improvements to five facilities; roof replacement at three facilities; electrical upgrades to Building 300; and primary exterior electric cable/ductbank replacement.

Detailed Justification for - 1A05 Data Communications in support of Next Generation Air Transportation System

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Data Communications in Support of Next Generation Air Transportation System ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted t
Data Communications in support of Next Generation Air Transportation System	$134,031	$143,000	$142,630	-$370

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Final Investment Decision (FID) Management Planning	---	$2,352.2
2. Systems Engineering	---	15,185.0
3. Operational Integration	---	4,757.8
4. Data Communications (Data Comm) Air Ground Network Service	---	49,321.0
5. Program Management	---	8,316.8
6. Business Management	---	2,317.0
7. En Route	---	56,427.0
8. Tower Revised DCL and Trials	---	3,603.2
9. Independent Operational Test and Evaluation (IOT&E)	--	350.0
Total	Various	$142,630.0

For FY 2013, $142,280,000 is requested for the Data Communications (Data Comm) program to provide two-way data between controllers, automation and flight crews; safety-of-flight Air Traffic Control (ATC) clearances, instructions, traffic flow management (TFM), flight crew requests and reports. Data Comm will enhance automation for ATC message generation and exchange. Also requested is $350,000 for IOT&E activities.

2. What Is This Program?

The Data Comm program will provide data communications between ATC facilities and aircraft, and will serve as the primary enabler for the Next Generation Air Transportation System (NextGen) operational improvements. Data Comm is necessary to transition from voice-based ATC communications sytem to data-centric NextGen.

Data Comm will improve National Airspace Systems (NAS) operations by:

- Improving controller productivity and reducing controller workload by automating delivery of routine clearances
- Improving NAS capacity and reducing flight delay by enabling existing controller staffing to handle increased traffic
- Enhancing safety by reducing operational errors associated with voice communications
- Enabling many of the NextGen operational improvements that require negotiation or exchange of information that cannot be efficiently delivered via voice communications

Data Comm Segment 1 will deliver the initial set of Data Comm services integrated with automation support tools, which provides NAS benefits and lays the foundation for a data-driven NAS. Data Comm Segment 2 will enable more advanced NextGen operations, which would not be possible using the existing voice systems.

Near-term Data Comm program efforts focus on:

- Final Investment Decision (FID) for the Data Comm Network Services, resulting in baselined program cost and schedule profiles
- Data Comm Network Services (DCNS) contract modification of the Data Comm Integrated Services contract
- Commence Avionics Equipment Initiative
- Initiate Roll-out of Data Comm Network Service Infrastructure to Testing
- Revised Departure Clearance (DCL) Operational Trials and Validation
- Develop Operational Procedures for initial Tower Services (DCL)
- Develop Controller Training for Initial Tower Services (DCL)
- Complete Software Development for Logon and Protocol Gateway Functionality for DCL
- Complete Developmental Testing for Logon and Protocol Gateway for DCL
- Complete Software Development and Functional Testing of Tower Data Link System (TDLS)
- Finalize National Airspace System (NAS) Enterprise Architecture Documents
- Complete Engineering Documentation for En Route Services (Transfer of Communications/Initial Check-in/Go Button)
- Develop Prototype Software for En Route Services (Transfer of Communications/Initial Check-in/Go Button)
- Initiate Developmental Testing for En Route Services (Transfer of Communications/Initial Check-in/Go Button)
- Develop Security Certification and Authorization Package (SCAP) for initial Tower Service Sub-Systems
- Continue Spectrum Reallocation Planning
- Initiate end-to-end System Integration and Testing for DCL service
- Continue specification work for initial En Route services (i.e. Transfer of Communications/Initial Check-in/Go-Button)
- Complete setup of Operational Test Bed and Test Procedures
- Commence Independent Operational Assessment (IOA) Plan
- Finalize Software Assurance Level Audits
- Complete initial DCIS engineering and implementation plans
- Develop Safety Requirements Management for Hazard Analysis

3. Why Is This Particular Program Necessary?

The operations and services enabled by Data Comm will allow more efficient, strategic management of the airspace, enabling the Agency to meet the growing demand for air travel, all while improving operational and life-cycle costs for both airspace managers and users. Each Data Comm segment will improve the capacity, operational effectiveness, and cost efficiency of the Agency's ATM services. Segment 1 will deliver the initial set of data communications services, and lays the foundation for a data-driven NAS. Segment 2 will enable the core set of advanced NextGen-enabling operations, which would not be possible without DataComm.

Current analog voice communications contribute to operational errors due to miscommunications, stolen clearances, and delayed messages due to frequency congestion. In FY 2004 and FY 2005, approximately 20 percent of en route operational errors were voice communication related. Of those, 30 percent of the high severity operational errors were deemed to be communications related. With substantial aircraft equipage, Data Comm will significantly reduce communications related operational errors and improve the safety of air travel.

Data Comm will enable air traffic controller productivity improvements, and will permit capacity growth without requisite cost growth associated with equipment, maintenance, and labor. As a result, unit costs (the resources necessary to provide controller pilot communication service per aircraft operation) will decrease. Data Comm will enable these benefits by automating repetitive tasks, transitioning from the tactical voice communications to a strategic, more accurate and less workload-intensive data communications, which will enable ground systems to use real-time aircraft data to improve traffic management efficiency. As indicated, Data Comm does not completely replace voice communications, rather it augments these services. Several studies suggest that with 70 percent of aircraft Data Comm equipped, exchanging routine controller-pilot messages and clearances via data can enable controllers to safely handle approximately 30 percent more traffic. This increase in traffic handling ability has a direct correlation to reduced delays and increased capacity - recent benefits analysis suggests airline operations will benefit from reduced flight times, improved on time performance and the opportunity to expand flight schedules. Data Comm enables NextGen services, including 4D trajectories and conformance management, will further improve capacity and efficiency by shifting air traffic operations from short-term, minute-by-minute tactical control, to more predictable and planned strategic traffic management.

The capacity and productivity of the NAS will be improved by data communications. Initially, Data Comm will be used in conjunction with the current traffic control strategies as well as planned strategies such as traffic flow management (TFM) re-routes. Data Comm will increase controller efficiency by automating routine exchanges as well as enabling the initial phase of Trajectory Based Operations (TBO). As controllers become more productive, sector capacity will grow without the need to assign additional resources. Data Comm benefits will be realized in en route and tower/ground operations. The busiest positions, whether in en route sectors, en route feeder sectors in metro corridors, terminal approach sectors, or airport clearance delivery positions at Core 30 airports will see the most dramatic benefit.

New services enabled by Data Comm will contribute even more dramatically to air traffic capacity. Advanced 4-dimensional trajectories will enable more strategic operations that can ensure the most efficient use of airspace resources, with greatly reduced ground management oversight. More predictable traffic flows will yield better on-time performance, and minimize service impact associated with weather-related system disruptions. Many of these new services will have positive impact in other arenas: Optimized Profile Descent (OPD), for example, will enable pilots to throttle back to idle on their descent to the airport, reducing noise, emissions, and fuel consumption. Data Comm, by allowing exchange of data to carefully coordinate the aircraft's position in time and space, will allow the FAA to effectively employ these approaches even in congested airspace.

4. How Do You Know The Program Works?

The Data Comm program is currently in the Final Investment Analysis phase. Final investment Decision (FID) for Automation Enhancements (Tower and En Route) combined with Authorization to Proceed (ATP) for Data Comm Integrated Services contract (DCIS) award will occur in early FY 2012. A subsequent FID will take place for the Data Comm Network Services award as part of the DCIS in early FY 2013.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$142,630,000 is required to fund the DCIS contract to allow the award of the Data Comm Network Service, along with integration and engineering activities, implementation plans, and avionics equipage initiatives leading to the initial roll-out of the data communications services. The funding will also support the enhancement of En Route Automation Modernization (ERAM) system software for FANS logon and protocol gateway functionality. Funding in FY 2013 is required to ensure a seamless integration into overall ERAM deployment, which is critical to achieving the initial roll-out of Data Comm Tower services. Also, work will continue on specifications of initial En Route services (i.e. Transfer of Communications/Initial Check-in/Go-Button).

At the end of FY 2013 the program will complete software enhancements and functional testing of Tower Data Link Services (TDLS). Additionally, TDLS regression testing will occur subsequent to functional testing. The program will focus on optimizing integration of all the data communication subsystems leading into setup of end-to-end integration testing. Furthermore, engineering resources will be utilized to develop test case and test plans for operational test and evaluation. Spectrum engineers will initiate spectrum reallocation activities in FY 2013 to create the availability of required bandwidth.

The program office will be well into conducting our initial trials at several sites within the NAS. The trials will exercise the operational procedures for both the cockpit and controller for initial Tower service of revised departure clearance. Further, output of trials efforts will feed into the development of training procedures and computer-based instructions for Tower controllers.

These preceding activities will support the objective of achieving Initial Operational Capabilities (IOC) for Tower services by a planning date of 2015.

Additionally, the program will complete engineering specification activities associated with initial En Route services for Transfer of Communications, Initial Check-in, and Go-Button. Upon completion of engineering specifications, the program will begin software prototyping followed by initial developmental testing.

Data Comm will bridge the gap between current voice-only ATC, and the data-intensive NextGen. To ensure the NAS has the capacity to grow, Data Comm will implement services that maximize controller productivity, reduce operational errors associated with voice communications, and enable new air traffic services and reduce delays. Data Comm is comprised of automation enhancements for air traffic control message generation and exchange (hardware and software), and the communications data link between ground and airborne users.

The FAA will begin the transition to Data Comm with the introduction of digital revised departure clearances. This will reduce the aircraft gate and taxi delays associated with delivery of clearances, an improvement that will get aircraft off the ground sooner and reduce controller workload. Aircraft equipped through the DCIS equipage initiative will provide the foundation for accrual of the following significant Segment 1 benefits:

- En Route $28.44 Billion
- DCL $.94 Billion
- FAA Staffing $1.8 Billion

These benefits are being finalized for the Final Investment Decision at FAA that will occur in May 2012. The estimates are for Segment 1 Departure Clearance (DCL) and En Route Services only.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 16, 17, 39, 44, 42, DataComm
- Achieve final investment decision on acquisition of the digital very high frequency (VHF) aeronautical mobile communications infrastructure
- Initiate development of en route automation enhancements
- Enable revised departure clearance capability in the tower environment via VHF Data Link mode 2 for aircraft equipped with Future Air Navigation System 1/A+

Detailed Justification for - 1A06 Next Generation Air Transportation System (NextGen) – Demonstrations and Infrastructure Development (DEMO)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Demonstrations and Infrastructure Development (DEMO)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Demonstrations and Infrastructure Development	$20,811	$15,000	$24,600	+$9,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Future Planning - Demonstrations	---	$24,600.0

For FY 2013, $24,600,000 is requested to provide for the following:

International Air Traffic Interoperability
- Continue demonstration activities of collaborative end-to-end domain systems
- Support standards and alternatives development in support of initial investment decision and OMB Exhibit 300 preparation/development for NextGen transformational technologies to assure timely implementation into the NAS
- Continue standards and alternatives development
- Continue demonstration activities of mid term end-to-end trajectory based operations
- Continue demonstration activities for enhanced avionics capabilities
- Continue demonstration activities for enhanced navigation capabilities
- Post-Demonstration Analysis and Final Report

Airborne Access to System Wide Information Management (AAtS)
- Continue Development of Cockpit Display
- Implement Wireless link to Aircraft to enable communications of SWIM data
- Perform System Integration and Testing
- Conduct data analysis of transmission, accuracy and quality of data sent from ground to aircraft over commercial service provider
- Conduct limited flight demonstration of one product available for use
- Conduct live flight demonstration of three products available for use including at least one weather and one other operational information product
- Conduct integrated live flight demonstration of all available SWIM products
- Produce Final Report of Demonstration Results
- Continue efforts in Project Management/Stakeholder Coordination

Airborne Execution of Flow Strategies
- Continue work towards execution of the demonstration
- Continue to develop Metrics and methodology
- Continue work with Systems Engineering
- Continue efforts towards Integration and Testing
- Continue efforts in Project Management/Stakeholder Coordination toward collaboration
- Post-Demonstration Analysis and Final Report

Global Harmonization of Flight Information and Exchange Strategies

- Demo planning and initiate implementation
- Develop Concept of Operations and scope for Scenarios
- Develop metrics and methodology
- Develop evaluation strategies to harmonize Flight Objects
- Continue efforts in Project Management/Stakeholder Coordination

Future Planning - Demonstrations
This segment provides the planning and integration of current technology with transformational technology demonstrations to achieve NextGen operational objectives as early as possible and sustainment of the demonstration sites.

2. What Is This Program?

The NextGen Demonstrations and Infrastructure Development Program is designated to integrate demonstration projects and programs, provide validation of mature solutions, and demonstrate implementation alternatives for the NAS. This program provides agility and flexibility in demonstrating alternative technologies, and concepts, while supporting procedure and standards development, as well as providing for the integration of near-term emerging technologies, procedures and/or customers' initiatives with on-going demonstrations. The demonstration program leverages the individual project demonstrations and supports the integration of these individual projects into multiple-domains designed to capture the synergies that are needed to provide timely NAS transformation.

International Air Traffic Interoperability

This demonstration project is designed to help the FAA promote safe, affordable and rapidly implemented innovations into Air Traffic Management (ATM) along oceanic routes. It will demonstrate and accelerate airline and Air Navigation Service Providers (ANSP) efficiency improvements using existing systems and technologies. The flight trials development stage will include system architecture, design, hardware and software development (where applicable), procedures development, simulations, component/subsystems testing and certification, and system checkout. Flight trial execution could include scripted flight tests, limited operational testing and/or extended operational evaluations. This international interoperability demonstration program contributes directly to NextGen concepts and supports international collaboration, avoids overlap, and will coordinate activities with national and international organizations, including DOD. Further, the International Air Traffic Interoperability demonstrations and development initiatives will assist the international communities and the FAA to validate new DOD 4-D Trajectory Based Operations (TBO) and Performance-based Air Traffic Management (PATM) alternatives.

Airborne Access to System Wide Information Management (AAtS)

This demonstration will begin validation of the preliminary requirements for Airborne SWIM and show the capability for the FAA system and airborne aircraft to communicate non-safety critical information via an airborne network. This capability should provide information such as traffic management with the capability to communicate data essential to system efficiency. Additionally, using this link, the flight crew could use this capability to communicate ETAs, 4D Intent information, and negotiated reroutes back to the FAA system. In addition to air traffic data, the link can be used to transmit weather data/information such as updated wind fields to the aircraft or state of the atmosphere information from the aircraft.

Airborne Execution of Flow Strategies

This project seeks to show how a metering Decision Support Tool (DST), such as the Traffic Management Advisor (TMA), could be informed by a fleet prioritization element within the Flight Object, in order to aide flight operators in sequencing their "higher value" flights. Demonstration will show the capability to define airborne flights to be rerouted by region, destination, or flow. With the current flight(s) defined, demonstrate the capability for Traffic Management to electronically negotiate the initiative with the Airline Operation Center in a timely manner.

Global Harmonization of Flight Information and Exchange Strategies
The purpose of this proposed demonstration is to continue to validate the Flight Object concept and the use of the Flight Information eXchange Model (FIXM) standard. The demonstration will show how ANSPs and flight operators, in both the Pacific and Atlantic regions, can leverage the FIXM standard as a means for sharing common flight information elements.

Future Planning

During the FY 2010 to FY 2015 time frame, demonstration, development, and validation results can lead to implementation of early improvements in the NAS while supporting long-term operational objectives. The initial segment initiatives provides integrated demonstration and end-to-end demonstration activities, near-term activities necessary to refine and integrate solution set capabilities with emerging technologies and/or emerging customers' NAS initiatives, and mid-term development to better understand future operational concepts. The initial segment also provides integration of current technology with transformational technology demonstrations to achieve NextGen operational objectives as early as possible and sustainment of the demonstration sites.

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The NextGen Technology Demonstration program is a development effort to support the transformation of the NAS to 4-D trajectory management and a performance-based system. The program provides integration and demonstration of alternate technologies and concepts, while supporting procedures and standards development, integration of near-term emerging technologies and airspace customers' initiatives with on-going scheduled demonstrations. This program provides a vehicle to test concepts and leverage individual transformational program and project technology to create multi-domain cohesive demonstrations to capture the synergies needed to transform the NAS in an expedited manner. The evaluation of technology and the collaboration between public/private industry partners, Air Navigation Service Providers, customers, and owners will continue into perpetuity.

4. How Do You Know The Program Works?

Demonstrations and Infrastructure Development encompasses the airspace and airports within the NAS. Demonstrations typically take place over the course of 18-24 months, with new demonstrations added as previous projects are completed. Since its beginning, the DEMO portfolio has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities from completed and ongoing demonstrations that have and will continue to improve the overall operations within the NAS.

a. International Air Traffic Interoperability
- Conducted Gate to Gate demonstration with Air France
- Expanded lateral optimization procedures to include AIRE Eastbound demonstrations
- Coordinated SRMD safety review process related to ADS-C Climb and descent procedures (ADS-C CDP)

b. Unmanned Aircraft Systems 4D Trajectory Based
- Drafted final UAS "Demonstration Test Plan (Ver 1.5) for UAS NextGen Flight Test at CCAFS
- Drafted final Safety Risk Management Document Memorandum (SRMD)M for UAS NextGen Flight Test at CCAFS
- Conducted UAS Demonstration (3) at CCAFS for a limited ADS-B CDTI capability providing enhanced situational awareness to the UA Pilot in the GCS and provided limited point to point digital radio connectivity from the UA pseudo pilot to ATC at CCAFS Skid Strip Tower (KXMR)

5. Why Do We Want/Need To Fund The Program At The Requested Level?

For FY 2013, $24,600,000 is required to continue activities within the NextGen - Technology Demonstrations and Infrastructure Development solution set. This solution set is designated to integrate demonstration projects and programs, provide validation of mature solutions, and demonstrate implementation alternatives for the NAS. A reduction in funding will result in various demonstration projects and programs that provide agility and flexibility in demonstrating alternative technologies, and concepts, while supporting procedure and standards development not to occur.

Detailed Justification for - 1A07 Next Generation Transportation System (NextGen) – System Development (SYSDEV)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 -- Next Generation Transportation System (NextGen) – System Development (SYSDEV)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System (NextGen) – System Development (SYSDEV)	$60,386	$85,000	$61,000	-$24,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Human Factors (Efficiency/Air Ground Integration)	---	$5,000.0
2. New ATM Requirements	---	22,000.0
3. Operations Concept Validation Modeling	---	5,000.0
4. Staffed NextGen Towers (SNT)	---	3,500.0
5. Environment and Energy – EMS and Noise and Emissions Reduction	---	9,500.0
6. Wake Turbulence – Re-categorization	---	1,500.0
7. System Safety Management Transformation	---	7,500.0
8. Operational Assessments	---	7,000.0
Total	Various	$61,000.0

For FY 2013, $61,000,000 is requested to provide for the following:

a. Human Factors (Efficiency/Air Ground Integration)
- Conduct demonstration simulations of integrated ATC workstations showing the phased introduction of NextGen decision support tools and new capabilities
- Determine the information requirements for ATC as UAS are integrated in the NAS in a less restricted manner than is currently used
- Manage safety risk associated with human performance in the NextGen environment
- Develop a tech ops integrated work environment in the NextGen maintenance environment
- Continue development of the Human System Integration Roadmap in support of the human element in the NAS Enterprise Architecture
- Conduct simulations of major air-ground simulation human factors issues

b. New Air Traffic Management (ATM) Requirements
- Weather Transition
- Coordinate NextGen Weather Requirements with the International community (e.g., ICAO, SESAR)
- Conduct policy analyses on FAA/NWS roles and responsibilities
- Conduct requirements allocation and validation with NWS
- Conduct service analysis activities to address operational problems (e.g., Path Based Shear, Ground DeIcing, Time-of-Wind-Return, Terminal Haze)
- Provide weather information demonstration and evaluation support for concept maturity and technology development (CMTD) activities (e.g., Concept of Operations)
- TCAS

  - TCAS/ADS-B Compatibility/Future Requirements
  - Future CAS Logic Development/Future Surveillance Requirements
  - CAS Logic Assessment/Avionics Model
- Airborne SWIM
  - Acquisition planning to support requirements levied on NAS systems by uses of AAtS
- Trajectory Modeling
  - Development of NAS trajectory performance requirements
  - Development of NAS trajectory interoperability requirements
  - Development of NAS trajectory information requirements
  - Trajectory Concepts Alternative Analysis
  - Initial Trajectory information items for Flight Object
- New Radar Requirements (Surveillance and Weather)
  - Deliver initial report on Full-Antenna Aperture Performance Model for Multifunction
  - Deliver report on Industry Solutions for Multifunction Radar Backend Architecture
  - Concepts and Requirements Definition (CRD) Team Kick-off
  - Deliver CRD Plan
  - Deliver Technical/Cost Trade Offs Report

c. Operations Concept Validation Modeling
- Continue process of developing and validating high priority Mid-Term operational concepts and conducting research to reduce the risk of NextGen programs being implemented before flawed operational concepts are identified.
- Simulation and modeling needed to validate concepts described in concept documents and scenarios will occur as dictated by research gaps that exist in programs transitioning to an implementation phase.
- Benefits associated with concepts will also be modeled in 2013 to determine the level of capacity and efficiency benefits that can be attributed to NextGen operations.
- Development of operational requirements for validated concepts

d. Systems Development Staffed NextGen Towers (SNT)
- Program requirements update
- Surface surveillance operational suitability (formerly ASDE-X Certification) documentation
- Initial procedures for surface surveillance operational suitability
- System safety analysis for surface surveillance operational suitability

e. Environment and Energy – Environmental Management System (EMS) and Advanced Noise and Emissions Reduction
- Development and enhancement in provisions of NextGen EMS in coordination with stakeholders
- Advance NextGen EMS framework through pilot studies, data collection for decision support analyses and scope out development of EMS tracking and IT system
- Explore NextGen EMS adoption incentivization options
- Assessment of NAS-wide benefits of NextGen Aircraft and Alternative Fuels Technologies through tests, demonstration and simulation analyses
- Exploration and demonstration of Environmentally and Energy Favorable Operational procedures
- Assessment of NAS-wide benefits of environmental standards and market based measures
- Implement EMS Framework including elements of multi-year activities on analysis of EMS environmental impacts and metrics, EMS communication and outreach, refinement of decision support tools, EMS testing and pilot studies, EMS tracking and IT system, analysis of EMS incentivization and NEPA compliance, EMS prioritization and implementation
- Elements of multi-year activities exploring, environmentally efficient gate to gate operational procedures
- Investigate NAS-wide benefits of potential aircraft CO2 emissions standard metrics aviation specific market based measures.

f. Wake Turbulence Re-categorization
- Begin engineering assessments for incorporating leader/follower pair-wise static wake separation standards into the FAA ATC automation platforms
- Continue to support implementation of six category wake separation standards into the FAA ATC automation platforms

g. System Safety Management Transformation

- SMS - Implement an integrated hazard tracking capability across all AVS services and offices with oversight responsibility
  - SMS DAH capability with hazard tracking oversight software
- SRM - Initiate annual FAA-wide safety risk management (SRM) training requirements, implementation and coordination works
  - RARM Annual FAA-wide safety risk management training
- SSA - Implement and validate the ability to calculate periodic system risk baselines for surface operations (all 35 major airports)
  - Baseline software acquisition and deployment
  - Baseline system wide fatigue modeling
- Implement integrated system risk analysis program and analyze potential impacts of other domestic safety initiatives
  - System safety metrics (all airports)
  - Integrated system risk analysis (System Wide)

h. Operational Assessments

- Develop, evaluate and implement enhancements in AEDT to cover study fidelity for local airport to regional NAS-wide NextGen environmental analysis
- Develop, evaluate and implement enhancements in APMT-Economics for domestic/ regional NAS-wide NextGen environmental analysis
- Refine analysis and assessment of NAS-wide NextGen environmental mitigation and cost-beneficial options for decision support
- Integrate AEDT environmental assessment capabilities with NextGen NAS simulation models
- Update the overall cost estimates for the government's NextGen investment, to reflect the latest technology /procedures development plans and the approved budget
- Update the NextGen avionics costs estimates to reflect the latest industry trends, traffic forecasts, industry costs, and technology readiness
- Continue to modernize FAA's System Wide Analysis Capability (SWAC), a state-of-the-art simulation of the NAS used to estimate the operational benefits of NextGen
- Update the NextGen benefits estimates to reflect modeling improvements, revised development plans. and new traffic and fleet forecasts
- Update the overall NextGen business case, to reflect the updated cost and benefits estimates
- Conduct an operational evaluation of NextGen operational capabilities deployed in 2012

2. What Is This Program?

The FAA operates arguably the safest, most efficient, and most cost-effective Air Traffic Control (ATC) system in the world, while handling more traffic and controlling more airspace than any other Air Navigation Service Provider (ANSP). Yet we endeavor to do more. The goal of NextGen is to provide new capabilities that make air transportation safer and more reliable while improving the capacity of the National Airspace System (NAS) and reducing aviation's impact on our environment. The achievement of these goals will be extremely challenging. The NextGen System Development program provides cross-cutting research, development, and analysis to help achieve these goals, in such areas as human factors research, requirements development, environmental and operational modeling and analysis, and safety research and analysis. The specific activities of the program are described below.

a. Human Factors (Efficiency/Air Ground Integration)

The significant features of this program are the development of a Human System Integration (HSI) Roadmap to complement the other roadmaps in the Enterprise Architecture, the development of a common air traffic workstation to accommodate the various NextGen technologies when providing services, and a series of integrated workstations that deliver the required services using the common workstation. The HSI Roadmap will explain the roles and responsibilities of the actors in the NAS (air traffic controllers, pilots, dispatchers, traffic managers, etc.), their interactions with NextGen technologies, linkage to required changes to staffing, personnel selection, training, and required research and development activities in the human factors area that are needed to realize the NextGen vision.

Research will examine the roles of ANSP and facilities maintenance personnel to ensure safe operations at increased capacity levels and the way the roles would be best supported by allocation of functions between humans and automation. The success of new NextGen technologies hinge upon the actions of air traffic service providers using new decision support tools or automation to achieve the operational improvement. The effectiveness of each of these solutions is contingent upon the proper human engineering of the new capability. This human engineering is not just the visible interface, but the characteristics of the tool and how the tool is used in the context of the work.

b. New Air Traffic Management (ATM) Requirements

The New ATM Requirements Program addresses FAA's goal for capacity and the DOT reduced Congestion Strategic Objective to "Advance accessible, efficient, inter-modal transportation for the movement of people and goods." Furthermore, this program fits the NextGen goal of expanding capacity by satisfying future growth in demand (up to three times capacity) as well as reducing transit time. For FY 2013, new ATM requirements will focus on five areas: Weather Transition, TCAS, Airborne SWIM, Trajectory Management, and New Radar Requirements (Surveillance and Weather).

Weather Transition ensures that weather concepts coming from the Aviation Weather Research Program are matured and technically developed under the FAA guidelines for Concept Maturity Technology Development (CMTD) to a level of appropriate readiness for transition to NAS operational production. Weather Transition will manage appropriate CMTD activities to include the creation, testing and evaluation of prototypes and operational demonstrations for the purpose of defining and refining an appropriate operational use concept. The Weather Transition program will also ensure that any risk inherent in the introduction of a new weather product to the NAS is done so in accordance with ATO Safety Risk Management guidelines.

TCAS had extraordinary success in reducing the risk of mid-air collisions. Now mandated on all large transport aircraft and installed on many smaller turbine powered aircraft, TCAS has been in operation for over a decade and has been credited with preventing several catastrophic accidents. TCAS is a critical decision-support system in the sense that it has been widely deployed (on more than 25,000 aircraft worldwide) and is continuously exposed to a high-tempo, complex air traffic system.

TCAS is the product of carefully balancing and integrating sensor characteristics, tracker and aircraft dynamics, maneuver coordination, operational constraints, and human factors in time-critical situations. Missed or late threat detections can lead to collisions, and false alarms may cause pilots to lose trust in the system and ignore alerts, underscoring the need for a robust system design. NextGen airspace will have increased capacity due to decreased aircraft separation made possible by new technologies and new procedures, such as the increased use of RNAV/RNP routes and Closely Space Parallel Runways operations. As aircraft separation is decreased, it is critical that TCAS be made even more accurate and dependable to ensure continued pilot trust in the system.

Airborne System-Wide Information Management (SWIM) - The current development of SWIM includes a gap in servicing airborne clients. European concepts of SWIM, built by SESAR, cover this. Thus, there is a need for concepts that would harmonize the FAA and SESAR SWIM systems. There is a need to determine if airborne SWIM is a requirement or an optional feature. Airborne SWIM will identify performance and bandwidth requirements for airborne internet capability to support the exchange of ATM information such as weather, aeronautical information and flight information to support Traffic Flow Management. The program will develop standards and publish standards that will ensure harmonization with SESAR SWIM systems.

Trajectory-based operations require multi-domain interaction with aircraft trajectories in the far-term future. As a step towards that end, concepts of use (ConUse) for trajectory operations (TOps) have been defined to focus on the NextGen midterm. The TOps activity defined an initial cross-stakeholder, common view of the utilization of Communications, Navigation and Surveillance (CNS) components related to TOps in the midterm. The Trajectory modeling project will develop NAS-wide trajectory-related requirements for Mid-Term automation systems. System level requirements with then be developed and allocated across the automation systems. The project focuses on defining what trajectory information and exchange methods are required, which trajectory prediction types are required and what is required to achieve trajectory interoperability across multiple domains. . In addition, international collaboration will be an integral part of trajectory based operations, as other regions of the world shift toward the same goal.

New Radar Requirements (Surveillance and Weather) is a concept maturity and technology development initiative in support of the NextGen Surveillance and Weather Radar Capability. The objective of this effort is to identify viable solution implementation alternatives that could provide for FAA's aircraft and weather surveillance radar needs and weather surveillance radar needs of both FAA and NOAA. It will include identifying the technical challenges, evaluating cost models, developing technology approaches and proposed solutions, and concept demonstration through modeling and prototyping. The overall project includes four major areas: Multifunction Phased-Array Antenna Maturation, Engineering Studies – Technology Assessment, Multifunction Radar Backend Definition, and Concept and Requirements Definition. The outcome of this body of work will result in an initial Antenna and Radar Backend specification. The information gained through this effort will support an FAA investment analysis readiness decision (IARD) in 2014 and will provide the government a greater capability of defining specific requirements for a potential joint radar acquisition.

c. Operations Concept Validation Modeling

Operations Concept Validation Program addresses developing and validating future end-to-end (flight planning through arrival) operational concepts with special emphasis on researching changes in roles and responsibilities between the FAA and airspace users (e.g., pilots and airlines), as well as the role of the human versus systems, that will increase capacity and improve efficiency and throughput. It will identify procedures that can decrease workload and increase reliance on automation for routine tasking to increase efficiency of the NAS. This program works toward developing operational methods that will meet the NextGen goal of expanding capacity by satisfying future growth in demand as well as reducing transit time (reduce gate-to-gate transit times by 30 percent and increasing on-time arrival rate to 95 percent).

The research provides an end-to-end NAS Operational Concept and a complete set of scenarios for the mid-term that describe operational changes for NextGen solution sets including: Trajectory Based Operations (TBO); High Density Arrivals/Departures and Airports; Flexible Terminal and Airports; Collaborative Air Traffic Management; and Networked Facilities.

d. Staffed NextGen Towers (SNT)

The Staffed NextGen Tower (SNT) concept provides for a paradigm shift from using the out-the-window (OTW) view as the primary means for providing tower control services to using surface surveillance approved for operational use.

SNTs will provide for improved safety and increased capacity at night and during periods of inclement weather when impaired visual observation from an air traffic control tower results in delays or a reduced level of access to the airport. SNT will also allow the FAA to expand its service to meet projected increases in Air Traffic Control Tower (ATCT) operations.

SNT is planned for high density airports as these airports are likely to have the surveillance infrastructure and most aircraft equipped with avionics that will support SNT operations.

e. Environment and Energy – Environmental Management System (EMS) and Noise Reduction

There are two environmental projects that support this program: Environmental Management System (EMS) and Environment and Energy.

The NextGen Environmental Management System (EMS) will manage NextGen environmental impacts and help to define and identify optimum mitigation actions and assess their benefits in order to achieve NextGen environmental goals. This subprogram will develop, refine and evaluate EMS framework, support implementation as well as communication and coordination strategies, decision support tools, and environmental impacts metrics and analysis approaches.

Environment and Energy - Advanced Noise and Emission Reductions: Three main components of this subprogram are: Evaluate potential NAS-wide environmental benefits of mitigation solutions i.e. new aircraft technologies matured under CLEEN (Continuous Lower Emissions, Energy, and Noise) for reduction in noise, emissions and fuel burn through testing, demonstration and benefits analysis, aviation alternative fuels, potential and viable policy, and environmental standards and market based measures; explore and assess new optimized operational procedures for energy efficiency and improved environmental performance; and identify ways to integrate environmental impacts mitigation options with the NAS infrastructure and demonstrate any NAS adaptation required to implement these solutions and to maximally benefit from NextGen provisions.

f. Wake Turbulence Re-categorization

This program focuses on satisfying the capacity demands of future aviation growth. The last full review of wake separation standards used by air traffic control occurred nearly 20 years ago in the early 1990s. Since then, air carrier operations and fleet mix have changed dramatically, airport runway complexes have changed and new aircraft designs (A-380, very light jets, unmanned aircraft systems) have been introduced into the NAS. The 20 year old wake separation standards still provide safe separation of aircraft from each other's wakes but it no longer provides the most capacity efficient spacing and sequencing of aircraft in approach and en-route operations. This loss of efficient spacing is adding to the gap between demand and the capacity the NAS can provide.

This program is part of a joint EUROCONTROL and FAA program that has reviewed the current required wake mitigation aircraft separations used in both the USA's and Europe's air traffic control processes and has determined the current standards can be safely modified to increase the operational capacity of airports and airspace that will have heavy operational demand in the NextGen era. Associated work is incorporating new aircraft (i.e. Boeing 787, Airbus A-380, Boeing 747-8 and others) in this ongoing development of safe capacity efficient wake separation standards.

The next phase of the Wake Re-Categorization program is now underway. By 2014, this program will develop sets of tailored leader aircraft and follower aircraft pair-wise static wake separation standards whose application would depend on flight conditions and aircraft performance; resulting in being able to get more aircraft into and out of airports and in the same volume of airspace.

g. System Safety Management Transformation

This program provides research leading to a comprehensive and proactive approach to aviation safety in conjunction with implementation of NextGen capacity and efficiency capabilities. The implementation of these capabilities will require changes in the process of safety management, the definition and implementation of risk management systems, and management of the overall transformation process to ensure that safety is not only maintained but improved. A core foundation of the system safety transformation is the introduction of system-wide access and sharing of aviation safety data and analysis tools within the aviation community, providing safety resources that are integrated with operations of aviation industry stakeholders.

Capabilities to merge and analyze diverse sets of aviation information will be provided to expose and track precursors to incidents/accidents, allowing safety analysts within the FAA and aviation industry to understand emerging risks before they become potential safety issues. This research also enables safety assessments of proposed NextGen concepts, algorithms, and technologies and provides system knowledge to understand economic (including implementation) and operational and performance impacts (with respect to safety) of NextGen system alternatives. A demonstration will be conducted at a National Level. System Safety Assessment working prototype that will proactively identify emerging risks as NextGen capabilities are defined and implemented.

h. Operational Assessments

The Operational Assessment project focuses on two areas: Systems and Environmental Analysis.

The transition to NextGen requires NAS operational assessments to ensure that safety, environmental, and system performance considerations are addressed throughout the integration and implementation of NextGen. Such assessments are particularly important as the NextGen program evaluates current airspace design and develops new procedures to be implemented within the NAS. This project will continue to conduct system safety assessments, environmental-specific assessments, system performance evaluations, and risk management activities. This research will include initial NAS-wide assessment of methods to mitigate NextGen environmental impacts and developing cost-beneficial options to support decision making.

This research will also continue to explore integration of advanced performance assessment capability with NAS models for other NextGen programs. This project will contribute to system safety enhancements across the NAS, reducing aircraft emissions and noise, and improving capacity, efficiency, and delay reduction.

The focus of the Environmental program is to enhance local to NAS-wide environmental assessment capability within Aviation Environment Design Tool (AEDT) and within Aviation Environment Portfolio Management Tool (APMT) tools and to integrate environmental assessment capability with NAS design tools, simulation models and performance monitoring systems. It also involves application of NAS-wide environmental assessment models to assess environmental benefits of NextGen NAS-wide mitigation options for decision support. This environmental assessment capability will be used to support Environmental Management System so that evolving environmental state of aviation system can be continually quantified, appropriate targets can be developed and adjusted towards meeting NextGen environmental goals and the effectiveness of mitigation solutions can be quantified in order to develop guidance for adaptations.

NextGen environmental analyses require that external forecasts of operations, such as the FAA Terminal Area Forecast (TAF), be combined with fleet technology assumptions to generate future year fleet and operations sequences. The plan is to develop a fleet and operations sequence (FOS) module that is leveraged for U.S. NextGen analysis and compatible with Aviation Environmental Design Tool (AEDT) Regional and Aviation Portfolio Management Tool (APMT) Economics analysis requirements. This would include compatibility with the FAA TAF U.S. city-pair structure; and, once completed, would support the FAA Aviation Environmental Tools Suite and other aviation analysis tools.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The solution involves four areas of research and development – safety, capacity, human factors, and environment. The safety research includes expanding information sharing and data analysis to identify and mitigate risks before they lead to accidents. The capacity research develops new air traffic management systems to support NextGen measures and NextGen concepts to determine if they can achieve the targets for 2025; and develops flexible airspace categories to increase throughput. The human factors research provides higher efficiency levels in air traffic control and identifies the new role for controllers as more responsibility shifts to the flight crew. The environmental research explores new procedures, and adapts new technologies and fuels into the National Airspace System (NAS) to reduce emissions, fuel burn, and noise; and includes demonstrations, methods to adapt the current infrastructure, and estimates of costs and benefits.

4. How Do You Know The Program Works?

Projects in the Systems Development solution set encompass the entirety of the airspace and airports within the NAS. Since its beginning SYSDEV has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Human Factors (Efficiency/Air Ground Integration

- Completed Integrated NextGen En Route Workstation - Initial midterm NextGen En Route Workstation Human Factors Requirements
- Compeleted cross-cutting Automation Requirements - Initial Human Factors Automation Guidelines and Requirements
- Completed development of Initial Air/Ground Integration Simulation Roadmap

b. New ATM Requirements

- Delivered the latest version of FIP Severity and GTG2 to Aviation Digital Data Service (ADDS)
- Investigate the feasibility of ADS-B message content as an input for future Collision Avoidance Systems
- AAtS Final Integrated Operational and Technical Requirements Document

- Trajectory Synchronization Demonstration
- Final Airborne SWIM Concept of Use
- Initial Multifunction Radar Backend Architecture definition

c. Operations Concept Validation / Modeling
- Time Based Flow Management Integrated Research Plan
- Time Based Flow Management (TBFM) Transient Analysis Results on the effectiveness of various alternatives to mitigate the impact of transient events on TBFM
- Final Data Communications Segment 2 Requirements in support of data communications investment decisions

d. Staffed NextGen Tower (Staffed and Autonomous)
- Completion of Field Demo 2 at DFW
- Preliminary Program Requirements
- Updated concept of operations

e. Environmental Management System (EMS) and Advanced Emissions and Noise Reduction
- Application of EMS for NextGen to manage environmental performance and its development in coordination with stakeholders
- Assessment of NAS-wide benefits of aviation environmental standards for aircraft emissions and noise and market based measures
- Demonstration of control algorithms for environmentally and energy favorable gate to gate operational procedures
- Assessment and demonstration of NAS-wide benefits of CLEEN aircraft and alternative fuels technologies

f. Wake Turbulence Re-categorization
- New 6 Category air traffic control wake separation airport capacity enhancing standards submitted to ICAO; and, FAA has initiated the process for implementing them
- Concept for using Leader/Follower Pair-Wise Static air traffic control wake separation standards has been developed – potential additional airport runway capacity increase of 4 percent.

g. System Safety Management Transformation
- SSA - Baseline risk assessments for system-wide risks associated with current operations in (1) terminal area airspace (2) transition airspace or (3) en route airspace
- SMS - Design Approval Holder (DAH) SMS requirements

h. Operational Assessments
- AEDT Integration
- Updated NextGen cost analysis
- Updated NextGen benefits analysis
- Annual NextGen Performance Assessment
- Updated NextGen business case
- Analysis of the potential benefits of Collaborative Air Traffic Management (CATM), using a stochastic NAS-wide model incorporating Traffic Flow Management (TFM) procedures
- Improved modeling capability, incorporating Low Instrument Meteorological Conditions (IMC) representation, dynamic Ground Delay Program (GDP) representation, surface congestion model, and simple weather re-routes

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$61,000,000 is required to allow for continued execution of work within the System Development solution set. The FY 2013 work will support strategies to meet future aviation demand in an environmentally sustainable manner, reduce domestic curb-to-curb transit time by 30 percent and minimize the impact of weather and other disruptions to achieve 95 percent on time performance. System Development provides the research and development required to resolve these potential problems. In addition, an increase in demand could cause an increase in the number of accidents, aircraft noise and emissions, as well as the

ATC workload. With a reduction in funding, achievement of these targets and solving these issues by 2025 will not occur.

Detailed Justification for - **1A08 Next Generation Transportation System – Trajectory Based Operations**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 -- Next Generation Transportation System – Trajectory Based Operations (TBO) ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System – Trajectory Based Operations (TBO)	$39,560	$7,000	$16,500	+$9,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Modern Procedures (D - Side and R - Side)	---	$13,500.0
2. Oceanic Tactical Trajectory Management	---	3,000.0
Total	Various	$16,500.0

For FY 2013, $16,500,000 is requested for the following:

a. Separation Management- Modern Procedures

- Continue evolving En Route NextGen Mid-Term Baseline capabilities. Areas of capability research and analysis include:
  - Conformance monitoring for Area Navigation/Required Navigation Performance (RNAV/RNP) flights on RNAV/RNP routes based on the performance criteria adapted for the route
  - Integration of manual trial planning on the radar console

b. Trajectory Management- Oceanic Tactical Trajectory Management

- Tactical Trajectory Feedback/Oceanic Conflict Advisory Trial (OCAT)
  - Support Development of artifacts and transition activities of OCAT to ATO-E
- Controller Enhancements
  - Complete simulations and HITLs
  - Data Collection and Analysis Report
  - Initiate preparation for IARD

2. What Is This Program?

TBO is a shift from clearance-based control to trajectory-based control. Aircraft will fly negotiated trajectories, and air traffic control (ATC) moves to management by trajectory; the traditional role of the pilots/controllers will evolve due to the increase in automation, support, and integration. TBO focuses primarily on en route and oceanic operations, although the effects of TBO will be felt in all phases of flight.

Currently, separation is handled by controllers using radar screens to visualize trajectories and make cognitive operational judgments, with some automation decision support to help identify and resolve future conflicts. With an increasing diversity of aircraft characteristics, using a single set of equipment-based separation standards for all aircraft encounters is becoming increasingly inefficient and limits capacity. This is especially true for aircraft (such as Unmanned Aircraft System (UAS), A380) that may need larger separations to maintain overall airspace safety levels. Human limitations constrain efficiency and expansion of service as sectors have shrunk to the point of diminishing returns in many places. An ability to handle more diverse traffic, with fewer impacts to operator desired performance profiles, while lowering unit costs as needed.

a. Modern Procedures (D-Side and R-Side)

The performance-based concept calls for separation standards to vary according to aircraft capabilities and pilot training. This activity will result in a set of separation standards requirements and algorithms to implement them. This includes changes to automation, procedures, and training. This also funds an analysis of performance-based data processing to see if it is appropriate for lowering separation minima. Performance-based data processing is a way to integrate all information about an aircraft's path and location to provide full situational awareness and predict possible problems.

Developing new automation Conflict Alert (CA) and Conflict Probe (CP) algorithms and changing the controller workstations to support the new information are on the critical path of many NextGen technologies. Completion of this task enables successful completion of other TBO goals, as well as broader NextGen objectives.

Separation Management automation enhancements include concepts and technologies, performance enhancements to existing automation functions identified through development, deployment, and operational use of ERAM and predecessor systems. Pre-implementation activities include operational and technical risk reduction, and acquisition artifact development.

Separation Management includes all ATC automation capabilities that assist controllers in maintaining safe aircraft separation while optimizing use of airspace capacity. This project will apply pre-implementation processes to define, prioritize, sequence, and transition to implementation of the R-Side and D-Side controller capabilities and technology enhancements

b. Oceanic Tactical Trajectory Management (OTTM)

The Oceanic Tactical Trajectory Management program is a critical NextGen capability that addresses current performance gaps in the areas of capacity, productivity, efficiency, safety, and environmental impacts in the oceanic environment. OTTM represents a shift from clearance-based control to trajectory-based control.

- Aircraft-specific traffic flow management
- Increased management of flows at merge points
- Improved ATM through weather information integrated into decision support tools
- Decision support tools for the controllers resulting in improved efficiency and increased safety

Tactical Trajectory Feedback/OCAT will finish its operational trial and perform data collection and analysis to support the final trial initiative. It will also conduct all work in development of artifacts to transition the initiative to IARD and to ATO-E for implementation. Controller Enhancements will finish work on the HITLs and simulations and will begin the work required for IARD.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Flights are managed in today's system primarily by voice communication. Separation is handled by controllers using radar screens to visualize trajectories and make operational judgments. These judgments are turned into clearances often expressed as vector coordinates - all handled by two-way radio. Decision support tools aid the controller by predicting potential future conflicts and aid in evaluation but there effectiveness is limited by the use of voice – workload and voice limitations on complexity. Separation management remains much as it was when the radar was first introduced into the system. Human limitations constrain efficiency and expansion of service as sectors have shrunk to the point of diminishing returns in many places. A separation management that can handle more, diverse traffic, with fewer impacts to user desired performance profiles, while lowering unit costs is needed.

As demand has grown, especially in the airspace surrounding and between major metropolitan areas, the current fixed airspace routings and large separations limit airspace capacity and tactical management of major flows. En route congestion has become a major constraint on the system as the inflexibility of the system to airspace adjustments makes tactical flow in the face of demand congestion or major weather disturbances difficult. Due to the limitations in automated prediction capability and voice communication, separation standards remain, for the most part fixed and conservative, which restricts capacity to the overall system.

The current flight data management system and the current navigation systems do not support the flexibility that is needed from both a planning and execution perspective. Trajectory management means that true 4-D trajectories can be exchanged and monitored, and the system can support the exchange of multiple alternative trajectories in both separation management and tactical flow. This requires a capability beyond that of the current flight plan which was developed in an era of human only interpretation and planning. Trajectory management and full use of the airspace also requires that aircraft can navigate off fixed routes and that new routes can be developed and published with minimum distances between. Keeping aircraft on historic routings with historic between route separations limits the use of airspace capacity in general and specifically to address weather and congestion limitations.

4. How Do You Know The Program Works?

The TBO solution set encompasses all of the airspace and airports within the NAS. Since its beginning TBO has made great progress expediting the integration of TBO technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Modern Procedures (D - Side and R - Side)

- Deliver Separation Management Concept of Operations
- First Phase (FMC Route Offset, SAC, RA Position, Conflict Probe at Radar Position, Strip-less Non-Radar Operations) Concept of Use
- Phase 1 WJHTC Hardware Demonstration and Acceptance Test for ERAM Evaluation System (EES)

b. Oceanic Tactical Trajectory Management

- Deliver Concept of Operations (CONOPS) for In-Flight Operations Re-Profile Alert capability
- Conduct ADS-C Climb and Descent Procedure (CDP) Ops Trial

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$16,500,000 is required to continue work within the TBO solution set. The FY 2013 work will continue the shift from clearance-based to trajectory-based control. With an increasing diversity of aircraft characteristics, using a single set of equipment-based separation standards for all aircraft encounters is becoming increasingly inefficient and limits capacity, and with a reduction in funding work towards this shift will be greatly impacted. The ability to handle more diverse traffic, with fewer impacts to operator desired performance profiles will not be realized.

Detailed Justification for - **1A09 Next Generation Air Transportation System (NextGen) – Reduce Weather Impact (RWI)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 -- Next Generation Transportation System (NextGen) – Reduce Weather Impact (RWI) ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System (NextGen) – Reduce Weather Impact (RWI)	$21,444	$15,600	$16,600	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Weather Forecast Improvements	---	$14,600.0
2. Weather Observation Improvements	---	2,000.0
Total	Various	$16,600.0

For FY 2013, $16,600,000 is requested tol provide the following:

- Complete NextGen Weather Processor (NWP) Segment 1 document package for Final Investment Decision (FID)
- Obtain NWP FID decision
- Award NWP contract to a Vendor
- Initiate NWP solution development
- Complete NWP Government Furnished Information (GFI) package provided to Vendor
- NWP Solution Implementation activities begin
- Execute Project Management Best Practices
- Maintain 0-8hr convective weather forecast prototype operations (i.e., CoSPA) at selected ATC facilities to support TFM
- Maintain and deliver QMS reports and documentation
- Develop specifications for required input to air traffic management (ATM) Decision Support Tools (DST)
- Develop of international standards for forecast products,

b. RWI Weather Observation Improvements:

- Complete prototype demonstration of Flexible Terminal Sensor Network (FTSN) functionality, a NextGen capability that consolidates output from existing ground based weather observation systems (ASWON, LWAS, RVR, etc) and increases availability of such observations via SWIM/NNEW
- Begin system engineering activities for FTSN pre-production/qualification systems

2. What Is This Program?

RWI is a planning and development portfolio to ensure NextGen operational weather capabilities utilize a broad range of weather improvements and technologies to mitigate effects of weather in future National Airspace System (NAS) operations. This portfolio has two major elements: weather observation improvements and weather forecast improvements. The RWI portfolio will address many weather problems including, but not limited to, rightsizing the observations network, transition of aviation weather research to operations, development of weather impact metrics, development of weather decision support tools, integration of weather information into operations, weather processor architecture redesign and restructuring and transition planning for legacy systems. RWI will conduct planning, prototyping, demonstrations, engineering evaluation and investment readiness activities leading to an implementation of operational capabilities throughout NextGen near, mid and far terms. The RWI portfolio will leverage the weather infrastructure and access work completed under the NextGen Network-Enabled Weather (NNEW) program, which provides for improved interface and formats with NOAA's 4-D Weather Data Cube for universal common access to weather information.

a. Weather Observation Improvements

A consistent and effective aviation weather observation sensor network is fundamental to NextGen. The existing sensor network is comprised of aging, stand-alone capabilities that were not designed to meet the flexible, open and adaptable needs of NextGen. RWI weather observation improvements will manage the evolution of the existing capability to one that possesses the optimal quantity and quality of ground, air and space based sensors. Initial RWI-WOI activities included assessing the current sensor network capabilities and identifying gaps, with the primary focus on ground based sensors. Technical studies were conducted to identify economical methods to consolidate existing ground based legacy platforms, provide improved capability, and allow sensor outputs to be more universally available. The Flexible Terminal Sensor Network (FTSN) answers these needs and when fielded, will result in a homogenous network of ground sensing equipment that requires fewer resources to maintain and manage and is readily accessible to all NextGen users. Improvements to the aviation weather observation sensor network will be a collaborative effort between the FAA and other NextGen partners to include the National Oceanic and Atmospheric Administration (NOAA), and the Department of Defense (DoD).

RWI-Weather Observation Improvements is one of several complementary and interrelated weather investments that leverage each other to build integrated capabilities for the future. RWI-Weather Observation Improvements will optimize quality and accuracy, while RWI-Weather Forecast Improvements will enhance coverage, accuracy, real-time forecasting techniques, and translation techniques for weather integration support to users and DSTs.

b. Weather Forecast Improvements

The RWI-Weather Forecast Improvements support the need to improve weather decision making and use of weather information in the transformed NAS. The term "forecast" is used in this document to describe the assimilation of National Weather Service (NWS) forecast models into models that forecast the NWS impacts on aviation. RWI-Weather Forecast Improvements includes: 1) integrating weather information tailored for DSTs and systems into NextGen operations; 2) implementing improved flight impact forecasts through research transition of advanced forecast capabilities from aviation weather research; 3) developing and using metrics to evaluate the effectiveness of weather improvements in the NAS; 4) developing probabilistic forecasts of future flight impact that can be effectively used in air traffic and traffic flow management; and 5) determining the most effective solution for a processor architecture to support these capabilities. RWI will propose recommendations for near, mid and far time frames which will include a recommendation for transition of FAA legacy systems.

Collectively, the effect of the NextGen RWI portfolio will address the numerous stand-alone weather displays, eliminate cognitive interpretation of weather and impact assessments; and significantly decrease impact delays. NextGen RWI will redesign weather information to integrate with, and support decision-oriented automation abilities; and human decision-making processes.

DOT Strategic Goal - Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Most of the current sensor capabilities in the NAS are based on 70s-80s technology and have been in the field since that period. While the current observation network performs adequately, it is becoming increasingly costly to maintain. The practice of fielding sensing capabilities to address specific needs (stove pipe approaches) over time has resulted in a sensor network that is overly redundant. For instance in the NAS today there are currently six different types of visibility sensors supporting individual programs. This circumstance forces the FAA to pay to maintain a large inventory of different field replaceable units and provide power, telecommunication, training and other management costs for each sensor platform. Furthermore, information collected from current sensor platforms is tied to specific missions and not openly available to support new, dynamic sensing or advanced forecasting applications. Effective consolidation of today's sensing capabilities into a flexible sensor network will not only save agency resources, but provide the opportunity for improved service. Specifically, the currently fielded observation network lacks the capability to resolve and identify many types of precipitation, especially lacking is the ability to discern the type and intensity of frozen precipitation types. This significantly impacts the efficiency of winter weather/deicing operations. Consolidating and modernizing weather sensing capabilities will support the initialization of weather forecasts and alerts that monitor such hazards and ensure aircraft safety and increased capacity occur in the NextGen environment.

Current weather forecast infrastructure and abilities are inadequate to meet real-time needs of ATM DSTs, operational decision-makers and NextGen. Existing impact forecasts lack spatial resolution and time accuracy needed by users for decisions involving key weather phenomena impacting aviation. Current legacy information is in unusable form for integrated use in ATM DSTs e.g. icing and turbulence indices for the potential impact on aircraft treat the various types and configurations of aircraft differently. Weather forecasts for the same phenomena impacting aviation operations are often inconsistent, redundant, or are not accurate. Current legacy processing closed architectural systems are incompatible with one another. Legacy weather infrastructure is too limited and unable to ingest process and disseminate observation, forecast and modeling data to meet highly quality NextGen eight hour forecast abilities. Data quality and latency of information in Radar Mosaics needs to be improved. Existing legacy software is inefficient, difficult to modify and unable or incompatible to serve users across multiple domains. Current weather infrastructure is not up to an enterprise scale and unable to support NextGen integration requirements and greater societal demand. There are numerous stand-alone weather displays at facilities in the NAS that provide conflicting information.

4. How Do You Know The Program Works?

Capacity will be enhanced through better integration of weather information in operational decision making The combination of optimized weather observations, improved forecasts, probabilistic forecasts and translation into direct airspace constraints, will allow users to identify the best routes to fly for their aircraft type, flight plan and flying preferences, and for traffic flow management to optimize the airspace capacity given the weather constraints and demand. Overall, RWI provides tailored weather data for integration into decision support tools for collaborative and dynamic NAS decision making.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$16,600,000 is required to continue work within the RWI solution set. As stated above, RWI provides improved weather observations, weather impact forecasts, and weather constraint information for integration into decision support tools for collaborative and dynamic NAS decision making. It enables enhanced capacity by making fuller use of weather information for operational decision-making. This supports the optimal selection of usable airspace and precise spacing for arriving and departing aircraft. The increased accuracy of forecasts and improved observations enables the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace.

The FY 2013 work completes the investment analysis of the initial NWP infrastructure to re-host and streamline the current weather processing systems, designed to handle the addition of new weather products to support ATM decision-making; initiates NWP Solution Implementation which includes display consolidation; supports prototype demonstration activities for a flexible terminal sensor network capability for the surface observation network; and development of weather translation techniques to enable capacity and efficiency improvements in the mid-term through other NextGen solution sets including trajectory-based operations and collaborative ATM.

A reduction will impact the initial operating capability of NWP targeted for 2015, force the agency to fund costly support activities to preserve legacy ground sensor platforms, and delay the development and evaluation of weather translation techniques which can be used by ATM decision support tools and users in the mid-term (e.g., Time Based Flow Management, Surface Trajectory Based Operations).

Detailed Justification for - 1A10 Next Generation Transportation System – Arrivals/Departures at High Density (HD) Airports

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Transportation System – Arrivals/Departures at High Density (HD) Airports
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System (NextGen) – Arrivals/Departures at High Density (HD) Airports	$40,221	$12,000	$11,000	-$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Surface Tactical Flow	---	$8,000.0
2. Surface Conformance Monitoring	---	1,000.0
3. Time Based Flow Management (TBFM) Work Package 3	---	2,000.0
Total	Various	$11,000.0

For FY 2013, $11,000,000 is requested to provide the following:

a. Surface Tactical Flow

- Continue support to Terminal Flight Data Manager (TFDM) program AMS effort
- Continue technical transfer of mature surface capabilities to TFDM
- Continue Surface Trajectory Based Operation (STBO) field evaluations at Memphis and Orlando for the Airport Configuration, 2D Taxi Route Generation, and Collaborative Departure Scheduling tools
- Develop STBO Communication, Surveillance, Navigation, and Weather Requirements

b. Surface Conformance Monitoring

- Conduct field evaluation of Surface Conformance Monitoring (2D) at Orlando
- Update ConUse, Requirements, and ATC Procedures for Surface Conformance Monitoring (2D) at Orlando

c. Time Based Flow Management (TBFM) Work Package 3

- Continue to develop and refine concepts for TBFM WP 3
- Develop documentation to support TBFM WP3 acquisition management system requirements towards achieving an Investment Analysis Readiness Decision (IARD) in 2013 and Final Investment Decision (FID) in 2014. This documentation will include, concept of use, preliminary requirements, initial benefits information, initial cost data, and architecture artifacts

2. What Is This Program?

The Arrivals/Departures at High Density (HD) Airports initiative is a program focused on the development of trajectory-based terminal operations and flow management in support of NextGen. The primary goal of the HD initiative is to increase arrivals and departures in areas where demand for runway capacity is high or where there are multiple runways with airspace and taxiing interaction, and for close proximity airports with potential airspace/approach interference. The HD initiative expands on the capabilities of the Flexible Terminal and Airports program by developing traffic flow management (TFM) and metering technology to provide greater throughput. Major areas of focus will include: 1) HD corridors with reduced separation to provide trajectory based transitions to match airport arrival capacity; 2) Enhanced surface technologies to support Surface Trajectory-Based Operations; 3) Parallel Runway Operations with reduced lateral separation; 4) Taxi clearance and conformance monitoring for trajectory-based operations (TBO) and safety; and 5) Expansion of terminal separation procedures throughout the arrival and departure airspace (Big Airspace). HD operations encompass all operations from the gate to the en route structure and from the en route structure to the gate (Surface, Departures and Approaches). HD operations will require higher performance navigation and communication capabilities than those required for Flexible Terminal Airspace.

The Flexible Terminal and Airports initiative capabilities includes dynamically configurable airspace (flexible airspace) in conjunction with tailored arrivals and departures, development of "equivalent visual" approach procedures, digital aircraft communication (data link), surface trajectory management, low visibility taxi and departure operations, taxi conformance to enhance safety, and collaborative decision support tools to enhance capacity, safety and efficiency. A major metric of this program will be increased capacity without a corresponding increase in human resources.

In addition to the developmental activities within the Flexible Terminal and Airports, the initiative will also leverage many ongoing FAA programs, including Automated Dependent Surveillance-Broadcast (ADS-B), Area Navigation/Required Navigation Performance (RNAV/RNP), Traffic Management Advisor (TMA), Traffic Flow Management (TFM), System Wide Information Management (SWIM), and future automation interfaces and data communications efforts to provide greater capacity while balancing safety, security and environmental requirements.

a. Trajectory Management – Surface Tactical Flow

The Trajectory Management - Surface Tactical Flow project is focused on the development of trajectory-based surface operations in support of the NextGen initiative. It leverages ongoing FAA research using the Surface Decision Support System prototype platform and provides guidelines for the development of a collaborative Surface Traffic Management (STM) system with tools necessary to achieve a fully collaborative surface environment. This is required to safely improve the use of airport capacity which is necessary to enable trajectory based operations on the airport surface.

The NextGen Concept of Operations, authored by the Joint Planning and Development Office (JPDO), states that "4DTs [four-dimensional trajectories] may be used on the airport surface at high-density airports to expedite traffic and schedule active runway crossings." Achieving this vision will require a series of advances in procedures and supporting automation systems, and collaboration between air traffic control (ATC) and the flight operators.

This project will demonstrate and document requirements for a series of capabilities that build to the NextGen vision for surface trajectory-based operations. Examples include local data exchange, leading to the sharing of flight readiness information and collaboration, which will enable pre-planned runway schedules integrated with airborne trajectory-based operations. Surface flow management will reduce surface engine operating times, resulting in fuel-savings and reduced environmental impacts, and lead to collaborative resource allocation and avoidance of surface gridlock.

The Trajectory Management – Surface Tactical Flow project will require changes to procedures in the flight operator and ATC Tower (ATCT) environments. The concept and requirements development and acquisition process is designed to allow incremental steps toward the complete concept, providing benefits at each step of the way and remaining aligned with the introduction of other NextGen technologies. Testing and extraction of requirements will be realized through several phases.

b. Trajectory Management – Surface Conformance Monitoring

The Surface Conformance Monitoring - Taxi Conformance Monitoring (TCM) effort is designed to show the potential safety and workload benefits that can be achieved through a comprehensive taxi route management and conformance monitoring capability. The end state would allow a precise, unambiguous taxi clearance to be generated by the Air Traffic Controller, communicated to the aircraft via data link and conformance to the clearance monitored by automation in the ATCT. An important consideration is the development and demonstration of user-friendly, minimal-workload methods for the controller to specify the taxi route. Conformance monitoring can be limited to route adherence only, or both route and timing through the incorporation of timed check points. By using a proactive approach to separation on the airport surface, taxiing aircraft can be "de-conflicted" with other aircraft in the taxi, landing, and takeoff phases of flight, resulting in safer ground operations. The reduction in taxi time will support use of Trajectory-Based Operations (TBO) on the airport surface. In the future, Taxi Conformance Monitoring (TCM) concepts can be applied to staffed and automated virtual ATC towers.

The demonstrations and validation activities will:

- Demonstrate and validate procedures for TCM in an ATCT
- Evaluate performance of pre-established taxi routes vs. controller-generated taxi routes in a TCM environment
- Evaluate performance of prototype taxi conformance algorithms
- Demonstrate TBO on the airport surface

c. Time Based Flow Management (TBFM) Work Package 3

Trajectory Management – Time Based Flow Management (TBFM) will continue to modernize and enhance the current Traffic Management Advisor (TMA) System. Traffic Management Advisor (TMA) is a vital part of the NAS and enhances air traffic operations, by reducing delays and increasing efficiency of airline operations. TMA is an automation system currently available that enables the use of time-based metering to optimize the flow of aircraft as they approach and depart congested airspace and airports. TMA is already installed in the 20 Air Route Traffic Control Centers (ARTCC) and adapted for most of the major airports served by those centers.

Time Based Flow Management (TBFM) is an evolution of the Traffic Management Advisor (TMA) Program. This system uses Time Based Metering (TBM) software to optimize the capacity in the NAS. TBFM Work Package 3 will prepare for the follow-on phase, which focuses upon further leveraging time-based metering capabilities to implement NextGen concepts, such as terminal metering, expanding Tower scheduling of departures to additional locations, integrating surface data into TBFM calculations to improve departure scheduling, enabling the opportunity for optimized descents during metering operations, and making TBFM more flexible to accommodate dynamic reroute operations in response to changing weather conditions.

3. Why Is This Particular Program Necessary?

With increasing demand the need grows to achieve peak throughput performance at the busiest airports and in the busiest arrival/departure airspace. Capability improvement via new procedures to improve airport surface movements and improve overall tactical flow management into and out of busy metropolitan airspace is needed to maximize traffic flow and airport usage. Essentially the problem is getting the right aircraft to the right runway in the right order and time to minimize its individual impact on the system and maximize the use of these airports. Operations are conducted to achieve maximum throughput while facilitating efficient arrival and departure. Inefficiencies in any aspect of the operation reduces the total use of the capacity and, because of high demand, causes excessive compounding of delay.

4. How Do You Know The Program Works?

Arrivals/Departures at High Density (HD) Airports focus on the metroplex airports and terminal airspaces within the NAS. Since its beginning HD has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Surface Tactical Flow

- Technical Transfer of documents and associated artifacts of initial STBO capabilities to the FAA implementing organization

- Field Evaluation of Collaborative Departure Queue Management at Memphis
- Field Evaluations of Flight Operator Surface Application Version 2 Interface concept and Collaborative Departure Queue Management Version 2 concept and Weather Data Integration at Memphis and Orlando

b. Surface Conformance Monitoring

- Surface Conformance (2D) HITL Simulation
- Surface Conformance (2D) HITL Simulations – using hold short and give way instructions

c. Time Based Flow Management (TBFM) Work Package 3

- Previous work package completed an FID to implement TBFM, an update of TMA, to improve metering operations in the NAS
- Previous work package deployed coupled scheduling update to TMA software

5. Why Do We Want/Need To Fund The Program At The Requested Level?

For FY 2013, $11,000,000 is required to continue work within the Arrivals/Departures at High Density (HD) Airports solution set. The FY 2013 work will continue with the program's initiative to focus on the development of trajectory-based terminal operations and flow management in support of NextGen. A reduction in funding will slow down the achievement of the primary goal of the high density initiative to increase arrivals and departures in areas where demand for runway capacity is high or where there are multiple runways with airspace and taxiing interaction, and for close proximity airports with potential airspace/approach interference.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 40, 43, 38, 41, Surface

- Complete Surface Trajectory Based Operations (STBO) field evaluations of Collaborative Departure Scheduling and Time-Base Taxi Route Generation Tool at Memphis and Orlando and provide report detailing results of new capabilities

Detailed Justification for - 1A11 Next Generation Transportation System – Collaborative ATM

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Transportation System – Collaborative ATM ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System – Collaborative ATM (CATM)	$55,788	$24,000	$24,200	+$200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Strategic Flow Management Integration	---	$3,000.0
2. Strategic Flow Management Enhancement	---	3,000.0
3. Common Status and Structure Data	---	2,500.0
4. Advanced Methods	---	2,500.0
5. Flight Object	---	7,500.0
6. Integrated NAS Design and Procedure Planning	---	1,700.0
7. Collaborative Information Management	---	2,000.0
8. Systems Development – Information Management	---	2,000.0
Total	Various	$24,200.0

For FY 2013, $24,200,000 is requested to provide for the following:

a. Flow Control Management – Strategic Flow Management Integration (Integration Execution of Flow Strategies into Controller Tools)

- Conduct studies, analysis, high fidelity prototype and operational evaluations to define requirements and risk mitigation for implementation in En Route Automation Modernization (ERAM).

b. Flow Control Management – Strategic Flow Management Enhancement (Enhancing the Strategic Flow Program)

- Deliverables to support artifact development start in FY 2013 to support Investment Analysis Readiness Decision (IARD) in FY 2015
  - Preliminary Program Requirements Document
  - Enterprise Architecture Products and Amendments

c. Flight and State Data Management – Common Status and Structural Data (Separation, Tactical, Strategic Trajectory Management)

- Aeronautical Information Management (AIM) Modernization Segment 2 Final Investment Decision
- Demonstrate limited Airports Data Management capability to collect airport survey information
- Demonstrate limited Special Activity Airspace schedule collection capability

d. Flight and State Data Management – Advanced Methods

- Unified Flight Planning and Filing (UFPF)
  - Conducting engineering analysis to include the UFPF Benefit Justification Report, UFPF Evolution Strategy Report, and Evaluation Platform Plan for Unified Flight Planning and Filing/ Flight Information Exchange Model (UFPF/FIXM) demonstration

- Conduct a demonstration on UFPF/FIXM capabilities and analysis of demonstration results
- Update AMS Support – Enterprise Architecture (EA) Products Plan, EA Report, draft Functional Analysis Report
- Complete Concept and Requirements Definition (CRD) Readiness Decision Products – Independent Evaluation Review, Shortfall Analysis, Preliminary Program Requirements Review, ACAT level request form, ConUse, CRD Plan, recommend changes to EA

- NAS Common Reference (NCR)
  - Conduct demonstration on NCR and UFPF Interoeration in SWIM Environment
  - Conduct demonstration on NCR with Live Data Feed (Special Activity Airspace (SAA) and NOTAMS)
  - Complete Engineering Analysis to include the Concept Validation Plan for NCR and UFPF Interoperation in System Wide Information Management (SWIM) Environment Demonstration, the Concept Validation Plan for NCR with Live Data Feed (NOTAM, SAA) Demonstration, and Long-term Demo Framework Analysis for Demos 4, 5, and 6
  - Complete the Concept and Requirements Definition (CRD) Document
  - Develop NCR ConOps

e. Flight and State Data Management – Flight Object

- Conduct International Flight Object demonstration
- Develop Flight Object Data Dictionary v1.5
- Develop initial version of FIXM (Flight Information Exchange Model), in collaboration with NAS and International partners
- Draft the preliminary Flight Object Requirements Document
- Begin the CRD Decision for Flight Object and complete the IARD products
- Conduct Flight Object Working Group (FOWG) meetings
- Conduct a Flight Object Community of Interest (COI) day
- Complete the Flight Object Exchange System (FOXS) Requirements Document

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning

- Best Equipped Best Served Greenfield Analysis
  - Complete evaluation of new airspace and procedure design
  - Complete transition plan for possible implementation
  - Conduct Operational Trial for selection applications and capabilities
  - Identify sites for Operational Trials to validate the design and modeling results of the airspace and procedures as well as gain operational experience in the Best Equipped Best Served operational environment
- Greener Skies Research and Development
  - Complete transition of research to Greener Skies Design and Implementation team for implementation at the key site

g. Collaborative Information Management

- Research, analyze, and develop Unmanned Aircraft System (UAS) net-enabled applications
- Research, analyze, and develop Automatic Dependent Surveillance Broadcast (ADS-B) net-enabled applications

h. Systems Development – Information Management

- Identify information that needs to be shared to meet NextGen concept
- Develop a standard frame work to capture requirements for the sharing of information including required performance to achieve the expected operational outcome
- Establish an initial shortfall with respect to information management based on this analysis

2. What Is This Program?

CATM covers both the strategic and tactical interactions with the customers to manage demand when the desired use of capacity cannot be accommodated. CATM includes the flow programs as well as collaboration on procedures that will establish balance by shifting demand to less desirable capacity alternatives (e.g., routings, altitudes, and times). The major demand and capacity imbalances will be worked collaboratively between the air traffic managers and flight operators. Critical to enabling this capability is information distributed by System-Wide Information Management (SWIM).

CATM represents an opportunity to evolve towards a fully integrated and tactically managed ATM system exploiting the potential of system support in a closed loop environment, while increasing opportunities for the exploitation of technical systems by human operators.
Furthermore, CATM takes a first opportunistic step in addressing the need to change controller focus to network needs rather than individual aircraft, and airlines need to provide an optimum profile to be followed by the pilot, providing for system stability.

a. Flow Control Management – Strategic Flow Management Integration (Integration Execution of Flow Strategies into Controller Tools)

Flight planners or an operator's flight planning automation interact with a common flow strategy and trajectory analysis service, available to all NAS stakeholders, that enables common situational awareness of current and projected NAS status and constraints. In addition to having common services to understand the potential effects on a trajectory or the effects of a flow strategy, operators and the ANSP can collaborate on the selection of both capacity management and flow contingency management strategies that balance NAS performance objectives with Flight operators goals. All of the parties have a common understanding of overall national goals and desired performance objectives for the NAS. A transparent set of strategies is in place to achieve overall performance objectives, including airspace management to maximize capacity when demand is high and, as required, flow management initiatives to ensure safe levels of traffic are not exceeded when capacity limits are reached.

Strategic Flow Management Integration (Execution of Flow Strategies into Controller Tools) provides funding for the implementation of modifications needed to receive/process the Traffic Management Initiatives (TMI). These improvements include automatic identification to controllers of aircraft affected by Traffic Flow Management (TFM) TMIs, electronic communication of the TMI information in a timely manner to the relevant ATC operational positions, tools that help monitor how well aircraft are conforming to the TMI, and tools that suggest controller actions to achieve the flow strategy.

b. Flow Control Management – Strategic Flow Management Enhancement (Enhancing the Strategic Flow Program)

Currently, flow strategies developed from the various decision support tools used by the Traffic Management Units (TMU) are manually intensive because the tools are not integrated. Traffic Management specialists have to work out the impacts of multiple Traffic Management Initiatives (TMIs), and the solutions may not be optimal because the current tools do not support analyzing the linkages between multiple TMIs. This project would allow TMU specialists to automatically explore various reroute options and the impact of multiple TMIs and how they fit with efforts to accommodate NAS customer preferences. By automating this process, much more rapid flight reroutes can be developed, which would lead to fewer delays and less congestion.

The primary goal of Air Traffic Management (ATM) is addressing demand/capacity imbalances within the NAS. The FAA needs to improve implementing Traffic Management Initiatives (TMI) such as Ground Delay Programs (GDP), Airspace Flow Programs (AFP), Ground Stops (GS), Reroutes, and Miles-In-Trail (MIT). To improve TMIs, more sophisticated modeling capabilities will be used to assess the impact of implementing a combination of TMIs, determine the value of user feedback data, and project the impact of TMIs on overall NAS efficiency. The modeling results will be shared with the aviation community when evaluating these initiatives. Automate and enhance post analysis capabilities can feed the results back to the TMU originating the initiative. This project provides a solution that allows electronic negotiation with aviation users to manage congestion.

c. Flight and State Data Management – Common Status and Structural Data (Separation, Tactical, Strategic Trajectory Management)

The Common Status and Structure program provides the mission analysis and pre-implementation support for developing the aeronautical common service delivering special activity airspace static data and airport information including airport configuration static data.
Common Status and Structural Data (CSSD) will establish the requirements and information flows for the collection, management, and maintenance of aeronautical information in a digital format for machine to machine exchange and develop a business case acquisition packages to support AIM Modernization Segment 2 and Segment 3 Final Investment Decisions.

d. Flight and State Data Management – Advanced Methods

The Advanced Methods objective is to provide well defined and well understood methodologies to enhance Traffic Flow Management (TFM) capabilities. Specifically, two components of Advanced Methods, Unified Flight Planning and Filing (UFPF) and NAS Common Reference (NCR) address the Next Generation Air Transportation System (NextGen) Operational Improvement (OI) number 101102 – "Provide Full Flight Plan Constraint Evaluation and Feedback".

The UFPF integrates flight planning and flight filing through an iterative and continuous process that uses a common foundation of data and functionality. The UFPF enhances strategic flight planning, improve operational performance and reduce air traffic control (ATC) workload. The NCR is a virtual, multidimensional conceptual model that facilitates the storage, management, retrieval, filtering, and presentation of the various types of 3-D and 4-D geospatial and temporal information. The NCR harmonizes and integrates information from disparate systems connecting the data objects to one another via the spatial, temporal, and functional relationships among them, storing only the relationships that associate them to one another.

e. Flight and State Data Management – Flight Object

The Flight Object is a collection of common information elements that describe an individual flight, its capabilities, preferences and constraints
- The Flight Object is intended to be the future medium for capturing and sharing the most up-to-date information on any flight
- The Flight Object will serve as the single common reference for all system information about a flight
- A Flight Object is created for each proposed flight
- An information sharing mechanism, such as the Flight Object, needs to be developed to enable information sharing among various users and stakeholders in the NAS allowing for better coordination, situational awareness, and collaborative decision making

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning

Establish a systematic approach for NAS wide airspace procedure development to support the "Best Equipped – Best Served (BE-BS) Concept of Operations
- Development of the 'Greenfield' BEBS Approach will create airspace and procedures that allow for the operations of high end applications while accommodating legacy aircraft
- Research and development on methods to overcome challenges Performanced Based Navigation (PBN) procedure implementation such as the use of Required Navigation Performance (RNP) routes in conjunction with non-area navigation (RNAV) routes
- Study the use of Wide-Area-Multilateration to enhance the services provided at small non-towered airports

g. Collaborative Information Management

Currently, flight data for Unmanned Aircraft Systems (UAS) during both normal and abnormal flight conditions is not readily available for Air Traffic Control (ATC). Collaborative Information Management (CIM) aims to improve information flows to Air Traffic Control and assess the improvement provided to the controller.

Utilizing enhanced flight data such as aircraft intent and trajectories, as well as advanced airspace coordination concepts, CIM will analyze controller workload and ease of coordination in both normal and abnormal UAS flight conditions.

h. Systems Development – Information Management

Information Management will address issues that arise during the transition from a legacy environment controlled through physical connections and Interface Control Documents into a publish/subscribe using networked environment. It supports the move from data control into managing information from a business usage perspective. To address those issues, the program will:

- Identify information that will be shared in NextGen
- Develop framework to capture information requirements such as Quality of Service
- Create governance structures to manage information from a business perspective
- Analysis to allocate information dissemination responsibilities to the appropriate
- Complete requirements for tools and processes to monitor information performance in NextGen

3. Why Is This Particular Program Necessary?

The current system uses relatively blunt tools to manage demand and capacity imbalances. The tools do not "share" objectives for flights nor do they have a common picture of the structure and status of NAS. While great strides have been made in the management of flow, this lack of common objectives, status and structure constrains improvement. The system needs to minimize the over constraint demand and assure efficient operations once constrained. Constraining flights needlessly costs carriers and the traveling public time and money. On the other hand, failing to accurately forecast constraints and manage demand when they are warranted also generates costs. Users have limited ability to specify their preferred alternatives when a constraint is required; creating a need to allow input from users on resolving imbalance issues.

The overall philosophy driving the delivery of CATM services in NextGen is to accommodate flight operator preferences to the maximum extent possible and to impose restrictions only when a real operational need exists, to meet capacity, safety, security, or environmental constraints. CATM strives to adjust airspace and other assets to satisfy forecast demand, rather than constraining demand to match available assets. If constraints are required, maximizing user opportunities to resolve those constraints, based on their own preferences, is a goal.

4. How Do You Know The Program Works?

CATM encompasses the airspace and airports within the NAS. Since its beginning CATM has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Strategic Flow Integration

Execute risk reduction activities:

- Conduct technology transfer to development contractors the knowledge and experience of storyboard analysis and lab evaluation for risk reduction
- Develop hi-fidelity prototyping and perform operations evaluation to validate requirements for implementation

b. Strategic Flow Enhancement

- Concept and Requirements Definition Readiness (CRDR) Decision Point (DP) 354
- Investment Analysis Readiness Decision (IARD) DP 355

c. Common Status & Structure Data

- Development of Aeronautical Common Services Requirements
- Demonstrations and Test Deployments

- AIM 2 OMB-300 Package

d. Advanced Methods

- UFPF Evaluation Model Platform Plan
- NCR Demonstration

e. Flight Object

- Flight Object Data Dictionary
- Flight Object Data Model and XML Schema
- Flight Object Evaluation Platform and Model
- Flight Object Engineering and Requirements
- Flight Object Industry & International Collaboration

f. Integrated NAS Design and Procedure Planning

- Best Equipped Best Served Performance Assessment Plan
- Best Equipped Best Served 'Green Field' Approach Analysis
- Green Skies Independent Approach Feasibility Analysis for Phase 1 of approach into SeaTac
- ADS-B Interval Management Flight Trials

g. Collaborative Information Management

- AAI Shadow Unmanned Aircraft System (UAS) Flight Management System (FMS)/4D Trajectory Based Operations (TBO) Capability Integration and Upgrade in NIEC/UAS M&S Suite
- Integrate and Test NIEC/UAS M&S Capabilities with Standard Terminal Automation Replacement System (STARS) Laboratory
- AAI Shadow Human in the Loop (HITL) Simulation
- Shadow "Dry Run" Simulation for Live Flight
- Shadow Live Flight at Warren Grove, New Jersey
- Test Plan for Flight Demo 7
- Publish Draft Concept of Operations (CONOPS) of Net-Enabled UAS Applications
- Publish Draft Demonstration Plan of Net-Enabled UAS Operations

h. Information Management

- Program has not started

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$24,200,000 is required to continue execution of work within the CATM solution set. The FY 2013 work continues to cover both the strategic and tactical interactions with the customers to manage demand when the desired use of capacity cannot be accommodated. CATM will continue to execute flow programs as well as collaborate on procedures that will establish balance by shifting demand to less desirable capacity alternatives. If funding in CATM is reduced, the opportunity to evolve towards a fully integrated and tactically managed ATM system will be slowed.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 35, Cruise, 7b, 8, 46, 47, Integrated ATM

- Demonstrate prototype Special Activity Airspace Editor
- Conduct studies, analysis, high fidelity prototype and operational evaluations to define requirements and risk mitigation for implementation in ERAM
- Investment analysis readiness decision (IARD) for CATMT Work Package 4

Detailed Justification for - **1A12 Next Generation Transportation System – Flexible Terminals and Airports**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Transportation System – Flexible Terminals and Airports ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System – Flexible Terminals and Airports	$57,372	$33,300	$30,500	-$2,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Wake Turbulence (Departures)	---	$4,000.0
2. Wake Turbulence Mitigation for Arrivals	---	1,000.0
3. Surface/Tower/Terminal System Engineering	---	9,000.0
4. Future Communication Infrastructure	---	1,000.0
5. Approaches, Ground Based Augmentation System	---	3,000.0
6. Closely Spaced Parallel Runway Operations	---	2,000.0
7. Approaches, NextGen Navigation Initiatives	---	1,500.0
8. Alternative Positioning, Navigation, and Timing	---	4,000.0
9. Trajectory Mgmt - Arrivals	---	3,000.0
10. Reduced Runways Visual Range	---	2,000.0
Total	Various	$30,500.0

For FY 2013, $30,500,000 is requested to provide for the following:

a. Wake Turbulence Mitigation for Departures (WTMD)

- Completion of benefit and safety assessment documentation
- Completion of evaluation report and documentation for investing in seven additional WTMD airports
- Support to change over to WTMD Implementation design
- Develop additional sites for weather data analysis and wind forecast algorithms performance
- Continued support for WTMD Implementation design changes and integration into four additional airport operations
- Develop simulation environments for the next four WTMD candidate airports – with controller familiarizations
- Regional installation and checkout for WTMD at three ATCTs
- Develop WTMD controller and technician training package for four WTMD airports and conduct training
- Setup T1 lines for four additional airports
- Provide regional planning the next three airports

b. Wake Turbulence Mitigation for Arrivals (WTMA)

- Engineering development of WTMA information displays, NAS interfaces and associated IRDs
- WTMA Weather data analysis and wind forecast algorithms performance, use of aircraft wind data
- Finalize WTMA-Procedural (WTMA-P) Automatic Terminal Proximity Alert (ATPA) software, procedures, and Noise Compatibility Program (NCP) for candidate airport
- Begin operational use of WTMA-P at candidate airport

c. Surface/Tower/Terminal Systems Engineering (TFDM)
- Continue with prototype development, demonstration, and acquisition of the Terminal Flight Data Manager (TFDM) system
- Achieve a successful Final Investment Decision (FID) for the core TFDM system
- Perform evaluation of TFDM prototype at a 2nd site
- Demonstrate TFDM enhancements derived from DFW demonstrations
- Demonstrate adaptability of TFDM at atIAD
  - Demonstrate ASDE-X Surface Surveillance data, enhanced displays and alerts integrated with flight data
- Demonstrate 2-Way Flight Data exchange between TFDM and ERAM
- Demonstrate TFDM in an operational Air Traffic environment with live data
- Perform Technology Transfer of initial Surface Trajectory-based Ops Decsions Support Tools (DSTs) into TFDM prototype and acquisition
- Validation plans, procedures, and results for TFDM Core functions and near term DSTs
- Document requirements validation result for transfer to production contractor resulting in validated detailed TFDM requirements (algorithmic, performance, etc)

d. Future Communications Infrastructure
- Develop Investment Analysis Documentation
- Investigate Flexible Airborne Architecture

e. Approaches, Ground Based Augmentation System (GBAS)
- Testing of commercially developed Radio Frequency Interference (RFI)-Robust GBAS Category III Prototype Ground System
- Requirements development for RFI-Robust GBAS Category III prototype avionics
- Review of System Design Approval (SDA) artifacts by the GBAS technical team, leading toward Non-Federal GBAS CAT III approval in FY 2016

f. Closely Spaced Parallel Runway Operations (CSPO)
- Deliver RNAV/RNP (GPS) Interim Report
- Deliver WAAS/LAAS Interim Report
- Deliver SAT/NAV/ILS w/ High Update Radar (HUR) Interim Report
- Update Modeling & Simulation Toolset
- Deliver Triple/Quad Approach Interim Report
- Continue Simplified Aircraft-Based Paired Approaches (SAPA) algorithm development
- Deliver SAPA interim report

g. Approaches, NextGen Navigation Initiatives
- Advanced NextGen Navigation
  - Business Case Analysis
  - Alternatives Analysis
  - DME Testing Analysis
- Terminal RNAV DME-DME
- Business Case Analysis
- Alternatives Analysis
- DME Testing Analysis
- Perform Operational Site Testing and Demonstrations
- Update the National Standards
- Acquisition Management System (AMS) Process
- Surface Navigation
- Business Case Analysis
- Alternatives Analysis
- DME Testing Analysis
- Performance Requirements and Finalization of Alternative Analysis/Historical Data Review
- In-house Prototype development

h. Alternative Positioning, Navigation, and Timing
- Update operational assumptions for PNT needs in the NextGen future environment

- Define basic alternatives for further research to include Enhanced DME, Wide Area Multilateration (WAM), and Pseudolite
- Update coverage predictions, identify shortfalls, assess potential accuracy, integrity, availability, continuity and time-to alert (TTA)
- Assess security technology, common time reference, future radio frequency interference (RFI) environment
- Award study contract(s) to develop prototypes for all three alternatives
- Prepare Shortfall Analysis, functional analysis, TBO scenarios, preliminary performance requirements, and operational concept scenarios
- Prepare operational safety analysis (OSA), safety requirements for integrity, continuity, and TTA, top-level designs, estimate performance and cost for full scale development

i. Trajectory Management – Arrivals

- Complete evaluating the ability of aircraft to accurately meet vertical constraints and required time of arrival
- Complete evaluating the advantages and disadvantages associated with imposing vertical constraints and required time of arrival in different congestion scenarios from the aircraft operator and ATM perspectives
- Complete evaluating DataComm for aircraft messaging for Required Time of Arrival (RTA), reroutes, and waypoint verification data integrity
- Evaluate ground merging and sequencing tools that will employ control by time of arrival (identify enabling requirements)
- Human factors analysis shifting to control by time of arrival through controller-in-the-loop simulations and field trials
- Analysis of human factors and flight deck automation requirements to minimize errors and provide integrity assurance
- Seek certification approval of initial TBO procedures/scenarios
- Draft Plan for limited implementation (includes new RNAV/RNP route requirements if needed)

j. Trajectory Mgmt - Reduced RVR Minima

- Analyses of all qualifying runways in NAS
- Single Thread Airports
- SA Cat II Service APs
- RVR1800

2. What Is This Program?

Flexible terminal airspace and airports encompasses the majority of the terminal operation areas and airports within the National Airspace System (NAS). It is anticipated that all high-density terminals and airports will be capable of flexible operations when demands warrant. At terminals and airports where traffic demand decreased from high-density to a lower density, the operations will "flex" or transition to lower density operations. Lower density operational requirements are not as stringent as high-density operations affording greater access to a wider class of users, while still maintaining equivalent levels of safety and efficiency. Both trajectory-based and classic operations may be conducted within flexible terminal and airports. It is anticipated that a significant number of airports will not change from their current operation.

Flexible Terminals and Airports include activities to improve both pilot and controller situational and the general use of Area Navigation/Required Navigation Performance (RNAV/RNP) routings. Operations within flexible terminal airspace and airports are a mix of Instrument Flight Rule/Visual Flight Rule (IFR/VFR) traffic with aircraft types ranging from airline transport to low-end general aviation. Airports in these areas are towered and non-towered, depending on the traffic demand. In the future, many of these airports will experience higher traffic demand due to a migration of air traffic to smaller satellite airports in high population areas in the effort to avoid traffic congestion. In addition, there is a renewed interest in personal transportation including the increase in personal aircraft for pleasure and business and the emergence of on-demand air taxi services utilizing very light jets (VLJs). The Flexible Terminal and Airports initiative will meet the requirements of both the high and non-high density terminals and airports. It is anticipated that some low density/low complexity (usually class C and D) airports will remain classic.

a. Wake Turbulence Mitigation for Departures (WTMD)

The WTMD decision support tool will enhance Air Traffic Organization (ATO) wake mitigation separation service capabilities. Air traffic control's (ATCs) wake turbulence mitigation procedures are a major constraint on the departure operations at airports which use their closely spaced parallel runways for departing Boeing 757 and "heavy" category aircraft. Presently, aircraft must wait a minimum of two minutes to depart after the departure of a Boeing 757 or "heavy" category aircraft on the adjacent closely spaced parallel runway and must wait a minimum of three minutes if the departure thresholds of the closely spaced parallel runways are staggered more than 500 feet. Wake research has shown that if a favorable cross wind is present, the wakes from aircraft departing on the downwind closely spaced parallel runway cannot transport over into the path of aircraft departing on the upwind closely spaced parallel runway. The WTMD decision support tool will provide tower controllers' notification when they can safely allow departures on an airport's closely spaced parallel runways without the mandatory two to three minute wait time following a Boeing 757 or "heavy" category aircraft departures on the adjacent runway.

The WTMD program is being accomplished in two phases. The first phase is developing an operationally mature WTMD prototype and installing it in the air traffic control towers (ATCTs) of George Bush Intercontinental/Houston Airport (IAH), Memphis International Airport (MEM) and San Francisco International Airport (SFO) for operational use and evaluation. The WTMD evaluations at the these airports will be completed in FY 2013 and based on its performance as an airport capacity enhanced tool, a decision will be made to further deploy the WTMD capability to the remaining seven candidate airports; which would be the second phase of the WTMD Program and is funded by this budget request.

b. Wake Turbulence Mitigation for Arrivals (WTMA)

This program will evaluate air traffic control decision support tool concept feasibility prototypes as possible enablers to safely meet the predicted NextGen demand for additional flights in the nation's air transportation system. If these prototypes are successful, more flights can be accommodated in airport approach corridors because the required wake mitigation separations between aircraft can be safely reduced. This program is taking the results of technology research and development and new wake separation concept modeling and simulation efforts; and, evaluating the resulting concept feasibility prototypes for flight safety and impact on the NAS capability for meeting the demand for more flights.

Evaluation of the prototype WTMA decision support tool, based on predicted and monitored winds along the approach corridor, will complete in FY 2013 and requirements for implementing the WTMA capability will be developed. The WTMA tool would be used by controllers in reducing wake separations imposed on aircraft following behind Boeing 757 or "heavy" category aircraft when landing on an airport's set of closely spaced parallel runways (runways less than 2,500 feet apart). Research is ongoing in Europe for developing a similar solution for aircraft landing directly behind each other on a single runway. An evaluation of that capability will be accomplished by this program in future years.

c. Surface/Tower/Terminal Systems Engineering (TFDM)

The primary goal of this activity is to provide engineering analyses, operational field evaluations and benefit assessments that will support Terminal NextGen capabilities. Concept engineering analysis of proposed Terminal Radar Approach Control (TRACON), Tower and Surface traffic management capabilities will be performed to determine which concepts are most beneficial to improve efficiencies, reduce controller workload, enhance situational awareness, to safely increase capacity, reduce traffic delays, lower costs and reduce impact on the surrounding environment. As a result, a new automation platform, Terminal Flight Data Manager (TFDM), will be introduced in the tower environment, integrating flight data, surveillance data, controller traffic manager decision support tools, data exchange with airports, airlines and traffic management, and consolidating existing tower equipment.

The expected outcome of these efforts will result in enhanced capabilities that provide more efficient, safer movement and control of air traffic in the Terminal domain. This will also ensure smoother transition into and out of the Terminal airspace in support of consolidation of airspace and provide guidance for implementing projects as part of the NextGen Concept of Operations.

In previous years, the enabling technologies/information was assessed and methods developed for gathering data, integrating information (i.e. Flight data, clearance (taxi/takeoff) information, surveillance information, user (aircraft/pilot/AOC/airport operators)) and receipt/acceptance of that data. Based on these capabilities, a series of decision support tools were identified. These tools, integrated into the TFDM platform, will enhance/optimize airport surface traffic management efficiency, mitigate risk of safety related incidents, and significantly improve the overall movement of air traffic in the Terminal environment.

d. Future Communications Infrastructure

The Future Communications Infrastructure contains communications projects in both the C and L bands. The C-band program of Future Communications is planning to evaluate selected mobile and fixed applications of the aeronautical mobile airport communications system (AeroMACS) communication network in the NASA-CLE airport test bed for future provisioning of both safety critical and advisory services. The program also plans to validate that the proposed AeroMACS can provide the required capabilities for a selected mobile application (e.g. loading FMS at the gate), and a fixed application (e.g. migration of point-to-point links to the AeroMACS). Other activities encompassed within the C-band communications include the following:

- Investigate the network capabilities required for the AeroMACS to comply with SWIM Oriented Architecture (SOA) requirements to support Net Centric applications
- Augment the C-Band channel plan for allocation of safety and regularity of flight services via the AeroMACS within the additional 30 MHz of AM(R)S spectrum to be proposed by the U.S
- Validate that the proposed AeroMACS complies with interference requirements for the US proposed additional 5,000-5,030 MHz band allocation
- Provide the interference models and data to support US position requesting additional AM(R)S spectrum at World Radio Communications Conference in 2012
- Conduct safety/certification analyses to support appropriate infrastructure implementation decisions by the FAA
- Support International Standards approval process at ICAO
- Investigate a Flexible Airborne Architecture Concept including a Software Defined Radio

The plans for L-Band Communications include collaboration with EUROCONTROL on technical assessment of L-DACS to ensure that proposed solutions meet potential US needs beyond the capabilities of the FAA's Data Communications program. L-Band also plans to establish an operational capability to characterize the performance of the L-DACS prototype and conduct services demos/trials. Lastly L-Band will develop recommendations for joint FAA/EUROCONTROL standards for L-DACS option for potential augmentation to future US en route air/ground communications capabilities.

e. Approaches, Ground Based Augmentation System

The Local Area Augmentation System (LAAS) is the United States implementation of internationally accepted standards for Ground Based Augmentation System (GBAS) Cat I (GAST-C) services. GBAS is intended as an alternative to ILS with multiple technical, operational, and maintenance advantages over ILS. GBAS is intended to augment the current Global Positioning System (GPS) service for Category I/II/III precision approaches. LAAS, however, was determined not to be a cost effective replacement for FAA Category I ILS. A GBAS CAT I design, the Honeywell SLS-4000 was subsequently approved in September 2009 as a non-Fed system for use within the NAS. While an SLS-4000 was being installed at Newark New Jersey, radio frequency interference (RFI) on GPS was encountered, preventing the operational use of this system as intended. Subsequently the FAA and GBAS vendor has deployed an upgraded version of SLS-4000 (Block I) at Newark to mitigate RFI caused by personal GPS jamming devices. The FAA is supporting system testing of the upgraded system at Newark with CAT I operational approval at Newark planned for summer 2012.

A CAT III SATNAV solution is still desired worldwide, and led to the development of ICAO standards for CAT III GBAS, which have been published and are in the validation phase. The CAT III GBAS was designed for CAT III from the start, with the CAT I system design and approval completed as a stepping stone toward CAT III approval. The FAA work being completed leverages the CAT I design and will be used to validate the ICAO GBAS CAT III requirements.

An FAA-owned SLS-4000 installed in Atlantic City International Airport (ACY) will continue to be used as an interim platform to develop and validate Category III requirements under this project. Support will be provided for non-Fed services providers at Newark NJ and Houston TX. Alternative architectures for potential development and procurement to provide future GNSS Category II/III services will be investigated during this work. Modifications will be investigated to produce a system that will operate with minimized interruption during periods of GPS interference.

The project goal is to support development of a commercial prototype of a CAT III GBAS capability for validation testing with an option of the vendor to seek a CAT III non-Fed approval using the developed baseline.

The Department of Defense (DoD) also plans to implement GBAS - Technology in their Joint Precision Approach and Landing System (JPALS) program. Civil interoperability is a "Key Performance Parameter" to this DoD system. The FAA will support DOD developments, facilitating technology transfer as applicable.

f. Closely Spaced Parallel Runway Operations

The Separation Management - Closely Spaced Parallel Runway Operations (CSPO) initiative will accelerate activities to provide increased arrival, departure and taxi operations to airports with closely spaced parallel runways in all weather conditions. This initiative will enhance procedures that allow dependent operations to closely spaced parallel runways or converging approaches to runways closer than 2,500 feet, as well as supporting independent operations to parallel runways between 2,500 feet and 4,300 feet.

g. Approaches, NextGen Navigation Initiatives

This program supports NextGen goals related to maintaining/improving capacity during instrument meteorological conditions (IMC), and focuses on improvements supporting both the terminal and approach phases of flight as well as improving situational awareness on the airport surface. There are two main program elements addressing each of these areas.

The first program element supports the use of Distance Measuring Equipment (DME) - DME area navigation (RNAV) down to 1,000 feet above ground level (AGL) without the need for an inertial reference unit (IRU). Implementation of performance-based navigation is a NextGen goal. The success of this work will allow fuller implementation of RNAV including aircraft other than air carriers and high end business jets. Current research and testing may lead to significant changes to the National Standard for DME usage within the United States, last updated in 1982. Today, to implement DME-DME RNAV requires the spectrum office to perform a case-by-case work on each runway to plan out expanded service volumes. The results of this work could allow each DME to have an expanded service volume over what is possible today, greatly enhancing the NAS capability. Research and testing is focused on determination of what technical issues are required to allow for DME-DME RNAV without IRU. Work with Systems Operations may lead to a better definition of airspace, with the potential to increase the airspace volume around certain airports.

The second program element is focused on improving situational awareness on the airport surface. Improving situational awareness for aircraft on the taxiways and runways will increase traffic flow and is also a NextGen goal. This program element will leverage the capabilities of existing systems to the extent possible and explore how new pilot-avionics interfaces may be used to deliver service to the cockpit. Systems to be leveraged include: Automatic Dependent Surveillance-Broadcast (ADS-B), Airport Surface Detection Equipment, Model X (ASDE-X), Global Positioning System (GPS) augmentation systems i.e. the Local Area Augmentation System (LAAS) and Wide Area Augmentation System (WAAS), and other systems providing RNAV and RNP. This program element will also coordinate with existing efforts by the surface movement working group.

h. Alternative Positioning, Navigation, and Timing (APNT)

Many of the NextGen operational improvements (OIs) depend on position, navigation, and timing (PNT) services to enable area navigation (RNAV), and required navigation performance (RNP). This means there is a greater dependence on GPS-based PNT. National Policy requires (National Policy HSPD-7/NSPD-39) that the FAA to provide a backup in the event of a Global Positioning System (GPS) interference event or outage to maintain safety and security and preclude significant economic impact.

Today's APNT consists of legacy VOR, DME, TACAN systems that will not fully support RNAV and RNP or TBOs. The NextGen APNT project will investigate three alternatives to provide a back up for GPS. It will investigate Enhanced DME, Wide Area Multilateration (WAM), and Pseudolites (PL).

i. Trajectory Management- Arrivals

The enablers for Trajectory Management which are - RNAV/RNP with 3D and Required Time of Arrival program will ensure that the safe and efficient transition of aircraft from en route to terminal airspace with appropriate sequencing and spacing. Several key mechanisms such as RNAV/RNP procedures with vertical constraints and required time of arrival will greatly improve the precision of the transition. Metered times at key merge points will be used by air traffic managers (as used today in Center-TRACON Automation System Traffic Management Advisory (CTAS TMA) systems. For this type of operation, an aircraft's meter point time (MPT) is assigned to determine when it enters into the TRACON airspace so it can be efficiently routed to the assigned runway. Metering will take into account runway load balancing and will serve to reduce (not eliminate) the need for delay absorption needed for aircraft inside the TRACON airspace.

As the FAA transitions to NextGen, aircraft will increasingly be assigned to RNP/RNAV routes and have modern avionics that include Flight Management Systems (FMS) capable of executing Required Time of Arrival (RTA) instructions. The RTA capability provides a time-based control mechanism that supports the trajectory-based operations concept. In particular, RTAs will be used for the management of arrival traffic to an airport. Time-based metering can be used for managing arrivals at an arrival-oriented waypoint (such waypoints could be established for top-of-descent, an arrival fix during the descent, or arrival at the runway threshold). The use of RTAs will take advantage of existing capabilities expected to become more widespread throughout the fleet. The FMS in the aircraft computes the most efficient change to the original trajectory to meet the RTA. In addition, the FMS can "independently self deliver" to the RTA, thus reducing significantly the coordination needed between the user and ATC. Finally, since the FMS actively and directly "controls" the aircraft to meet the RTA, very accurate arrival is possible with minimal human intervention.

j. Trajectory Management - Reduced RVR Minima

The NAS incurs numerous flight delays and schedule interruptions due to weather each year. Weather conditions create low visibility conditions that require Instrument Flight Rules (IFR) to go into effect. Even for those aircraft with suitably trained crew and equipage, conditions may worsen, causing flight diversion, flight cancellation, or flight delays -- each of which can result in a cascading ripple effect that can spread throughout the NAS, even to areas where weather is not an issue. There are periods of low visibility when the aircraft cannot takeoff or land at their desired airport resulting in the following conditions.

- Decreased numbers of arrivals/departures at high density airports
- Increased flight delays, cancellations, and/or diversions under IFR low visibility conditions
- Decreased capacity for airlines to schedule flights in marginal weather conditions (since both the primary and alternate routes must be approved within the flight plan)
- Decreased flexibility/potential congestion in the terminal environment
- Under-utilization of alternate airports (airlines have indicated they could use these more if the alternate airports had increased capability)

These problems can limit or prevent access to airports in IFR conditions, resulting in congestion and delay in the NAS. Even under Visual Flight Rules (VFR) access to airports and utilization of airspace can be made more flexible, particularly in the terminal environment. Therefore, lowering required RVR minima will improve capacity during low visibility operations by allowing runways that would otherwise be unusable to continue to support airport operations.

Benefits are related to increased access to airports in low visibility conditions for Category I, Category II, and Category III. This work is reflected in the Navigation Roadmap, a component of the FAA's Enterprise Architecture. It is also tracked as part of Operational Improvement (OI) 107119, Expanded Low Visibility Operations Using Lower RVR Minima. This work is part of the effort to bring improved capabilities through the prudent lowering of the RVR requirement by acknowledging benefits provided by cockpit equipment and crew training. Other benefits of Special Authorization Category II capability is increased continuity of service during unexpected outages. Additionally, provision of SA Category II can be achieved with great savings on the lighting systems (nominally $5-6 million per site if new systems are being put in). Navigation Services support is required when additional RVR work is required to support these operations at a specific runway. Navigation Services and Flight Standards are coordinating closely on these efforts.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Flexible terminal operations are a mix of IFR/VFR traffic with aircraft types ranging from airline transport to low-end general aviation. Airports in these areas are towered and non-towered, depending on the traffic demand. In the future, many of these airports will experience higher traffic demand due to a migration of air traffic to smaller satellite airports in high population areas in the effort to avoid traffic congestion. In addition, there is renewed interest in personal transportation including the increase in personal aircraft for pleasure and business and the emergence of on-demand air taxi services utilizing very light jets (VLJs).

Inflexible airspace structures, reservations and routes have resulted in the inefficient use of airspace and the airports themselves. The continuing growth of aircraft air and ground movement is projected to exceed the capacity of the system, causing serious delays and gridlock. This has required the need for improved terminal area management.

4. How Do You Know The Program Works?

The Flexible Terminal Environment encompasses the majority of the terminal operation areas and airports within the NAS. Since its beginning FLEX has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Wake Turbulence Mitigation for Departures
- Prototype of WTMD demonstration system completed at William J. Hughes Technical Center
- Deliver WTMD demonstration to first site (IAH)
- Deliver WTMD training package for controller to first site (IAH)
- Deliver WTMD demonstration to second site (SFO)
- Deliver WTMD demonstration to third site (MEM)

b. Wake Turbulence Mitigation for Arrivals
- Complete initial WTMA feasibility prototype evaluation using implementation on chosen simulated automation system
- Complete initial wake vortex analysis at selected airports (SFO, ATL, JFK) for WTMA study

c. Surface/Tower/Terminal Systems Engineering
- DFW Prototype Demonstrations
  - Successfully completed the DFW Prototype Demonstrations on Schedule in 2010-2011
  - TFDM Prototype Development transitioned from FFRDC to industy partner
- Second site Prototype Site Evaluation
  - IAD prorotype Installation on track for 2012
- TFDM Initial Investment Decision (IID)
  - Received an Investment Analysis Readiness Decision (9/2010)
  - Established a positive cost/benefit Ratio
  - Currently on track for an IID in FY 2012
- Previous Research results
  - Completed Human In the Loop (HITL) simulations over multiple years
  - Technology transfer from Surface Trajectory-Based Ops FAA program
  - Additional Technology Transfer from NASA
  - Implemented similar technologies internationally

d. Future Communications Infrastructure
- AeroMACS Demonstration Performed
- AeroMACS Profile Developed
- AeroMACS Interference Analysis Conducted

e. Approaches, Ground Based Augmentation System
- Completion of Preliminary IARD artifacts
- Commercial CAT III Ground Prototype development
- CAT III Avionics Prototype development
- RFI-Robust Commercial CAT III Ground Prototype development
- GAST-D SARPS Validation
- GAST-D (CAT III) Non Fed System Design Approval (SDA)

- RFI Mitigation Investigation Airport Assessment
- SLS-4000 Block I Change Non Fed SDA
- Newark GBAS RFI Modification Report
- RFI Detection System Test Report: Newark
- Operational Approval at Newark
- Operational Approval at Houston

f. Closely Spaced Parallel Runway Operations
- Deliver RNAV/RNP (GPS) Interim Report
- Deliver WAAS/LAAS Interim Report
- Deliver SAT/NAV/ILS w/ HUR Interim Report
- Update Modeling and Simulation Toolset
- Deliver Triple/Quad Approach Interim Report
- Continue SAPA algorithm development
- Deliver SAPA interim report

g. NextGen Navigation Initiatives
- Special Authorization CAT II Business Plan
- Terminal RNAV DME-DME test and validation
- Surface Navigation Shortfall Analysis

h. Alternative Positioning, Navigation, and Timing (APNT)
- Program has not started

i. Trajectory Management – Arrivals
- RTA proof-of-concept Field Trial
- RTA Human in the Loop Simulation
- Conduct engineering and analysis necessary to support the development of the mid-term RTA capability
- AIR 4D TBO Gap Analysis and Recommended Changes

j. Trajectory Mgmt - Reduced RVR Minima
- Identified project demand for services

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$30,500,000 is required to continue the execution of work within the Flexibility in the Terminal Environment (FLEX) solution set. The FY 2013 work continues to cover activities to improve both pilot and controller situational and the general use of RNAV/RNP routings. With a reduction in funding the Flexible Terminal and Airports initiative will not meet the requirements of both the high and non-high density terminals and airports in the future.

This funding is required to fulfill FAA NSIP commitments made in response to RTCA Task Force 5 recommendations pertaining to Surface data sharing and automation, and will reduce risk to the acquisition of the Terminal Flight Data Manager (TFDM) system, an ACAT 1 acquisition identified on the FAA's NAS Enterprise Architecture (EA) automation roadmap.

The requested funding is intended to support operational demonstration of key TFDM data sharing and Air Traffic Control (ATC) Decision Support Tools (DSTs) capabilities, as identified in the following RTCA TF5 recommendations:

- #43/38 (AP3) 2012-2014 Work with the Surface Collaborative Decision Making Team and the Tower Flight Data Manager development team to define interoperability standards for surface operational data exchange.
- #43/38 (AP4) 2013-2015 Conduct interoperability testing between FAA and Flight Operations Centers
- #43/38 (AP5) 2014-2016 Execute field implementation of surface operation data sharing
- #41 (AP1) 2010-2014 Leverage existing R&D activities and development plans to field integrated airport surface standards, processes and Decision Support Tools by 2018

Detailed Justification for - 1A13 Next Generation Air Transportation System (NextGen) – System Networked Facilities (FAC)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – System Networked Facilities (FAC)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
System Networked Facilities	$23,340	$5,000	$11,000	+$6,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Integration, Development and Operations Analysis	---	$3,000.0
2. Test Bed/Demonstration Sites	---	8,000.0
Total	Various	$11,000.0

For FY 2013, $11,000,000 is requested to provide for the following:

a. Integration Development and Operations Analysis Capability
- NextGen Integration and Evaluation Capability (NIEC) upgrades and enhancements
- Modifications for NextGen R&D projects
- NIEC operations, maintenance, and engineering
- Modification and Implementation Plan for NIEC

b. Test Bed/Demonstration Sites
- Enable Remote Connectivity to Partner Sites
- Test Bed Capability Expansion Strategy
- Test Bed System and Facility Enhancements and Tech Refresh
- Test Bed Operation, Maintenance & Engineering

2. What Is This Program?

NextGen introduces evolutionary and revolutionary concepts of operation and new technologies into the air traffic system. As a result of this, implementation of NextGen requires extensive work in the area of early evaluations, concept development, and/or demonstration in a real-time environment without being encumbered by the fidelity of the NAS infrastructure. NextGen System Networked Facilities includes multi-discipline laboratories and test beds to support NextGen requirements development and risk-mitigation efforts.

DOT Strategic Goal – Economic Competitiveness
- Maximize economic returns on transportation policies and investments.

a. Integration, Development, and Operations Analysis Capability (NIEC)
This program continues the integration, development, and operations analysis capability to provide a real-time and flexible environment for the development and validation of the broad framework of concepts, technologies, and systems introduced by NextGen. It provides for the ongoing conduct of early evaluations, concept development, and/or demonstrations in a flexible, real-time NextGen integrated environment that is

unencumbered by the NAS infrastructure. It also provides the capability for these activities to be developed and validated in parallel to ongoing NAS activities and research. The program enables the FAA to assess technologies and mature concepts in an integrated environment that supports medium to high fidelity exercises. The integration, development, and operations analysis capability uses a rapid prototyping environment that interfaces with a high-fidelity capability in a controlled environment. The operations analysis capability emulates information flow and system performance characteristics, and is adaptable to illustrate and assess NextGen human-machine-interface concepts. An ongoing capability is required to conduct early concept validation and maturation, alternatives analyses, and requirements development.

For FY 2013, the program will continue the development of the integration, development, and operations analysis capability. It will integrate systems required to support human-machine studies. The operations analysis capability will provide an infrastructure required to evaluate concepts and alternatives. The capability will measure and validate human performance, usability, workload, and safety indications in a flexible integrated environment supporting the design and conduct of experiments. The program will include the development and validation of system prototypes and system analyses capabilities to define requirements while researching candidate solutions. The program will provide additional software development and system integration to enhance capabilities. As capabilities are integrated, processes will be developed for the operations and maintenance of the operations analysis capability.

b. Test Bed/Demonstration Sites

The demonstrations at the NextGen Test Bed/Demonstration Sites are envisioned to facilitate development and implementation of NextGen. NextGen procedures and technologies are intended to transform air transportation by the year 2025. These new procedures and technologies are associated with solution sets and capabilities, which include:

- High Density Airports
- Networked Facilities
- Reduced Weather Impact
- Collaborative Air Traffic Management (ATM)
- Flexible Terminal and Airspace
- Safety, Security, Environment
- UAS NAS Interoperability
- New emerging technologies, as they are developed, will be tested and demonstrated to allow the FAA to meet the NextGen mid-term goals and objectives

Established as a scalable, expandable, cost-effective and repeatable process and architecture, the Test Bed sites are envisioned as a single thread or non-redundant automation, communications, and display system and facilities for the surface, terminal, en route and oceanic domains that mirror the current NAS and enable the transition toward NextGen.

During FY 2013, this Test Bed/Demonstration Site program will continue building upon the infrastructure and systems established in prior years. More specifically, the Florida NextGen Test Bed, located at the Daytona Beach International Airport (DAB) in Florida, will be enabled to interact with other key sites, including NASA NTX, located near the Dallas/Fort Worth Airport (DFW), and WJHTC located near Atlantic City, NJ. Also in FY 2013, the Test Bed/Demonstration Sites are envisioned to be established as key nodes on the FAA's R&D Domain that enables controlled information sharing among NextGen stakeholders and partners. This activity will enable direct industry participation to facilitate industry innovation and collaboration, and allow for increased government – industry partnership on the road to NextGen.

3. Why Is This Particular Program Necessary?

Today's air traffic system was built around 1960's radar technology and is constrained by its limitations. This geo-dependent model (communication constraints, hardware/software limitations, and available data distribution capabilities) dictated how many facilities were needed and their location. As a result of these limitations, the number of terminal and en route air traffic control facilities has grown to over 500. Security concerns, including location-based risks, distributed infrastructure constrained by legacy architecture, and disparate automation platforms, further challenge the air traffic control infrastructure. This results in operational inefficiencies, including capacity limitations and less than optimal business continuity planning (BCP) strategies. In addition, many of these facilities have aged to the point where repair and remediation would be financially unsound.

NextGen facilities must handle increased traffic in the future while managing costs, improving and expanding services, and transforming FAA en route and terminal facilities to facilitate NextGen operational improvements. The current system has built-in limitations in flexibility, cost of service delivery, and continuity of operations. Some smaller airports have limited service due to cost of service; creating a need to increase service in these locations, while reducing costs.

4. How Do You Know The Program Works?

Networked Facilities (FAC) encompasses the majority of the terminal operation areas and airports within the NAS. Since its beginning FAC has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities, which have and will begin to improve the overall operations within the NAS.

a. Facilities Integration, Development, and Operations Analysis
- Initiate the integration of SWIM Segment 1
- Automate and synchronize NIEC Audio and Video recording capability
- Improve laboratory capabilities and integrate new tools and systems to support Phase 1.75 and Phase 2 of the SNT Study

b. Test Bed/Demonstration Sites
- Completed a Near-Term Florida Test Bed Strategy
- Completed Florida Test Bed Segment 1 Initial Operating Capability (IOC)
- Provide additional Florida Test Bed Infrastructure to enhance demonstration capabilities
- Connect to 1st Regional Location
- Provide Florida Test Bed Facility Development and Quality Control Plan

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$11,000,000 is required to continue work within the Networked Facilities solution set. The FY 2013 work will maintain focusing on delivering an infrastructure that supports the transformation of air navigation service delivery unencumbered by legacy constraints. With a reduction in funding Networked facilities will not be able to provide for expanded services; service continuity; and optimal deployment and training of the workforce.

Detailed Justification for - **1A14 Next Generation Air Transportation System (NextGen) – Future Facilities Investment Planning**

What Do I Need To Know Before Reading This Justification?

- The NextGen Future Facilities program office obtained its Segment 1 Initial Investment Decision (IID) on November 16, 2011. Segment 1 Project 1 Final Investment Decision (FID) is expected in the first quarter FY 2013.
- The program has been engaged with National Air Traffic Controllers Association (NATCA) and Professional Aviation Safely Specialists (PASS) representatives in evaluating alternatives and eliciting requirements. Union representatives are fully engaged in the overall planning of the program.
- FY 2013 is the first year this program is requesting funding other than planning. The FAA has accepted the recommendations of OST, OMB, IG, and GAO and formed an executable program plan where the first project can begin by the end of FY 2013.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Future Facilities Investment Planning
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Future Facilities Investment Planning	$0	$15,000	$95,000	+$80,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Business Case Decision Activities/Products – Segment 1 Planning	---	$3,300.0
2. Program Management, System Engineering	---	21,500.0
3. Site Selection and Acquisition	---	19,000.0
4. Construction Contract Award/Long Lead Items	---	51,200.0
Total	Various	$95,000.0

For FY 2013, $95,000,000 is requested to cover critical pre-construction contract award activities for Segment 1 Project 1 Integrated Control Facility (ICF), designated as the Liberty Integrated Control Facility (ICF), and to prepare for construction contract award in FY 2014. $43,800,000 of this request will cover continuous Segment 1 planning, engineering, design, site evaluation, site selection, land acquisition, and environmental assessment for Liberty ICF in FY 2013. $51,200,000 of this request will be available for the construction contract award depending upon the size or phasing of the project.

2. What Is This Program?

NextGen Future Facilities Investment Planning

The NextGen Future Facilities program is responsible for defining FAA's long-term strategy and approach to facility and service transformation. The program's charter and activities are aligned to the goals of the Air Traffic Organization (ATO), the Federal Aviation Administration (FAA), Department of Transportation (DOT) and pending FAA Reauthorization language germane to FAA facilities.

The NextGen Future Facilities program seeks to upgrade and transform air traffic control facilities and sites to make them flexible, scalable, and maintainable. It focuses on delivering an infrastructure that supports the transformation of air navigation service delivery unencumbered by legacy constraints. NextGen transforms the national air transportation system by establishing enhanced and expanded services through new technologies, policies, procedures, and methods of operation to meet future demand and avoid gridlock in the sky and at the airports. This includes the allocation of staffing and facilities to provide expanded services; service continuity; best deployment, management, and training of the workforce; and the use of more cost-effective and flexible systems for information sharing and back-up. Air traffic facility optimization is essential. The future facilities will enable operational improvements by optimizing the use of NextGen technologies and capabilities, facilitating cultural integration across the FAA and rightsizing the scope and number of facilities.

The overall NextGen program will redesign the air traffic control systems and break down the geographical boundaries that characterize air traffic control and lead to a more seamless view of traffic, organized not by geographically oriented sectors, but by aircraft trajectories. Infrastructure, automation, equipage, procedures, and regulations are designed to support this seamless operational concept and must evolve from a geographical focus to a broader air traffic management concept. Since requirements for facilities are no longer geo-dependent and do not define proximity of air navigation services to the air traffic being managed, facilities will be sited and occupied to provide for more efficient air traffic management facility operations. This may include integrating several facilities (e.g., air route traffic control centers (ARTCCs) and terminal radar approach control (TRACONs) within a single facility.

The program office will coordinate with other agency initiatives to evaluate alternatives for new facilities as well as alternatives for retrofitting existing facilities. The program office will develop business cases for construction of new facilities and/or retrofit existing facilities, and create transition and implementation plans. The program office will design FAA facilities that meet the needs of the future and leverage technologically advanced NextGen capabilities. The program has been structured to achieve this transformation in multiple segments, with several projects (facilities) planned within each segment.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments

3. Why Is This Particular Program Necessary?

The NextGen Future Facilities program will deliver a facilities infrastructure that supports increased traffic in the future while managing costs, improving and expanding services, and transforming FAA en route and terminal facilities to facilitate NextGen operational improvements. The current system has built-in limitations in flexibility, cost of service delivery, and continuity of operations.

The scope of the program includes 20 En Route centers (largest FAA facilities), which house hundreds of employees and equipment to control aircraft flying in the En Route airspace; and 155 TRACON facilities that control traffic departing and arriving at airports. Security concerns, including location-based risks, distributed infrastructure constrained by legacy architecture, and disparate automation platforms, challenge the air traffic control infrastructure. This results in operational inefficiencies, including capacity limitations and less than optimal business continuity plans. In addition, many of the FAA's air traffic control facilities have exceeded their useful lives and their physical condition continues to deteriorate. Although the FAA has made significant strides to reduce the maintenance backlog, the agency needs a comprehensive strategy to drive decisions regarding facility and infrastructure improvements.

A recent DOT Inspector General Report titled "FAA's Management and Maintenance of Air Traffic Control Facilities," Report Number AV-2009-12, and dated December 15, 2008, cited 59 percent of the current U.S. air traffic control facilities exceeding 30 years of age.

The NextGen Future Facilities program supports the optimization of FAA's air traffic service provider resources. It considers infrastructure alternatives and associated benefits such as that of a geo-independent service delivery model to optimize air traffic service, improve workforce security, and ensure continuity of service. Future facilities will provide for increased cost effectiveness through better matching of assets to demand and reduce the need for local surge buffers in personnel and equipment. Additional benefits include the following:

- Air traffic control environments that support NextGen operational changes
- Business continuity is built into the system and provides for a more resilient infrastructure, better contingency operations, and a higher degree of service
- Seamless information exchange that increases flexibility and air navigation service provider (ANSP) agility to respond to demand
- Improved work environment and increased opportunity for career progression
- Reduced time and cost to train controllers and other ANSP personnel
- Facilities that meet Department of Homeland Security guidelines
- Reduced overall air traffic service provider costs while increasing the level of service
- Cost-effective management of air traffic facilities

4. How Do You Know The Program Works?

The NextGen Future Facilities program is developing a comprehensive process for planning, designing and implementing facility transformations within each of the proposed six segments. Each segment will be managed as a portfolio of programmatic and operational decisions aligned to optimize our service delivery model. Transition risk management will be a paramount concern in this approach. In addition, the segmented approach will help mitigate operational, budgetary, technical, political, and economic risks, as lessons learned from implementation of earlier segments will be applied to later segments. This approach is consistent with the rigorous analysis that large transformational programs of this magnitude deserve and aligned with the US Government requirement for capital investment plans.

For the Initial Investment Decision (IID) on November 16, 2011, the NextGen Future Facilities program submitted its initial benefits findings to the JRC. The identified benefits included cost avoidance, operational benefits and qualitative benefits. The most substantial component of the operational benefits story centers upon the airspace redesign effort in the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area.

In September 2007, the FAA issued a final decision to approve the project to redesign the airspace in the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area. The FAA selected the Environmental Impact Statement (EIS) mitigated Preferred Alternative, known as the Integrated Airspace Alternative with Integrated Control Complex (ICC). The selected project would consolidate many sectors of airspace under one facility. The ICC uses of the three nautical mile separation criteria for flights in terminal airspace rather than the standard five-mile criteria for en route airspace over a larger geographic area and up to 23,000 feet above mean sea level in some areas.

The basic Integrated Airspace alternative combines the New York TRACON airspace with portions of the surrounding ARTCC airspace. The EIS stated that the Integrated Airspace Alternative could be accomplished either with existing standalone facilities or in a consolidated facility. The key component of the Integrated Airspace alternative was the use of a common automation platform. Using existing facilities, airspace would be reallocated among the facilities in order to facilitate a more seamless operation. At the time the Airspace Redesign project issued its Record of Decision (ROD), the FAA had not yet specifically defined what an ICC concept would entail. In October 2011, the FAA defined an ICC as a single ICF that would be capable of housing the air traffic controller positions required to optimally implement NY/NJ/PHL Metropolitan Area Airspace Redesign and enhance the operational benefits.

The delay savings used in the EIS for the project were developed from detailed fast time simulation modeling using the Jeppesen Total Airspace and Airfield Model (TAAM). The TAAM modeling was done for all the alternatives, including the Integrated Airspace Alternative, that were considered as part of this environmental review. The TAAM modeling provided a detailed report that factored in many of the variables responsible for airspace delay. These benefits for using an ICC were computed from the EIS.

The new state-of-the-art ICF and integrated airspace will deliver benefits to the aviation industry, taxpayers, and local communities through:

- Reducing delays and delivering over $133 million of annual savings to airspace users

- Enhancing service and business continuity in the event of natural and man-made disasters
- Reducing lifetime infrastructure sustainment costs
- Decreasing costs of implementing future technologies in the field
- Addressing the requirement for TRACON replacement in PHL due to construction of a new runway
- Providing a platform for optimization of the NY/NJ/PHL Airspace Redesign Record of Decision

During Final Investment Decision (FID), the program office will develop analyses that will determine the operationally-preferred boundary for the Liberty Integrated Control Complex (ICF), the core volume of airspace to be housed in the new ICF. Within a single facility, controllers have many venues to coordinate their activities. Controllers can use voice communication, data entries in the automation system and/or face-to-face conversation. Maximum efficiency results from these types of intra-facility coordination. Coordination by controllers between facilities does not have as many coordination venues available to them. Inter-facility coordination requires some form of electronic/voice communication, which have multiple points of failure. Safeguards against these types of system failures are created in the form of letters of agreement (LOA). These LOAs specify rigid procedural restrictions between facilities. Exceptions to procedural restrictions can be negotiated on a case by case, but in some instances this may take more time to coordinate than the flights will spend under the control of the facility. Flow management between facilities is generally done strategically, with spacing restrictions put in place for proscribed lengths of time.

Segment 1 Project 1 will optimize the implementation of the New York/New Jersey/Philadelphia airspace, and therefore, the benefits from this effort, as detailed in the NextGen Integrated Basis of Estimate dated November 2011. These benefits are derived solely from Project 1 for the purpose of this analysis and will be refined for each additional project in subsequent final investment analyses.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Any reduction in the required funding will result in further delay in the realization of FAA's goals for facility improvements. Funding at the required level will allow the continued improvement of work conditions for FAA employees, and the realization of critical infrastructure investments to enable the realization of NextGen benefits. Funding reductions will adversely affect the investment interdependencies of the FAA portfolio and its ability to meet the goal to align NextGen operational capabilities with facilities requirements, and ensure the safe transition between legacy and future services as stated in the FAA's NextGen Implementation Plan (March 2011.)

Detailed Justification for - **1A15 NextGen Performance Based Navigation (PBN) – Optimization of Airspace and Procedures for Metroplexes (OAPM)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen Performance Based Navigation (PBN) – Optimization of Airspace and Procedures for Metroplexes (OAPM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
NextGen Performance Based Navigation (PBN)- Metropex Area Navigation (RNAV)/Required Navigation Performance (RNP)	$0	$29,200	$36,200	+$7,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Optimization of Airspace and Procedures for Metroplexes (OAPM)	---	$19,500.0
2. NextGen Safety	---	6,700.0
3. Navigation Procedures Implementation Plan (NAV Lean)	---	10,000.0
Total	Various	$36,200.0

For FY 2013, $36,200,000 is requested to provide for the following:

- Complete analysis and studies, through established OAPM Study Team processes, at two Metroplex locations (Chicago and Phoenix) focusing on expedited integrated PBN procedure development coupled with airspace design to optimize benefits.
- Based on the output of the earlier analysis and study stage, begin OAPM design work at four Metroplex locations (Southern California, Florida, Chicago, and Phoenix)
- Begin OAPM pre-implementation/evaluation activities at three Metroplex locations (DC, Northern Texas, and Houston)
- Provide Safety Analysis, simulations, environmental evaluations and policy development to support Performance Based Navigation development and initiation of implementation by the end of the fiscal year
- Improve and streamline all processes used to request, prioritize, develop and implement instrument flight procedures (IFP). This initiative, known as the *Navigation Procedures Implementation Plan (*NAV Lean), will accelerate OPAM projects and NextGen by improving efficiency and production time for all IFPs.

a. Optimization of Airspace and Procedures for Metroplexes (OAPM)

Funds will be used to continue implementation of OAPM deliverables in the Metroplex that were recommended by the RTCA Task Force 5. In response to RTCA's recommendations, funds will be used to conduct studies to compile and assess data from select sites. Using the results of these studies, Design and Implementation Teams will integrate airspace and procedure design to optimize operations at select Metroplex sites based on the information provided by the studies. OAPM work also includes procedural design and implementation in the high altitude structure to improve Metroplex ingress/egress to and from a given site as well as efficiency between sites.

b. NextGen Safety

With optimized airspace and procedures, additional safety analysis will need to be performed. All changes to the National Airspace System (NAS) require safety analyses and documentation. Funding will be used to increase efficiency in the NAS by developing guidance material such as Orders, Notices, and Advisory Circulars. The guidance material will provide industry and Aviation Safety (AVS) field offices information to safely implement/certify new technologies and develop more efficient flight procedures, improving safe operation within the NAS. The funding will update standards to better accommodate modern aircraft capabilities. Training material will be developed to transition the program to operations oversight. This will include course development, video production, maintenance, and course implementation. Funding in FY13 will provide safety risk analysis and studies, flight simulation and data collection. Using the information from the data collection and analysis, updates to PBN instrument flight procedure criteria and guidance materials will begin, with estimated completion by 2015.

c. Navigation Procedures Implementation Plan (NAV Lean)

The Navigation Procedures Implementation Plan (NAV Lean) was published in June, 2011, in response to the Navigation (NAV) Procedures Project Final Report, September 2010, containing 21 recommendations to streamline the IFP development process. Funding will facilitate implementation of the recommendations to include a streamlined version of the current core process (request, design and development, approval, implementation, and maintenance). It will also explain the intersection of auxiliary processes, such as Safety Management System (SMS), environmental, and operational approval. The process will be better managed by having all IFP requests submitted through an authorized Web-based portal established as the entry point into a system for processing, tracking, and managing the IFP development life cycle. This will be accomplished by consolidating/ upgrading the current databases and amending the current policies and guidance.

The NAV Lean recommendations and specific activities that will be funded include:

- Recommendation 1: Amend policy to allow expedited processing and clear definition of minor revisions to IFPs.
- Recommendation 5: Establish standardized databases with custodianship and data stewards.
- Recommendation 6: Provide access to, and mandate use of, a single set of data for all IFP providers.
- Recommendation 7: Allow electronic transfer of data.
- Recommendation 8: Standardize software and data formats.
- Recommendation 18: Establish and implement a Web-based request and access portal for IFPs.
- Recommendation 20: Develop an outreach/communication plan to educate users on use of IFP portal.
- Recommendation 21: Establish a Web-based Operations Approval entry portal and a Web-based work package to accommodate the needs of LOBs.

2. What Is This Program?

The Airspace Optimization Group will integrate airspace design and associated activities, including traffic flow analysis and facilitated design and procedures optimization. This will lay the framework for accelerating PBN initiatives, taking a systems approach for airspace design and procedure implementation. Airspace and procedure integration provides an important systems view that: utilizes additional transition access/egress points not tied to ground-based navigation aids; considers concurrent development and implementation of arrivals and departures, ensuring an integrated approach to procedural optimization; decouples operations between primary and secondary/satellite airports serviced by complex terminal airspace; and develops high altitude routes through congested airspace better connecting major metropolitan areas. Implementation of RNAV and RNP routes and procedures will continue to address the RTCA Task Force 5 recommendations, maximizing benefits, and accelerating NextGen concepts.

Airspace redesign and procedure development will be accomplished with a Metroplex focus, targeting specific Metroplex areas that have been designated as high priority using quantitative and qualitative metrics. Results from Study Teams will be used to implement those improvements yielding the highest benefits and lead to design work that will include analyses and simulations, assessments of alternatives, and modeling of projected airspace and procedures benefits.

The program integrates the safety requirements, through all phases of implementation, to ensure successful implementation.

NAV Lean will allow participants in the process to obtain up-to-date information concerning an IFP status, exchange information with other system users, and will provide an archive function and audit trail. This system will also serve as a gateway to the consolidated databases required for IFP design and development, applicable publications, and forms and templates. Consolidation and standardization of the databases will provide improved data integrity and improved process management. Use of this system will facilitate early screening of requests to ensure completeness and prioritization of requests, and will provide transparency for users. It will also promote and ensure that safety, airspace, operational approval, and environmental aspects are all considered early in the process. Use of this common portal will also facilitate the early recognition of potential requirements for new or modified criteria.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments

3. Why Is This Particular Program Necessary?

Optimization of Airspace and Procedures facilitates an operationally integrated view of NextGen implementation. The OAPM will expedite delivery of key efficiencies for the nation's busiest metropolitan areas. OAPM will help to address the major operational issues faced in today's Metroplexes: flow congestion, inefficient routing and altitudes, airports in close geographical proximity, and other limiting factors such as environmental constraints. Through OAPM, we are implementing new routes and procedures that leverage emerging aircraft navigation capabilities, including PBN, and redesigning airspace to improve flight efficiency. The implementation of these procedures includes the safety oversight of the procedures themselves, and the approval of aircraft and operators to conduct these procedures.

NAV Lean Implementation of the future IFP process is expected to significantly reduce the average time required to implement IFPs and will position the FAA to meet the increased demand for instrument flight procedures that are the cornerstone for NextGen. Achieving this optimal future process and all of its benefits will require full implementation of all recommendations.

4. How Do You Know This Program Works?

In September of 2010, the FAA initiated two "prototype" study teams for the Washington, DC and North Texas metropolitan areas. Those prototype study teams were used to exercise the study team approach and provide lessons learned to be considered as the full initiative begins in early 2011. Leveraging the study team approach at those two sites, the Optimization of Airspace and Procedures for Metroplexes initiative is expected to be a multi-year activity that will have addressed twenty-one metroplex areas when completed.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$36,200,000 is requested to fund key operational efforts that serve as the foundation to the transition to NextGen. Funding will allow for expedited development and implementation of PBN procedures. A reduction in the requested level of funding will slow down the delivery of these necessary procedures, thereby slowing implementation of NextGen capabilities at a number of high priority Metroplexes. It will also reduce the FAA's ability to process aircraft and operator applications to conduct PBN operations, resulting in delays in applications and deferred benefits.

Funding for NAV Lean is required at the specified levels to ensure full implementation in a timely manner. Full implementation is imperative to fulfill expectations of FAA stakeholders. Recommendations include a streamlined version of the current core process (request, design and development, approval, implementation and maintenance); auxiliary processes (Safety Management System (SMS), environmental and operational approval); and data base consolidation (inability to electronically transfer data efficiently).

The overall process will be better managed by having all Instrument Flight Procedure (IFP) requests submitted through an authorized Web-based portal established as the entry point into a system for processing, tracking and managing the IFP development life cycle.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 32a, 29 Metroplex

- Deliver one Design and Procedure proposal

Executive Summary - Facilities and Equipment, Activity 2

1. What Is The Request And What Will We Get For The Funds?

The Facilities and Equipment (F&E) Activity 2 program is requesting $1,467,770,000 for FY 2013, an increase of $61,039,000 above our FY 2012 enacted level. The Activity 2 funding request is needed for the following programs:

- $433,970,000 is requested for NextGen technologies, tools, and systems;
- $1,033,800,000 is requested for legacy systems, buildings, infrastructure, and sustaining a safety infrastructure adequate for ATC services in the NAS.

The funding for Activity 2 programs and initiatives is used for modernization of air traffic control facilities, systems, and equipment. We support infrastructure upgrades, system replacements, and technology refresh at manned and unmanned facilities to sustain:

- Ground-based radar;
- Communications;
- Automation;
- Navigation;
- Landing; and
- Other ATC systems and support equipment.

Together, these programs provide the facilities, systems, tools, and technologies that are required to support our air traffic control system.

Key outputs and outcomes expected to be achieved in budget year with the requested resources:

- Terminal ATC facilities Replace program will complete:
  - Phase I/II funding for design starts at three sites:
    - Teterboro, NJ
    - Philadelphia, PA
    - Tulsa-Riverside, OK
  - Phase III construction starts at two sites:
    - West Palm Beach, FL TRACON
    - Tucson, AZ
  - Phase IV/V continuation funding for nine sites:
    - Boise, ID,
    - Fort Lauderdale Executive, FL
    - Kalamazoo, MI
    - Oakland, CA
    - Traverse City, MI
    - Houston, TX
    - Las Vegas, NV
    - Palm Springs, CA
    - West Palm Beach, FL ATCT

- ADS-B will continue to ensure that subscription services are operational for surveillance in the Gulf, Louisville/Philadelphia, the East Coast, Alaska, and for weather in the Gulf and Alaska.
- Deployment of ERAM will continue and all sites will achieve Initial Operating Capability (IOC) by the end of FY 2013.
- TAMR Segment 2 will initiate key site activities at two sites in order to provide ADS-B capability at all critical Terminal sites by CY 2013.
- Navigational and Landing Aids will complete 73 initial procurements and 92 new procurements.
- WAAS Satellite Leases will fund GEO satellite acquisitions, technology refresh, and related activities.
- Unmanned Infrastructure Sustainment will upgrade, modernize, refurbish and replace antenna and equipment tower buildings, shelters, roofs, and storage buildings; plumbing, heating, ventilating and air conditioning (HVAC) equipment; and other projects at over 150 locations across the NAS.

- Facilities decommissioning will perform final disposition of decommissioned infrastructures and associated property restorations, conduct Environmental Due Diligence Audits (EDDAs), and investigate other required work, for approximately 225 projects.
- Electrical Power Systems Sustain Support program will procure various power systems and related equipment for over 200 projects.
- Airport Cable Loop Systems will perform advanced engineering, construction activities, and Fiber Optic Transmission Systems (FOTS) equipment installations at 28 locations.

2. What Is This Program?

Activity 2 supports major systems acquisitions and facilities infrastructure programs in the implementation phase. These programs and initiatives fund the procurement and modernization of air traffic control facilities and equipment, including all funding related to the acquisition of air traffic control facilities, navigation and landing aids, surveillance equipment and facilities, automation systems, and communications systems and equipment. Activity 2 programs provide funding for control equipment and agency-owned aircraft that are used for flight inspections and other activities.

With this funding, we continue to ensure that current operational facilities and equipment deliver reliable and accurate services until investments in new technologies are ready to deliver the operational improvements needed for enhanced safety and future growth.

Over the past five years, FAA has met the following goals:
- Operational Availability for the nation's busiest airports;
- Daily airport capacity;
- Major acquisition system cost and schedule performance.

Typical Activity 2 programs include:

- Upgrades to existing equipment;
- Acquiring production systems to replace existing systems, extend serviceable life, or technically refresh system components;
- Deploying systems for installation or transition to operational status;
- Deploying new, satellite-based technologies such as Automatic Dependent Surveillance-Broadcast (ADS-B) and Wide-area Augmentation Systems (WAAS);
- Deploying communications infrastructure to provide surveillance and navigation services;
- Replacing or modernizing manned and unmanned ATC facilities;
- Replacing or modernizing automation, communications, navigation, surveillance/weather infrastructure, systems, and equipment.

Activity 2 efforts contribute to the following DOT Strategic Goals:
- Safety: Reduction in transportation-related injuries and fatalities
- Economic Competitiveness: Maximum economic returns on transportation policies and investments
- Environmental Sustainability: Reduced transportation-related pollution and impacts on ecosystems

3. Why Is This Particular Program Necessary?

These programs are necessary to modernize and sustain the NAS, as well as provide the foundational infrastructure, technologies, and capabilities required for the NextGen System. The demands for ATC services expected by the year 2020 will be constrained unless targeted investments in system upgrades and new technologies are implemented. At the same time, we must develop the standards, procedures, and safety protocols needed for implementing these investments.

The economic impacts of the air traffic control system are well-documented in FAA's report, "The Economic Impact of Civil Aviation on the US Economy," published in December 2009. It states that, in 2007, aviation accounted for 12 million jobs, $1.3 trillion toward the gross domestic product output, and 5.6 percent of gross domestic product. Continued growth in this industry will be predicated in part on a modernized air traffic control system.

4. How Do You Know The Program Works?

The procurement and modernization of the nation's air traffic control system was first highlighted in 1980 with the publication of the first NAS Modernization Plan. Since that time, we have replaced old technologies with new generation systems that perform required functions better and more efficiently. During this period, aviation services were extended to new, small and medium-sized localities through the expanded deployment of updated air traffic control technologies, equipment, and infrastructure at these locations. We have efficiently operated and maintained these services through increased funding in Activity 2 programs and initiatives.

We have met most of the cost and schedule goals for the programs within Activity 2. The ERAM program is an estimated four years behind schedule and approximately $330 million over budget. The revised deployment for ERAM, as documented in the ERAM Improvement Plan, is to complete all site Initial Operating Capability (IOC) milestones by the end of FY 2013. The resulting lessons that were learned from ERAM were applied to TAMR Phase 3 and prompted FAA adjustments in the areas of schedule formulation, testing processes, and user expectation management. Activity 2 programs also contribute to the success of other Flight Plan metrics, including runway incursion reduction, ATC system operational availability, and NAS on-time arrivals.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

We are funding at this level to minimize risk to our near-term NextGen deliverables. In addition, we are funding other, non–NextGen investments at levels that enable us to sustain ATC safety and services expected by the public, the military and other stakeholders.

Detailed Justification for - 2A01 En Route Automation Modernization (ERAM)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – En Route Automation Modernization (ERAM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
En Route Automation Modernization (ERAM)	$181,935	$155,000	$144,000	-$11,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. ERAM	---	$106,400.0
2. ERAM Second Level Engineering	---	36,850.0
3. Independent Operational Test and Evaluation (IOT&E)	---	750.0
Total	Various	$144,000.0

Although originally planned to complete deployment in December 2010, the ERAM program is an estimated four years behind schedule and approximately $330 million over budget. The revised deployment for ERAM, as documented in the ERAM Improvement Plan, is to complete all site Initial Operating Capability (IOC) milestones by the end of FY 2013. Last site Operational Readiness Demonstration (ORD) would occur in FY 2014.

For FY 2013, a total of $144,000,000 is requested for ERAM. Of this amount, $106,400,000 is requested to support the deployment of ERAM sites. This funding is needed to support the identification, analysis, and development of software changes needed by each site in the ERAM waterfall to support limited operations to achieve site Initial Operational Capability (IOC) and continuous operations to achieve site Operational Readiness Date (ORD). Specific activities include: system engineering analysis of all Problem Reports (PRs) and Change Requests (CRs) generated by the sites; prioritization of the PRs and CRs and allocation of the software fixes into software builds that will be incrementally developed, integrated and tested prior to release to the operational sites. Based on the rebaseline plan that extends the program by four years and $330 million, the remaining 11 ERAM operational sites will achieve IOC during FY 2013.

$36,850,000 is requested for 2nd level engineering support at sites engaged in ERAM limited and continuous operations. Specific activity include: system integration and regression testing activities, adaptation support for IOC and ORD activities, and integration and verification of the ERAM operational software. The FY 2013 funding supports the prime and support contractor activities to achieve this objective. Also requested is $750,000 to support IOT&E efforts.

2. What Is The Program?

The En Route Automation Modernization (ERAM) System replaces the 40-year-old En Route HOST Computer System and backup system used at 20 FAA air route traffic control centers around the country. This is the main computer system air traffic controllers use to guide airplanes flying at high altitudes. Air traffic control towers, terminal radar approach control facilities, the Air Traffic Control System Command Center, flight service stations, and other agencies such as the Department of Homeland Security and the Department of Defense, all connect to and use the information managed by the En Route HOST Computer System.

Under the program rebaseline, ERAM Release 2 will be used as the system baseline for the initial sites to achieve IOC. Release 3 development efforts have proceeded in parallel. Release 3 including Automatic Dependent Surveillance – Broadcast (ADS-B) and infrastructure capabilities of Segment 1 of the System Wide Information Management (SWIM) that are consistent with ERAM architecture is planned to be the deployment baseline for all remaining waterfall sites beginning with Houston Air Route Traffic Control Center (ARTCC) in June 2012. Sites previously operational on Release 2 will also begin transitioning to Release 3 starting in June 2012.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The ERAM system is the foundation of the FAA air traffic control (ATC) environment. The system receives processes, coordinates, distributes, and tracks information on aircraft movement throughout the domestic and international airspace. The ERAM system is the key to the FAA's ability to implement new services, concepts, and traffic flows to users.

While the revised ERAM deployment will occur over FY 2011 - FY 2014, the program has installed and accepted the system hardware at all 20 ARTCCs.

4. How Do You Know The Program Works?

Four ARTCCs have reached initial operational capability (IOC) and two sites reached continious operations using ERAM. Based on the rebaseline plan, all ERAM sites will achieve IOC by the end of FY 2013.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The ERAM system is needed to replace the current HOST system and allow the FAA to continue to provide the high level of safe, reliable air traffic control services that the nation has come to expect; and also put in place the infrastructure necessary to transition the NAS to NextGen. Additionally, the existing Host Computer System hardware and software would have to be maintained long beyond its expected service life, which may impact the Agency's ability to provide the quality of existing air traffic control services to its users.

Detailed Justification for - 2A02 En Route Automation Modernization (ERAM) - D-Position Upgrade and System Enhancements

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – ERAM D-Position Upgrade and System Enhancements
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
ERAM D-Position Upgrade and System Enhancements	$4,990	$0	$10,000	+$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Program Management and Data Position Upgrade	---	$10,000.0

For FY 2013, $10,000,000 is requested for ERAM D-Position Upgrade and System Enhancements. With this funding, initial system engineering of the D-Position Upgrade will commence. Specific ERAM D-Position Upgrade and System Enhancements capabilities include: system engineering for the hardware and operating system changes for the D-position upgrade; system engineering for the software development for the initial D-Position Computer Human Interface (CHI) redesign and new display views; and procurement of new D-Position hardware for development labs. After completion of the system engineering, the D-Position upgrade activities will span three years for initial capability development through contractor testing.

2. What Is The Program?

The ERAM D-Position Upgrade and System Enhancements Work Package effort is shown on the Enterprise Architecture National Airspace System (NAS) Automation Infrastructure roadmap between the "ERAM Program Baseline" and the future evolutionary enhancements of the "En Route Automation NextGen Mid-Term Work Package." The ERAM D-Position Upgrade and System Enhancements effort will increase efficiency and add capacity benefits over those established by the baseline ERAM program. It will also build the foundation for incorporating NextGen technologies that mature during the ERAM D-Position Upgrade and System Enhancements timeframe.

The ERAM program baseline includes three releases. ERAM Release 1 contains the capabilities and performance required for acceptable operational suitability and effectiveness. ERAM Releases 2 and 3 contain maintenance upgrade software releases. Releases 2 and 3 will also begin to incorporate NextGen transformational program infrastructure into ERAM including Automatic Dependent Surveillance – Broadcast (ADS-B) and infrastructure capabilities of Segment 1 of the System Wide Information Management (SWIM) that are consistent with ERAM architecture.

ERAM Release 4 is not included in this program as it is externally funded by other NAS programs for new functionality and by ERAM baseline for operational (maintenance) software fixes.

This program upgrades the D-side displays, associated CHI, and associated processors at all Air Route Traffic Control Centers (ARTCCs) which currently are near maximum capacity both in viewable area as well as processing ability. System engineering will be accomplished in FY 2012 and FY 2013 with software development and hardware purchases starting in FY 2014; deployment is planned for FY 2015 and FY 2016 to be completed in calendar year 2016. Software enhancements such as non-radar control will be accomplished in FY 2015 and FY 2016. This program includes ERAM software release 5 and release 6.

This ERAM D-Position Upgrade and System Enhancements program supports

- Implementation of functional capabilities and performance enhancements for improved operational efficiency and Air Traffic system performance. These improvements may complement NextGen initiatives, but they are also uniquely critical to ERAM
- Hardware replacement and associated software to increase the D-Position display size and increase processing capacity. These performance enhancements are necessary because the hardware will reach utilization thresholds due to the cumulative effects of adding ERAM D-Position Upgrade and System Enhancements, DataComm and ADS-B requirements

The ERAM D-Position Upgrade and System Enhancements program effort began in FY 2011 with AMS documentation and planning to support a Final Investment Decision and initial system engineering tasks associated with scoping and defining the software release projections, and work on the initial hardware performance upgrade implementation planning. In addition, the program will undergo acquisition and investment analysis review in FY 2013.

Other programs will fund ERAM capabilities for implementation during the ERAM D-Position Upgrade and System Enhancements development timeline. Costs for those efforts are not included in this baseline program, although the planning for each of the ERAM D-Position Upgrade and System Enhancements software releases allows for necessary software development bandwidth to accommodate externally funded requirements. This program does not duplicate any efforts budgeted and documented in other programs' Capital Investment Plans (CIPs).

Software development and implementation begins in 2014 and completes in 2019. Hardware upgrades start in 2014 with the initial hardware engineering for the D-Position infrastructure upgrade. The benefits of the ERAM D-Position Upgrade and System Enhancements initial increment will be justified by a business case analysis. This activity is expected to be completed by 2013.

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The ERAM system is the foundation of the FAA air traffic control (ATC) environment. The system receives processes, coordinates, distributes, and tracks information on aircraft movement throughout the domestic and international airspace. The ERAM system is the key to the FAA's ability to implement new services, concepts, and traffic flows to users.

Current requirements documents addresses the supportability of En route and Oceanic facilities and the architecture needed to support projected air traffic growth. They incorporate sustainment and enhancement activity that reflects the FAA goals and objectives in the mission areas of safety, capacity, security, industry vitality and efficiency, and FAA business practices and productivity. They also address inefficiencies in the current systems that impacts FAA's mission in these areas.

Many of these inefficiencies are being corrected under the initial ERAM acquisition baseline, which focused on consolidating existing legacy capabilities on a modern platform upon which enhancements could be built. The ERAM D-Position Upgrade and System Enhancements program will address many of these enhancements and some new opportunities.

As traffic levels and the need to allow more fuel efficient flight profiles increase, the Air Traffic Controllers' ability to maintain safe separation becomes a limiting factor, often resulting in the imposition of airspace structure and traffic restrictions that limit airspace capacity utilization. There is a need to provide new and enhanced automation assistance in the NAS in order for Air Traffic personnel to handle traffic growth without increasing restrictions and delays.

In addition to the need to handle increasing traffic levels, there is a need to address deficiencies in existing ATC automation functions. These identified operational deficiencies and shortfalls include:

- Increased information requirements at the Radar Associate position
- Automation deficiencies that exist in providing separation services including:
- Unacceptable levels of missed and false alerts from tactical and strategic conflict alerting functions
- Inability to take full advantage of aircraft performance-based navigation
- Insufficient coordination of tactical and strategic information among controllers
- Priority "extensible" requirements identified in the ERAM baseline requirements document that will not be completed when the baseline development efforts end in 2011

4. How Do You Know The Program Works?

ERAM D-Position Upgrade and System Enhancements is a new program baseline. It will build upon the deployed ERAM baseline to harness ERAM's full potential for operational effectiveness. Many of these capabilities have been prototyped in the research and development pipeline prior to being included in the ERAM D-Position Upgrade and System Enhancements baseline. These improvements may complement NextGen initiatives, but they are also uniquely critical to ERAM.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The ERAM system will be operational at all 20 CONUS Air Route Traffic Control Centers (ARTCCs) by FY 2014. However, once operational, a program is needed to implement En Route driven capability improvements to the ERAM baseline. Lack of enhanced automation assistance in ERAM will impact the ability of Air Traffic personnel to handle traffic growth without increasing restrictions and delays. In addition, current ERAM infrastructure will not fully accommodate an interface and/or integration with other FAA Enterprise Architecture elements (Data Communications, Aeronautical Information Management, System Wide Information Management, Tower Flight Data Manager, Traffic Flow Management, International, Oceanic, and Weather). The ERAM D-Position Upgrade and System Enhancements program is intended to bridge the gap between final implementation of the base ERAM program and the introduction of new capabilities under a NextGen Mid-Term acquisition baseline.

Beginning in FY 2013, ERAM will upgrade the controller Radar Associate (Data Position) infrastructure needed to implement other NAS program technologies. It will lay the foundation for implementation of NextGen capabilities, implement En Route enhancements that will address the deficiencies described above, and address the priority requirements not implemented in the base ERAM program.

Detailed Justification for – 2A03 En Route Communications Gateway (ECG)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – En Route Communications Gateway (ECG)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
En Route Communications Gateway (ECG)	$5,988	$2,000	$3,100	+$1,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. 500W Low Power PDU	---	$850.0
2. 500W PDU	---	850.0
3. Modem Splitter Cards	---	100.0
4. Operational Analysis, STEP, RMA	---	400.0
5. In-Service Engineering	---	900.0
Total	Various	$3,100.0

For FY 2013, $3,100,000 is requested to provide for the following:

- Power Distribution Units (PDUs) provide power distribution and conditioning for rack and workstation components
- Modem splitter card replicates and re-drives the input of radar, Coded Time Source (CTS), and interfacility signals
- Program Support services provides assistance with Operational Analysis (OA), Sustainment Technology Evolution Plan (STEP), Reliability Maintainability Availability (RMA) for the ECG Program, which help measure performance and cost of ECG operational assets against an established baseline and identify evolution opportunities, best alternatives, and the best solutions to maintaining and evolving the ECG technical baseline.
- In-Service Engineering provides immediate response to emerging technology solutions

Prioritization: Projects will be prioritized to provide the maximum reduction of risk of loss of NAS services.

2. What Is This Program?

The En Route Automation Programs provide automation infrastructure improvements at the 20 high-altitude centers in the continental U.S. Five interdependent projects comprise the program: En Route Communications Gateway (ECG); Host and Oceanic Computer System Replacement; En Route System Modifications; En Route Enhancements; and En Route Automation Modernization (ERAM). These automation systems provide the foundation for FAA's air traffic control system.

The ECG system, which replaced the aging Peripheral Adapter Module Replacement Item (PAMRI), is fully operational nationwide. The ECG system was procured using commercial-off-the-shelf (COTS) products. The performance gap is the short life-cycle associated with COTS products, which require more frequent technology refreshes. The ECG program allows the FAA to monitor, maintain, and evolve the ECG system to take advantage of technical advances.

The program office developed the ECG Sustainment and Technology Evolution Plan (STEP) to document the multi-year approach to maintaining the viability of the ECG system. This approach to sustainment and technical evolution combines purposeful, ongoing monitoring for obsolescence or evolution opportunities with proactive planning to identify the best alternatives and the best solutions to maintaining and evolving the ECG technical baseline.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

ECG replaced the aging PAMRI system. The benefits of ECG over PAMRI are improved efficiency, capacity, and safety by providing controllers with newer, faster, and more capable technology.

More importantly, ECG is necessary to provide the flight/surveillance data necessary for the new En Route Automation Modernization (ERAM) system in support of Air Traffic (AT) operations. ECG uses standardized interfaces and commercial operating systems that facilitate ERAM and allow the addition of EBUS as well as recently implemented interfaces with Flight Data Input/Output (FDIO), Surveillance and Broadcast Services (SBS)/Automated Dependence Surveillance – Broadcast (ADS-B) at Houston ARTCC (ZHU) and system Wide-Area Multilateration (WAM) at Denver ARTCC (ZDV) without architectural changes to meet mission needs and strategic goals. ECG is easily upgraded to support emerging programs and adaptations.

4. How Do You Know The Program Works?

The ECG Operational Availability (OA) Report measures the performance of the ECG investment against an established set of cost, schedule, and performance parameters. The OA provides metrics associated with monitoring the fielded system performance. The results and recommendations of this report can benefit existing services provided by the ECG system as well as enhancing the capabilities of the ECG system to support emerging needs. The report covers all operationally fielded ECG systems, and spans the period from the first ECG site declaring Operational Readiness Demonstration (ORD) through February 25, 2011. This represents 1,042,104 hours of continuous ECG operation.

- The ECG system has experienced no operational outage to date, and as such has achieved an Operational Availability of 1
- Most Line Replaceable Units are experiencing failure rates well within their performance expectations

The ECG system is meeting and exceeding the benefits estimated in the ECG Investment Analysis Report and continues to be the Preferred Solution

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The current funding level is required to provide technology refresh and maintain the ECG systems to support integration of En Route Automation Modernization (ERAM). A robust and operational ECG system is required to field ERAM and other future systems. If funded at less than the $3,100,000 level, the program office would be unable to sustain the listed hardware components.

Failures of the Modem Splitter Cards can lead to possible loss of Surveillance and or Interfacility data that is provided to the HOST and ERAM for air traffic control. Failures of the PDU's can impact the quality of filtered power to ECG equipment that could cause degradation of service to Air Traffic.

Detailed Justification for - 2A04 Next Generation Weather Radar (NEXRAD)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Weather Radar (NEXRAD)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Weather Radar (NEXRAD)	$6,687	$2,800	$3,300	+$500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. FAA Share for NEXRAD Product Improvement (NPI) Science Evolution	---	$1,150.0
2. Icing and Hail Algrithm Enhancement	---	1,050.0
3. Procure Technology Refresh Hardware	---	950.0
4. Configuration Management	---	150.0
Total	Various	$3,300.0

For FY 2013, $3,300,000 is requested to support National Weather Service's (NWS) Dual Polarization contract management efforts and NEXRAD technology refresh planning and procurement efforts. In addition, funds will be used to manage the Massachusetts Institute of Technology/Lincoln Laboratory (MIT/LL) Dual Polarization algorithm development efforts.

NEXRAD algorithms that implement Dual Polarization technology will be finalized, and the NEXRAD program will be supporting external program efforts to ingest and display these new NEXRAD products. Program Office support will assist FAA with the oversight of contracted NEXRAD activities.

The first five Dual Polarization upgrades will be installed and tested in FY 2012. The remaining seven FAA sites will be upgraded in the spring and summer of FY 2013 (funded in FY 2011). Dual Polarization algorithms associated with the detection and dissemination of in-flight icing and hail will be delivered to the NWS in the summer of 2012, and incorporated into the NEXRAD baseline in the spring of 2013.

2. What Is The Program?

NEXRAD is a modern long-range weather radar that detects, analyzes, and transmits weather information for use by en route and terminal radar control facilities. This helps traffic management units determine the location, time of arrival, and severity of weather conditions to determine the best routing for aircraft controlled by these facilities.

Currently there are 159 NEXRAD systems operated jointly by the Tri-Agency partners - the National Weather Service (NWS), the FAA, and the Department of Defense (DoD). The NWS is the lead agency for the NEXRAD program.

The NEXRAD Legacy, Icing, and Hail Algorithm (NLIHA) Program has two main purposes:

- Along with the Department of Commerce (DoC) and the U. S. Air Force (DoD), the FAA provides support for product improvements to the Legacy NEXRAD program in accordance with Tri-Agency Memorandum of Agreement (MOA). In addition to annual cost-share requirements for NEXRAD Product Improvements Science, Evolution and NWS infrastructure support, the Tri-Agency team is currently acquiring a Dual Polarization capability for the NEXRAD platform via a five-year contract that is managed by the NWS. Each year, the FAA is required to pay its pro-rata share of Dual Polarization acquisition costs, along with allocated technical refresh costs. NLIHA is the vehicle by which the FAA meets its funding obligations to the Tri-Agency Partnership.

- The FAA continues to invest in the development of FAA-specific algorithms that improve NEXRAD weather products for use in aviation applications. In parallel with the ongoing acquisition of Dual Polarization technology for their NEXRAD platforms. NLIHA is developing algorithms that use Dual Polarization to discern and display in real time, incidences of in-flight icing and hail.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

NEXRAD, a Tri-Agency program between the Department of Transportation (DoT), the DoD, and the Department of Commerce's (DoC) National Weather Service (NWS) share developmental costs in proportion to the number of systems fielded by each agency. The FAA's NLIHA program represents the vehicle by which the FAA contributes its share to ongoing NEXARD development costs, and this program ensures that FAA dollars are applied wisely, and in a manner that maximizes the NEXRAD's benefit to the aviation community. The NWS is the lead agency responsible for the overall coordination of the development and implementation of the system upgrades. NEXRAD detects, processes, and distributes for display, hazardous and routine weather information. Technical upgrades are necessary to enhance NEXRAD and provide air traffic control (ATC) with weather detection equipment to improve safety by detecting and characterizing hazardous weather phenomena.

In 1979, Congress directed DoT (FAA), DoC (NWS), and DoD to work together to develop a Doppler weather radar system to be shared by all agencies. The Tri-Agency MOA commits the participating agencies to support, maintain, and enhance the NEXRAD system over the NEXRAD's service life, currently projected to 2025.

The FAA's NEXRAD program provides the means to fund the FAA's share of the overall NEXRAD mission, and to ensure that FAA priorities are included in the planning for NEXRAD sustainment and improvement.

The NWS awarded a $49 million contract in 2007 to acquire a Dual Polarization capability for the full complement of NEXRADs. Through NEXRAD product improvements, FAA will procure and install Dual Polarization hardware on its independently owned 12 NEXRAD platforms. Simply put, a Dual Polarization radar simultaneously transmits (and receives) radar data in two planes; vertical and horizontal. Analysis of differences in reflectivity from these two sources reveals much more information about the characteristics of the precipitation than comes from single polarization data. Dual polarization will improve overall data quality of existing NEXRAD weather radars. In addition, this capability will provide the ability to detect in real time, regions of icing aloft (in-flight icing). When fully developed and implemented on appropriate down stream system/platforms (e.g., FS21, ITWS, WARP and eventually, NextGen/NNEW), this capability offers the potential to significantly reduce icing-induced accidents and fatalities that are common in the General Aviation (GA) community.

4. How Do You Know The Program Works?

NEXRAD systems have increased aviation safety with the accurate and timely detection of hazardous aviation weather conditions. Weather related arrival and departure delays have been reduced, thus allowing aviation fuel consumption savings. While Dual Polarization technology has been utilized in the commercial weather radar community for over 20 years, it is only now being introduced onto the NEXRAD platform. Without the introduction of the in-flight icing and hail detection algorithms, Dual Polarization will provide incremental improvements in overall data quality over the present day NEXRAD.

The Dual Polarization acquisition contract, which is managed by the NWS, employs an acquisition life-cycle approach that is much like the FAA's Acquisition Management System (AMS). The NWS's approach to testing is no less rigorous than the FAA's. Furthermore, contract performance is tracked through a rigorous

Earned Value Management System (EVMS), which ensures effective tracking of contractor performance against the program's cost and schedule milestones.

Massachusetts Institute of Technology/Lincoln Laboratories (MIT/LL) has a long history of success in developing algorithms for the FAA's NEXRAD and TDWR programs, and preliminary results from their development work on other Dual Polarization radars shows considerable promise. MIT/LL's current development efforts are closely managed by the NEXRAD Program Office, utilizing the support services of senior subject matter experts, who ensure that these efforts are aligned with FAA's mission and primary goals.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$3,300,000 is required to fulfill the FAA's continuing commitment to NEXRAD sustainment and product improvement, in accordance with the Tri-Agency MOA. The MOA, originally implemented in 1980, was renewed in October 2009 for another 5-year period. Specifically, this includes the FAA's share in FY 2013 for the Dual Polarization contract, NEXRAD technical refresh planning efforts, and to provide NWS additional funding for NEXRAD hardware technology refresh. In addition, this funding will cover the final year of the development and test of in-flight icing and hail detection algorithms that will be installed onto the NEXRAD Radar Product Generator (RPG) in 2013.

A reduction from the FY 2013 Baseline Funding will impact the NEXRAD Program Office's ability to continue the level of project oversight and subject matter expertise that has made the program work successfully to date.

Detailed Justification for - 2A05 ARTCC Building Improvements/Plant Improvements

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – ARTCC Building Improvements/Plant Improvements
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
ARTCC Building Improvements/Plant Improvements	$36,818	$41,000	$46,000	+$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. ARTCC Facility Modernization	---	$32,600.0
2. ARTCC Sustainment	---	11,000.0
3. In Service Engineering	---	2,400.0
Total	Various	$46,000.0

For FY 2013, $43,600,000 is requested to continue Air Route Traffic Control Center (ARTCC) modernization and sustainment projects. Major construction projects will replace obsolete plant equipment and provide improved work areas. These projects will include asbestos abatement, replacement of mechanical/electrical systems, and the installation of fire detection and protection upgrades as well as interior architectural construction. All facilities will also receive smaller mission critical sustainment projects to mitigate the risk to operations associated with infrastructure failures. An additional $2,400,000 is requested for in service engineering activities.

2. What Is This Program?

This is a multi-year facility modernization and sustainment program that addresses physical plant requirements for the FAA's 21 ARTCC's as well as the Combined Center Radar Approach Control (CERAP) facilities at San Juan and Guam. These facilities were originally constructed approximately 50 years ago and expanded in phases since then. Much of the plant equipment within these buildings has exceeded its' life expectancy and must be replaced. This program replaces obsolete equipment and provides an efficient, reliable and safe work environment for en route air traffic control operations.

In-service engineering allows for immediate response to emerging technology solutions. Funding is needed for ongoing engineering support of all prototyping efforts.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The ARTCC Plant Modernization program is necessary to support Air Traffic Control (ATC) operational requirements, to reduce the risk of ATC delays caused by infrastructure failures, and to minimize future capital liabilities associated with infrastructure failures. These facilities and much of the mechanical and electrical equipment within them are approximately 50 years old. Many of the systems have exceeded their life expectancies and are at risk of failure. For example, in June 2001 smoke from a kitchen fire at the Cleveland ARTCC required an evacuation of the control room resulting in the loss of ATC capability for 16 minutes over 65,000 square miles. Fifty flights were delayed and all en route traffic was routed around the Cleveland airspace. In FY 2005 alone, there were eight catastrophic occurrences of pipe ruptures which could have similarly affected operations. At the Washington ARTCC, plastic sheeting had to be draped over air traffic control positions to continue operations during one such occurrence. Roof leaks, pipe failures and malfunctioning heating, ventilation and air conditioning (HVAC) equipment can also contribute to mold growth and adversely affect the health of employees within these facilities.

The presence of asbestos fireproofing continues to pose a risk to maintenance personnel and significantly increases costs associated with maintenance or repair activities. Fire protection systems must be added in some areas of the buildings to meet building codes and structural upgrades are also necessary at ARTCC's in seismic areas.

In FY 2010, a national condition assessment survey identified a $90.8 million backlog of facility equipment that is past its life cycle. Obsolete equipment in this backlog increases the risk to facility operations in the event of failure. Additionally, when this equipment fails, the FAA often must expend additional funding to repair affected areas. For example when a roof or pipe leaks, repairs must be made to walls, ceilings, and carpets.

4. How Do You Know The Program Works?

Over the past seven years this program has been able to reduce the national backlog by approximately $30 million. The associated reduction in out year capital liabilities is approximately $120 million. Operations risks have been mitigated by focusing sustain projects on the most critical failure modes. Personnel and life safety risks have been reduced through asbestos abatement and fire protection projects. Indoor air quality and mold risks have been reduced through roofing, piping and HVAC projects. Space utilization has been improved by providing more efficient configurations in office areas.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The ARTCC Modernization Program is primarily composed of 14 standard projects that are implemented at all facilities. Currently 9 of the 14 projects are complete. While the remaining four projects are not projected to be complete until the early 2020s, much of the equipment that was installed in the early phases of this program is beginning to reach its lifecycle. During these early phases, annual budgets were in the $100 - $130 million range and significant amount of infrastructure equipment was installed. Funding at the requested level is required to address remaining projects and keep pace with an increasing amount of equipment replacements that will be required in the upcoming years to avoid impacts to air traffic control operations.

A reduction would result in increased risk of infrastructure failures that could affect ATC Operations, and increased OPS liabilities associated with the Backlog Infrastructure Failures.

Detailed Justification for - 2A06 Air Traffic Management (ATM) – Traffic Flow Management (TFM)

1. What Is The Request And What Will We Get For The Funds?

**FY 2013 – Air Traffic Management (ATM)
($000)**

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Air Traffic Management (ATM)	$14,671	$7,500	$21,700	+$14,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. ATM-TFM Infrastructure Technical Refresh	---	$19,400.0
2. ATM-TFM In-Service Engineering	---	2,300.0
Total	Various	$21,700.0

For FY 2013, $19,400,000 is requested to conduct the procurement and installation of replacement hardware for the Traffic Flow Management (TFM) Processing Center (TPC), also referred to as the TFM System Core, at the William J. Hughes Technical Center (WJHTC). An additional $2,300,000 is requested for In-Service Engineering activities.

2. What Is This Program?

The TFM system is the automation backbone for the Air Traffic Control System Command Center (ATCSCC) and the nationwide Traffic Management Units that assist the ATCSCC in strategic planning and management of air traffic. The TFM system is the nation's primary source for capturing and disseminating flight information across the aviation community. The automation and communication mechanisms provided by the TFM system support the decision-making process used to adjust flight schedules and/or routes as necessary. When the National Airspace System (NAS) is impacted by severe weather, congestion, and/or outages, the TFM system has unique capabilities to predict chokepoints and facilitate the collaboration and execution of mitigation initiatives with stakeholders, using common information displays and tools, to minimize NAS delays.

ATM TFM Infrastructure Tech Refresh will:

- Provide a replace-in-kind technology refresh of the hardware used for the TFM Processing Center (TPC), also referred to as TFM System Core, at the William J. Hughes Technical Center. This hardware provides the central data processing capability for the TFM System.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The FAA must maintain mission essential operations at 81 TFM-equipped ATC facilities for its customers and continue to provide enhanced TFM services. The TFM System provides direct mission support to the FAA by ensuring efficient flow of air traffic through the NAS.

- Currently the TFM System exceeds the current hardware specifications and as a result, experiencing performance degradation. Performance degradation forecasts have not take into account the planned CATMT WP2 and WP3 functionality which will utilize the same hardware. Therefore there is added risk that the increased utilization due to the additional functionality will accelerate performance degradation. The TFMS Technical Refresh improves performance by replacing the hardware providing the central data processing capability for the TFM System.

4. How Do You Know The Program Works?

Since FY 2005 before the deployment of any of the TFM CATMT WP 1 enhancements, the percentage of flights with "Inequitable Delays - Fraction of Flights with the Highest Delay (defined as delay at least three times the median value of all delays) has been reduced from two percent in FY 2005 to one percent in FY 2009*, the last year data was available.

*Metrics and Analysis report performed by Flatirons Solutions, Inc. (November 2009)

The TFMS Technical Refresh is the hardware replacement of the TFM System Infrastructure (TFMS Core) equipment to avoid obsolescence, system performance degradation and avoid impact on other programs. The TFM System performs today and provides benefits through the CATMT applications. It enables the TFM and CATMT programs to continue to achieve benefits.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Funds are required to purchase hardware and continue the technology refresh installation activities for the TFM Processing Center at the William J Hughes Technology Center.

Detailed Justification for - 2A07 Air/Ground Communications Infrastructure

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Air/Ground Communications Infrastructure
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Air/Ground Communications Infrastructure	$7,585	$4,800	$4,000	-$800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Communications Facilities Enhancement (CFE) Expansion	---	$3,000.0
2. In Service Engineering	---	1,000.0
Total	Various	$4,000.0

For FY 2013, $3,000,000 is requested to fund six CFE expansion/relocation sites, procure replacement radios, equipment racks, antennas, towers, and site preparation. Also requested is $1,000,000, for in service engineering activities.

2. What Is This Program?

Air/Ground Communications Infrastructure will replace aging and increasingly unreliable equipment and communications facilities. In addition, Air/Ground Communications Infrastructure will establish new communications facilities.

Communications Facilities Enhancement/Expansion (CFE) – This program provides new communications facilities and equipment. The program also improves and/or relocates current communication facilities to meet new demands.

Radio Control Equipment (RCE) – This program replaces radio signaling and tone control equipment. The equipment is located at all air route traffic control centers, remote center air/ground communications facilities, air traffic control facilities, remote transmitter receiver sites, flight service stations and remote control outlets.

In-Service Engineering – Allows for immediate response to emerging technology solution. Funding is needed for on-going engineering support of all prototyping efforts.

DOT Strategic Goal - Economic Competitiveness.

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The current air/ground communication system must be improved to support FAA's goal to provide increased capacity in the U.S. airspace system that reduces congestion and meets projected demand. The growth in air traffic operational requirements has increased the need for air/ground communications coverage. The current system is aging, increasingly unreliable, and susceptible to radio interference. Disruptions of air/ground controllers to communicate with aircraft around affected areas may remove the ability of ground controllers to communicate with aircraft. Radio frequency interference at an Air/Ground (A/G) facility would severely disrupt air traffic services. Due to the deferment of the next generation air/ground communications (NEXCOM) system development program, FAA must continue to support the radio control equipment requirement to support expanded communications coverage.

Additionally, the CFE program represents 16 of the top 50 projects listed by the three Service Areas. Examples of these projects include establishing a Very High Frequency (VHF) Remote Communications Outlet (RCO), establishing a Remote Communications Air to Ground (RCAG) facility, and replacing an RCO antenna tower.

4. How Do You Know The Program Works?

New and relocated communication facilities enable the establishment of new sectors to support capacity. In addition, new and relocated communication facilities will enable new and more efficient flight patterns. Efficient flight patterns reduce aircraft operations and maintenance costs for the airline industry. New communications equipment will lower periodic and correctional maintenance costs associated with the old and technically obsolete equipment in the field.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The CFE and RCE programs maintain and increase air traffic capacity by ensuring the availability of equipment and facilities that are a critical component in pilot and controller communications.

CFE:
A reduction would result in FAA not being able to purchase equipment or fund site surveys for several projects and will delay implementation of two sites out of approximately eight planned sites for FY 2013.

A further reduction would result in FAA not being able to purchase equipment or fund site surveys for several projects and will delay implementation of two sites out of approximately eight planned sites for FY 2013.

Detailed Justification for - 2A08 Air Traffic Control En Route Radar Facilities Improvements

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Air Traffic Control En Route Radar Facilities Improvements
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Air Traffic Control En Route Radar Facilities Improvements	$5,289	$5,800	$5,900	+$100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Infrastructure Upgrades	---	$5,000.0
2. In Service Engineering	---	900.0
Total	Various	$5,900.0

For FY 2013, $5,000,000 is requested to continue facility maintenance and upgrades to the 148 Long Range Radar (LRR) sites. An additional $900,000 is requested for in service engineering activities.

2. What Is The Program?

The LRR Facilities Improvements program addresses the critical infrastructure requirements of the FAA-owned surveillance facilities serving the National Airspace System (NAS). The NAS currently has 148 surveillance facilities that provide aircraft position information to FAA En Route control centers and to other users (e.g., Department of Defense and Homeland Security). They all contain critical long-range secondary beacon radars. Many of these (long range radar) sites were established in the early 1950's and have reached their design life. Due to the extreme age of these facilities, the need for infrastructure maintenance and upgrades are required at all of these sites.

The NAS requires reliable and continuous operation of surveillance equipment. The repairs, improvements, and modernization to existing infrastructure will enable the facilities to meet current operational, environmental, and safety needs. It will extend the service life of facilities, and reduce the chance of outages that often cause air traffic delays.

Today, FAA air traffic control (ATC) calls for seamless surveillance information provided within each air traffic controller's area of responsibility. In order to reliably provide flawless surveillance information in en route environment and avoid operational outages that have severe and immediate impacts on the air traffic control services, the infrastructure deficiencies must be corrected without delay.

The existing air surveillance infrastructure has shortfalls that must be addressed sequentially for the air surveillance system to continuously meet the user needs into the future. The immediate need is to ensure that current air surveillance capabilities do not further degrade while planning and implementing longer-term solutions.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The planned infrastructure modifications will provide greater efficiency and reduce operating costs in en route air traffic control and facility maintenance operations by refurbishing en route equipment and facilities. The majority of the en route surveillance facilities require improvements and/or modifications to correct existing deficiencies. Approximately 40 percent of en route surveillance service outages currently experienced can be directly linked to infrastructure failures and deficiencies. Prior year accomplishments lowered the potential for reduced coverage. Projects include repair and replacement of heating, ventilation, air conditioning, air handlers, chillers, engine generators, elevators, uninterruptible power systems, lightning protection, grounding, bonding, and shielding (LPGBS) systems, access roads, security systems, storm water controls, sewage systems, roofs, and structural restorations to support Air Traffic Control Beacon Interrogator model 6 (ATCBI-6) deployments and existing Mode Select beacon radars.

4. How Do You Know The Program Works?

Air Route Surveillance Radar (ARSR) equipment availability over the previous 12-month period (ending March 31, 2011) has continued in an upward trend:

- Availability from April 2009 through March 2010 ....96.6 percent
- Availability from April 2010 through April 2011 ....98.4 percent

The LRR Infrastructure Improvements Program is one of the reasons for this increase. The LRR Infrastructure Program helps LRR facilities continue to meet operational, environmental, and safety needs, well beyond their expected service life. Without this program, infrastructure failures will result causing surveillance equipment failures that directly impacting the NAS.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The estimated deferred maintenance backlog for the LRR facilities is $113 million and is based on the projected cost to sustain and upgrade the 148 surveillance facilities owned by FAA. Funding is required to repair, maintain, replace and upgrade: facility roofs; heating, ventilation and air conditioning (HVAC) systems; uninterruptible power supply (UPS), lightning, grounding, bonding, and shielding (LPGBS) system; boilers; chillers; duct works; electrical wiring, plumbing; underground pipes; structural foundations; stairs; handrails; siding and external weather proofing; flooring and sub-floor; security gates; fences; and access road surfaces.

The required $5,900,000 is to make repairs to the facilities that are in poor condition and have greatest impact to the NAS. It will extend its service life and lower the risk of NAS outages to occur. Evidence shows up to ten-fold savings if properly funded sustainment programs were instituted. The required funding level will enable a proactive approach to facilities management and life-cycle.

A reduction from FY 2013 baseline funding will delay the required repairs and upgrades to LRR facilities. These facilities housed and protect the FAA's state of the art systems and equipment from the elements. They are essential to the nation's security and aviation safety. Majority of these facilities exceeded their design life and require upgrades /maintenance. Deferring essential maintenance will significantly increase forthcoming cost to refurbish and result to a deterioration of the infrastructure in a faster phase leading to failures of the surveillance radars and causing flight delays.

Detailed Justification for - 2A09 Voice Switch and Control System (VSCS)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Voice Switch and Control System (VSCS)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Voice Switch and Control System (VSCS)	$15,569	$1,000	$15,000	+$14,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. VSCS Sustainment Activities	---	$6,800.0
2. Engineering Analysis	---	4,700.0
2. Program Management	---	1,500.0
3. Contractor Support	---	1,500.0
4. Tech Ops Engineering Support	---	500.0
Total	Various	$15,000.0

For FY 2013, $15,000,000 is requested to conduct VSCS Technology Refresh Phase 3 Activities.

2. What Is This Program?

The VSCS controls the switching mechanisms that allow controllers to select the communication channel they need to communicate with pilots, other controllers, other air traffic facilities, and commercial telephone contacts. It is essential that controllers be able to select the proper channel so they can communicate with pilots, coordinate with other controllers and/or contact emergency services as necessary. These large switches handle communication connections for 40 to 60 active air traffic control workstations at each of the 21 en route centers.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The VSCS Technology Refresh program will replace and upgrade hardware and software components for the voice switching systems in all 21 en route Air Route Traffic Control Centers (ARTCCs). The technology refresh will be required to ensure that the VSCS continues to provide reliable voice communications, which can support future en route operations. These upgrades will ensure that the air-to-ground and ground-to-ground communications capabilities are reliable and available for separating aircraft, coordinating flight plans, and transferring information between air traffic control facilities in the en route environment. The real time Field Maintenance/Testing System at the FAA William J. Hughes Technical Center (WJHTC) and the Training System at the FAA Academy will also be upgraded to perform the same as an operational site. To date, this program has replaced all VSCS internal control systems. Equipment has been procured to replace the VSCS Traffic Simulation Unit at the FAA WJHTC. This test bed is being used to test the capabilities of the upgraded systems to determine if they meet the formal baseline requirements established for VSCS performance.

4. How Do You Know The Program Works?

VSCS is an integral part of a functional en route air traffic control system. Providing the following qualitative benefits: Reliable access to many different ATC radios; Ability for ATC personnel to communicate with each other and coordinate work in the ARTCCs; and Reliable and maintainable voice communication switching in en route ATC facilities. The following benefits are non-quantified for Phase II tech refresh: Voice Switching and Control System Training and Backup Switch (VTABS) Power Supply Retrofit allows continued power supply backup to VTABS; Repeater/ Local Area Network (LAN) Modification allows future expansion of LAN; Depot Test Equipment allows continued depot-level repair, ensures timely depot-level repair, and eliminates dependency on Programming language for Micro Computers (PL/M) SW engineers. Enhanced technician diagnostic software reduces technician fault assessment time and reduces depot test of non-faulted line replacement unit.(LRUs). PL/M to C Software Conversion eliminates dependency of scarce PL/M SW engineers. In addition, Virtual Address Extension (VAX) Compilers used to compile PL/M are obsolete. Since the benefits were determined to be equal among the alternatives, investment decisions were made based on cost.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$15,000,000 is required to conduct VSCS Technology Refresh Phase 3 which will ensure that VSCS continues to provide reliable voice communications that can support the current and future en route operations. The projects that are being reviewed for Phase III are Cutover Switch Retrofit, Life of Type Spares Purchases, Virtual VAX, VTABS PECO Tech Refresh, VTABS Sustainment Tech Refresh, Government Inventory Refurbishment, Transceiver Retrofits, Air to Ground PL/M to C Software Conversion, Test Set Tech Refresh, VSCS Control Subsystem Tech Refresh and Liebert Power Conditioner Tech Refresh.

NAS Voice System (NVS) funding is being reduced, requiring the VSCS to provide reliable voice communications for en route operations for an additional 10 years. This funding will mitigate that risk.

Detailed Justification for - 2A10 Oceanic Automation System

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Oceanic Automation System
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Oceanic Automation System	$3,992	$4,000	$4,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Oceanic Automation System (OAS) Prime Contract	---	$3,250.0
2. Program Management	---	750.0
Total	Various	$4,000.0

For FY 2013, $3,250,000 is requested to award of the Oceanic engineering and software development follow-on contract, support the transition between the incumbent and new contractor, provide for the delivery of ATOP operational improvements, safety enhancements, and Agency commitments to the three Oceanic Air Route Traffic Control Centers (ARTCCs) at Oakland, New York and Anchorage. Also requested is $750,000 for program management and engineering support.

2. What Is This Program?

The Advanced Technologies and Oceanic Procedures (ATOP) program has replaced existing oceanic ATC systems and procedures with a single integrated system and modernizes facilities responsible for managing over 24 million square miles of airspace over the Atlantic and Pacific Oceans. ATOP fully integrates flight and radar data processing, detects conflicts between aircraft, provides data link and surveillance capabilities, and automates the previous manual processes. The ATOP system collects, manages, and displays oceanic air traffic data, including electronic flight-strip data, on the computer displays used by air traffic controllers and integrate capabilities such as flight data processing, radar data processing, automatic dependent surveillance, controller pilot data link and conflict probe. ATOP provides a modernized oceanic air traffic control automation system including, installation, training, procedural development support and life-cycle system maintenance. Operational systems reside at the Oakland, New York, and Anchorage ARTCCs. A test and training system is in use at the William J, Hughes Technical Center (WJHTC). Now that ATOP is in operational use, the program office is gathering and documenting performance data and metrics to measure productivity, efficiency, user satisfaction, and project future system benefits.

The technology refresh for the automation system was completed for all three operational sites and the system installed at the William J, Hughes Technical Center (WJHTC). This technology refresh activity increased system performance, capacity, and usability, and made improvements to software functionality. The ATOP program will continue to deliver enhance safety, provide operational efficiency improvements, and support FAA and International Civil Aviation Organization (ICAO) mandated system changes through FY 2014.

DOT Strategic Goals: Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

ATOP allows the FAA to reduce the use of the difficult communications systems and the intensively manual processes that limited controller flexibility in handling airline requests for more efficient tracks over long oceanic routes. The program provides automated displays, Automatic Dependent Surveillance-Contract (ADS-C), and conflict resolution capability required to reduce oceanic aircraft separation from 100 nautical miles to 30 nautical miles.

ATOP has been implemented at New York, Oakland and Anchorage. The system performance data has been analyzed, a baseline has been established, and a fuel savings performance model has been developed. Further development of the fuel burn model through the use of a comprehensive oceanic analysis, simulation and modeling capability, will be used to further measure how ATOP contributes to fuel efficiency.

4. How Do You Know The Program Works?

Although oceanic flights comprise only four percent of total U. S. air carrier operations, they provide 49 percent of the international cargo revenue and 20 percent of the passenger revenue. The new automation system has reduced aircraft separation from 50 nautical miles lateral/10 minutes longitudinal to 30 nautical miles lateral/30 nautical miles longitudinal (equates to four minutes). Ninety percent more altitude change requests were granted at Oakland Center and New York Center in September 2005 versus September 2004. ATOP automation has allowed for the use of new routes from South America to New York, saving between 2,000 - 4,000 pounds of fuel per flight. ATOP increases oceanic capacity and efficiency, has mitigated potential cost of delays, and is expected to save airlines and aircraft operators more than $5 billion in fuel costs. ATOP has enhanced communication and surveillance, which has increased sector capacity. Annual U.S. transoceanic revenues are projected to increase significantly by the year 2010.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$4,000,000 is required to complete the award of the Oceanic engineering and software development follow-on contract, support the transition between the incumbent and new contractor, provide for the delivery of ATOP operational improvements, safety enhancements, and Agency commitments to the three Oceanic Air Route Traffic Control Centers (ARTCCs) at Oakland, New York and Anchorage. Funding at the requested level will also provide for the necessary level of program management and engineering support.

A reduction in funding below the request level impacts the program's ability to deliver external and internal agency commitments and specifically the International Civil Aviation Organization (ICAO) 2012 flight plan initiative.

Detailed Justification for - 2A11 Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$49,750	$45,150	$33,650	-$11,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$4,800.0
2. In Service Engineering	---	4,200.0
3. Hardware/Software	---	9,000.0
4. Logistics	---	1,000.0
5. Implementation	---	11,400.0
6. UHF Radio Replacement (for Nexcom Seg 2)	---	3,000.0
7. Independent Operational Test and Evaluation (IOT&E)	---	250.0
Total	Various	$33,650.0

For FY 2013, $8,400,000 is requested for NEXCOM Segment 1a. Segment 1a 708 multi-mode digital radio (MDR) receivers/transmitters (RX/TX) installed at 68 sites across the United States. For NEXCOM Segment 2, $25,000,000 is requested to install 1,188 RX/TX and 592 Ultra High Frequency (UHF) 592 (RX+TX) radios in terminal and flight Services facilities. An additional $250,000 is requested for Independent Operational Test and Evaluation (IOT&E).

2. What Is This Program?

NEXCOM will implement a new air/ground voice communication system using the limited available radio frequency spectrum more efficiently. NEXCOM will provide the operational flexibility required for NextGen. NEXCOM will be implemented in two segments (previously three).

- Segment 1 addresses the en route environment, and is divided into two phases, Segments 1a and 1b.
    - Installation of Segment 1a multimode digital radios (MDRs) began in 2004. The radios can function in analog or digital modes, though only one at a time. The MDRs, which will initially operate in the analog channel mode, will be a major improvement to our aging air-to-ground communications infrastructure.
    - NEXCOM Segment 1b, system hardware and software has been cancelled because the agency believes that the spectrum problem can be addressed by the combination of the MDR and the Data Communications Program.

- Segment 2 (2010 - 2027) will implement MDR and UHF radios that will service the high-density terminal areas and the flight service operations.

- The UHF radio replacement will provide significant benefits to the FAA. The UHF radios will be deployed concurrently with the multi-mode digital radios and will achieve minimum cost avoidance.

The difference between the cost of purchasing new radios and the cost of refurbishing and repackaging radios to meet these requirements will result in savings of $5,600,000 over four years. Deploying the radios concurrently also leaves the en route air/ground remote sites with new, more reliable major components, which reduce maintenance expenses. The UHF radios also provide a vital part of the critical infrastructure supporting the nation's homeland defense efforts.

DOT Strategic Goal: Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The existing Very High Frequency (VHF) analog controller-to-pilot communications system lacks the capacity and flexibility to accommodate future growth in air traffic. The FAA goal of Reduced Congestion is at risk due to the lack of available air traffic control radio spectrum in high-density areas. The continuous growth in air traffic and the introduction of new services has driven a proportional demand (approximately four percent per year) for air/ground communication frequency assignments. The system is beyond its estimated life-cycle and is increasingly expensive to maintain. Air/ground communication is the most fundamental and safety critical element of the ATC system supporting all phases of flight for en route, terminal, and flight service operational environments. There are approximately 60,000 analog radio units installed at over 4,650 sites.

NEXCOM will meet the new and growing demands for air transportation services; accommodate the growing number of sectors and services; utilize VHF spectrum required for voice communications more efficiently and make the recovered spectrum available for data communications (a future NextGen initiative); and improve reliability and reduce the growth of maintenance costs by replacing aging air/ground communications equipment with new digital equipment.

4. How Do You Know The Program Works?

Since deployment of NEXCOM radios in 2005, there have been two Air Traffic delays due to reported radio outages (for comparison, there were 32 in 2001 and 2002). Additionally, the Post Implementation Review team recently finalized an independent study of the NEXCOM program benefits and concluded the following: the NEXCOM investment program meets the service needs of its customers; the NEXCOM investment program meets baseline benefits expectations; and the NEXCOM investment business case is still valid.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

NEXCOM - Segment 1a: The baselined NEXCOM program must be funded at the requested levels to continue working at the accelerated deployment rate. The NEXCOM program has far exceeded the original deployment projections in the en route environment, which it expects to complete in 2013. Currently 978 of the 1,217 en route NEXCOM radios are available.

A reduction would delay implementation of five NEXCOM 1a sites in the en route environment.

A further reduction would delay implementation of 12 en route NEXCOM 1a sites.

NEXCOM - Segment 2: It is imperative that the NEXCOM program smoothly and effectively transition from the en route environment to the terminal environment during the next three years and the required funding will be necessary for this transition.

This reduction will delay implementation of multiple sites and push the installation out past 2027.

A further reduction would delay implementation of nine terminal or flight services NEXCOM Segment 2 sites.

UHF Replacement: For FY 2013 and beyond UHF radios will be combined with the Nexcom Segment 2 BSLI. Of the approximately 60,000 radios in the NAS, about 40 percent are UHF. Most of these radios (75 percent+) are over 25 years old. Mission Need Statement 137 identified supportability/reduction of logistics costs for both the VHF and UHF radios as one of the four primary drivers for a new system. NEXCOM program will solve the VHF supportability problem and will incorporate remote monitoring and control. Remote monitoring and control cannot be extended to the UHF part of the system without the introduction of a new UHF radio. The NEXCOM MDR transmitters will be available in high and low power versions, which will eliminate the need for 50 watt VHF Linear Power Amplifiers (LPAs). However, without new high and low power UHF transmitters the UHF LPAs must remain in place.

A reduction would result in the NEXCOM program will not being able to purchase enough UHF high power radios and possibly of the need to extend the UHF contract.

A further reduction would result in the NEXCOM program will not being able to purchase 50 UHF high power radios.

Detailed Justification for - 2A12 System-Wide Information Management (SWIM)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – System-Wide Information Management (SWIM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
System-Wide Information Management (SWIM)	$89,121	$66,350	$57,200	-$9,150

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Segment 1:		
1. Traffic Flow Management Data Publication	---	$2,900.0
2. Terminal Data Distribution System Publication	---	4,300.0
3. SWIM Core Services	---	13,100.0
4. Flight Data Publication Service	---	12,700.0
5. Independent Operational Test and Evaluation (IOT&E)	---	200.0
Total	Various	$33,200.0
Segment 2:		
6. Common Support Services – Phase 1 - Weather	---	$23,800.0
7. Independent Operational Test and Evaluation (IOT&E)	---	200.0
Total	Various	$24,000.0

For FY 2013, $33,000,000 is requested for Segment 1 efforts, $23,800,000 for Segment 2 Common Support Services, and $400,000 for IOT&E.

2. What Is This Program?

The SWIM program is an information management and data sharing system for Next Generation Air Transportation System (NextGen). SWIM will provide policies and standards to support data management, secure its integrity, and control its access and use. SWIM is being developed incrementally. The initial phase of SWIM, which is referred to as Segment 1, includes capabilities that were selected based upon the needs of various data communities, maturity of concepts of use, and the ability of existing programs to accommodate development of these SWIM capabilities within their existing program plans. Future segments will be defined in a similar manner and will include additional capabilities that move the FAA toward the data sharing required for NextGen.

SWIM will reduce the number and types of unique interfaces, reduce redundancy of information and better facilitate information-sharing, improve predictability and operational decision-making, and reduce cost of service. The improved coordination that SWIM will provide will allow for the transition from tactical conflict management of air traffic to strategic trajectory-based operations. In addition, SWIM will provide the foundation for greatly enhanced information exchange and sharing with other agencies.

Weather will be the first instance in the first phase of a NAS Common Support Services capability to disseminate aviation weather and aeronautical information in a network enabled and global environment utilizing SWIM Segement 2 enterprise services/infrastructure. Establishing and utilizing open standards and developing the software necessary to support universal access to this information will provide an enhanced method of making aviation weather information available to NextGen stakeholders. It will utilize Service Oriented Architecture (SOA) architecture to enable common, universal access to aviation weather data. It will develop the standards, procedures, and field the system capabilities necessary to support these functions. Common Support Services, Phase 1 - Weather is a key contributor to an effort to provide quick, easy, and cost-effective access to weather information for all users of the National Airspace System (NAS).

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Today's hard-wired infrastructure and systems cannot readily support the addition of new data, systems, data users, and/or decision makers as NextGen requires. In general, they are connected directly to support yesterday's decision-making needs. Each of these interfaces is custom designed, developed, managed, and maintained individually at a significant cost to the FAA. NextGen relies upon a new decision construct that brings more data, systems, customers, and service providers into the process. Data will be needed at more places, for more purposes, in a timely manner, and in common formats and structures to ensure consistent use. These new "data customers" need to be accommodated by providing the governance and policy that tells them how to connect to existing, open interfaces instead of designing, developing, testing, and implementing new ones from scratch. Network technology and data management software must use commercial equipment and current industry standards, to reduce developmental and upgrade cost and simplifying maintenance. Today's point-to-point architecture does not support these goals. This situation represents a performance gap that must be bridged for NextGen to be successful.

SWIM is vital to the achievement of national, DOT, and FAA strategic plans and the future evolution of air transportation management in the nation because it will provide vital infrastructure to the NAS, replacing inefficient and costly information exchange currently in use. The current FAA systems and operations cannot support NextGen in part because they are not network-enabled, but are instead characterized by rigidly configured systems (communications lines, computers, and software applications).

SWIM contributes to meeting these NextGen objectives:

- Expand System Capacity - The projected increase of demand on the air traffic system exceeds current or projected growth in FAA resources. Information management is a key to providing increased capacity and efficiency in the NAS. SWIM will enable information to be readily shared and used by all NAS participants. With more widespread use of better data, SWIM will improve strategic planning and trajectory management to allow better use of existing capacity en route.
- Increase Predictability - SWIM will improve coordination to allow transition from tactical conflict management to strategic trajectory-based operations. SWIM will also provide the potential to increase machine-to-machine interchange supporting and disseminating decisions rather than the current man-to-man interactions. SWIM increases the likelihood that similar decisions will be consistent by enabling them to be based on the same data.
- Reduce Costs for Aviation - SWIM will help to reduce infrastructure costs by reducing the number and types of interfaces, systems, and potentially, facilities. Initially, SWIM will provide a common network capability, reducing operation and maintenance costs of the hundreds of current interfaces. New systems will interface with SWIM, saving future development costs. Ultimately, redundant sources of data will no longer be needed and can be decommissioned.
- Shared situational awareness - SWIM will help to provide shared situational awareness so that all appropriate parties are privy to the same complete set of information.
- Collaborative Decision Making - SWIM will enable collaborative decision-making, by providing all parties access to the same information where they can make real-time decisions and reach agreements quickly.

Delays in the NAS are primarily attributable to weather. Over the last five-year period, more than 70 percent of delays of 15 minutes or more, on average, were caused by weather, based on Aviation System Performance Metrics and Operations Network data. Weather also impacts safety. Between 1994 and 2003, weather was determined to be a contributing or casual factor in over 20 percent of all accidents. In today's NAS, most decision tools, manual and automated, do not utilize weather information effectively or at all.

This condition is partly due to gaps in today's weather dissemination system. The current weather dissemination system is inefficient. Information gathered by one system is not easily shared with other systems. This results in different decision makers having access to different weather information. This lack of a common situational awareness results in inconsistent decision making across the NAS. Rather than sharing pictures of weather systems, we will now utilize open international data standards and instantiate the first phase of the NAS Common Support Services capability so that weather data can be more easily integrated into Air Traffic Management systems.

4. How Do You Know The Program Works?

SWIM represents the steps that FAA is taking to reduce costs while providing better service to:

- Change system interfaces to support network messaging, reducing the cost of testing and maintaining each individual interface (currently a major cost driver and resource load for NAS systems)
- Provide the flexibility to provide information to new systems and locations without adding custom interfaces. This will significantly reduce the marginal cost of adding new system interfaces. Among other metrics, SWIM measures the cost of developing an application-to-application interface
- Provide common interfaces that facilitate spontaneously adding new users and applications, for purposes of continuity of operations

Common Support Services, Phase 1, Weather has entered Initial Investment Decision (IID), and is scheduled to establish a baseline at FID, planned for FY 2013. During this timeframe, a 2013 limited operational capability is planned. It will establish a baseline from which to measure performance as improvements are implemented through the NextGen weather Initial Operational Capability (IOC) time frame. That baseline would determine the capacity in adverse weather provided by the legacy system data accessed by the current user set. A comparison will be made to the change in capacity metrics which ensue due to the availability of the improved data to a wider set of users for common situational awareness. In addition, allowing a universal access method for weather data is anticipated to save on communications bandwidth costs.

Open international standards are being used to format and exchange digital weather data to ensure harmonization and ease of future enhancement and implementation. Also, it is building a prototype for conducting test and evaluations of the developed capabilities to determine how effectively the new capabilities perform. The FAA is also leading the world with EUROCONTROL in developing the Weather Exchange Model (WXXM), which is the emerging worldwide standard for the exchange of weather data. The goal is to provide access to weather data tailored to each user's needs. This enables access by all decision support tools and trajectory-based operations.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$57,200,000 is required for the development of Segment 1 and Segment 2.
Efforts in FY 2013 include implementation of several Segment 1 capabilities and continuation of core oversight activities. For FY 2013, SWIM funding will:

- Provide for operational status on the Terminal Data Distribution System Capability
- Provide for operational status on the Traffic Flow Management, Flow Information Publication and continue work on the Runway Visual Range Capability
- Continue to operate the NAS Service Registry/Repository, COTs Repository, the SWIM Developer WIKI
- Buy required SOA licenses (FUSE) to develop, test, and operate SWIM-compliant capabilities
- Continue to provide governance of the Segment 1 SWIM Implementing Programs (SIPs)

Under Common Support Services, Phase 1, Weather, $24,000,000 is required to provide for a 2013 limited operational capability as an initial contribution to NAS common support services development; to refine software development for the reference implementations; refine security development in the network enabled environment, to acquire hardware, software and communications, and complete documentation necessary for a final investment decision. Included in the request is funding for Program Management and NextGen Systems Engineering, and Interdependent Operational Test and Evaluation (IOT&E).

$400,000 is required for IOT&E support.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 40, 35, Surface

- Publish data for:
  - Pilot weather report
  - Traffic Flow Management
  - Flight Data
  - Runway Visual Range
- Provide terminal data distribution capability
- Provide flight data services with publish/subscribe
- Provide flight data publication host air traffic management data distribution system/flight data input/output and AIM Special Use Airspace client

Detailed Justification for - 2A13 ADS-B NAS Wide Implementation

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – ADS-B NAS Wide Implementation
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
ADS-B NAS Wide Implementation	$175,748	$285,100	$271,600	-$13,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Segment 1:		
1. Solution Development	---	$43,600.0
2. Implementation	---	40,300.0
3. In-Service Program Management	---	179,700.0
4. In-Service Engineering	---	7,100.0
5. Independent Operational Test and Evaluation (IOT&E)	---	900.0
Total	Various	$271,600.0

For FY 2013, $270,700,000 is requested to continue the ADS-B NAS Wide implementation program. Also requested is $900,000 for IOT&E efforts.

2. What Is This Program?

Automatic Dependent Surveillance – Broadcast (ADS-B) is an advanced surveillance technology that provides highly accurate and more comprehensive surveillance information via a broadcast communication link. ADS-B is a surveillance technique in which aircraft provide, via a data link, flight data derived from on-board position-fixing and navigational systems. Aircraft determine their position (longitude, latitude, altitude, and time) using GPS, internal navigational reference system, or otherwise. The aircraft's ADS-B equipment function processes this position information, along with other aircraft-derived flight parameters, into a periodic broadcast transmission, typically once a second, of the aircraft's position. Any airborne or ground-based ADS-B capable receiver, within range of broadcast, may receive and process the surveillance information for a variety of functions or uses.

The greater positional accuracy and ability to provide aircraft-derived, additional flight parameters (flight objects or flight data message elements), in addition to position data, defines ADS-B as "enhanced surveillance." The aircraft provides unique flight parameter information with the broadcast of its surveillance position. These other parameters, such as identification, directional vector, velocity, next waypoint, and other data are limited only by the equipment's capability, the communication link capacity, and the receiving system's capability. Additionally, ADS-B equipment may be placed on ground vehicles or obstacles to allow for locating and identifying these items. The FAA's ADS-B system is based primarily on providing three fundamental broadcast services to support the ADS-B enabled applications:

- **ADS-B**: This service provides highly accurate, aircraft-derived ADS-B reports that contain identification, state vector, and status/intent information about the aircraft. The information will be used for surveillance applications. ADS-B information is broadcast by the ADS-B equipped aircraft, received and processed by the ADS-B on-board avionics, and displayed on the aircraft's multi-function display.

- **TIS-B:** Traffic Information Services provide ADS-B equipped aircraft with a more complete "picture" in situations where not all aircraft are equipped with ADS-B. TIS-B is a service that provides ADS-B equipped aircraft with surveillance data about non-ADS-B equipped aircraft. TIS-B comprises surveillance information provided by one or more surveillance sources, such as secondary or primary surveillance radar. The surveillance information is processed and converted for use by ADS-B equipped aircraft. TIS-B can also be used in ADS-B implementations involving multiple ADS-B data links to provide a cross-link or gateway between ADS-B equipped aircraft using the different data links. This TIS-B sub-function is identified as Automatic Dependent Surveillance – Rebroadcast (ADS-R). Two communication link protocols have been approved for ADS-R use; Universal Access Transceiver (UAT), used mostly by general aviation aircraft, and the 1090 extended squitter, which broadcasts but does not receive signals, normally used in commercial transport aircraft.

- **FIS-B:** Flight Information Services provide ground-to-air broadcast of non-control, advisory information which provides users valuable, near real-time information to operate safely and efficiently. FIS-B products include graphical and textual weather reports and forecasts, Special Use Airspace Information, Notices to Airmen, and other aeronautical information.

FY 2012 Base:

- Continuation of National Airspace System (NAS)-Wide deployment of ADS-B
- ADS-B software development will occur for the Advanced Technologies and Oceanic Procedures (ATOP) automation platform
- Continued development of future applications, including:
  - Ground-Based Interval Management - Spacing development and deployment
  - Flight Deck Based Interval Management - Spacing flight trials
  - In Trail Procedures Operational Evaluation
  - Traffic Situation Awareness with Alerts flight tests

Concurrent to the deployment and implementation of ADS-B, the agency has signed agreements with several airlines (JetBlue, United and US Airways). These agreements are set up to demonstrate the benefits of advanced ADS-B applications and procedures during revenue service. The operational evaluations will give the agency detailed cost and benefit data, and encourage airlines to equip early to capitalize on ADS-B benefits.

The FAA has also tasked an Aviation Rulemaking Committee (ARC) to provide recommendations for moving forward with the implementation of high value ADS-B applications that would require a cockpit display installed in the aircraft. The ARC is slated to make its final report to the FAA by September 30, 2011, and detail recommended next steps by June 2012.

Anticipated FY 2013 Accomplishments:

- Completion of an Initial Operating Capability (IOC) of All Remaining Sites - Colorado Wide Area Multilateration Phase 2
- Completion of IOC for En Route Automation Modernization Release 3 Air Traffic Control Separation Services at 17 Sites
- Completion of IOC for Surface Advisory Services for at least 12 Sites
- Completion of Critical Services Implementation Service Acceptance Testing at 89 Service Volumes
- Completion of IOC for Terminal ATC Separation Services at 52 Sites
- Completion of Critical Services Implementation Service Acceptance Testing for at least 33 Service Volumes
- Validation of Minimum Operational Performance Standards (MOPS) for In Trail Procedures
- Validation of Flight Deck Interval Management MOPS
- Validation of Traffic Situational Awareness with Alerts MOPS
- Completion of Ground Based Interval Management Integration Testing

DOT Strategic Goals – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

ADS-B NAS Wide Implementation supports the FAA mission and helps accomplish agency goals to increase economic competitiveness and safety. The En Route and Oceanic Directorate's activities influence the performance metrics for Average Daily Airport Capacity and NAS On-Time Arrivals. The enabling technologies provided by ADS-B also facilitate transition to Next Generation Air Transportation System (NextGen) capabilities.

3. Why Is This Particular Program Necessary?

The completion of the initial sites and approval of separation services enabled the FAA to release the Final Rule for avionics, published on May 27, 2010. FAA promised industry that the ADS-B service implementation would be completed by the end of 2013, providing stakeholders with an adequate amount of time (approximately seven years) to equip aircraft. Failing to complete ADS-B service implementation as promised would reduce the business benefit of the investment. Moreover, it is anticipated that industry would challenge the rule to equip if the ADS-B schedule were to slip. Final Rule is summarized below.

On January 1, 2020, when operating in the airspace designated in 14 CFR § 91.225 (outlined below) aircraft must be equipped with ADS-B Out avionics that meet the performance requirements of 14 CFR §91.227. Aircraft not complying with the requirements may be denied access to this airspace.

Under the rule, ADS-B Out performance will be required to operate in:

- Class A, B, and C airspace.
- Class E airspace within the 48 contiguous states and the District of Columbia at and above 10,000 feet Mean Sea Level (MSL), excluding the airspace at and below 2,500 feet above the surface.
- Class E airspace at and above 3,000 feet MSL over the Gulf of Mexico from the coastline of the United States out to 12 nautical miles.
- Around those airports identified in 14 CFR part 91, Appendix D.

To give stakeholders time to equip aircraft, FAA agreed to complete implementation of the ADS-B infrastructure so that operators would have adequate time (approximately seven (7) years) to equip thousands of aircraft that will operate in the airspace designated in 14 CFR § 91.225. Failing to complete the ADS-B infrastructure implementation as promised would result in a loss of business benefits that were originally identified as part of the ADS-B business case. Stakeholders would delay equipping aircraft, resulting in further reductions in benefits.

While current surveillance is generally adequate for today's environment, it will not support the anticipated growth in aviation without loss of efficiency within the NAS. As the request for additional services – including traffic demand – increases, system inefficiencies will increase in the form of delays and restrictions across the NAS. Surveillance methods used in today's environment will not support continued aviation growth. Additionally, the current surveillance systems do not take advantage of new technologies in navigation, communication, and flight management. Expansion of surveillance coverage is essential to support air traffic control modernization efforts. Any improvements FAA makes to surveillance capabilities must sustain or enhance the current levels of safety, capacity, and efficiency.

According to the Joint Government and Industry Roadmap for Surveillance Modernization, the Air Traffic environment of the future will be increasingly dependent on more accurate and timely information being available to Air Traffic Service providers and aircraft operators. Information pertaining to a variety of airspace conditions and accurate position data, including aircraft intent, will be necessary.

With ADS-B, pilots for the first time see what controllers see: displays showing other aircraft in the sky. Cockpit displays also pinpoint hazardous weather and terrain, and give pilots important flight information, such as temporary flight restrictions.

ADS-B reduces the risk of runway incursions with cockpit and controller displays that show the location of aircraft and equipped ground vehicles on airport surfaces – even at night or during heavy rainfall. ADS-B applications being developed now will give pilots direct warnings of potential collisions.

ADS-B also provides greater coverage since ground stations are so much easier to place than radar. Remote areas without radar coverage, like the Gulf of Mexico and parts of Alaska, now have surveillance with ADS-B.

Relying on satellites instead of ground navigational aids also means aircraft will be able to fly more directly from Point A to B, saving time and money, and reducing fuel burn, noise and emissions. The improved accuracy, integrity and reliability of satellite signals over radar means controllers eventually will be able to safely reduce the mandatory separation between aircraft and increase capacity in the nation's skies.

4. How Do You Know The Program Works?

Surveillance and Broadcast Services (SBS) includes a number of services and applications. The Essential Services (which include TIS-B, FIS-B and ADS-R) have been tested in the factory, in operations, and through independent tests to verify performance. The Essential Services have been approved for national deployment. The Essential Services In-Service Decision was approved in November 2008. The Critical Services (which is ADS-B used for Air Traffic Control separation services) have been through factory and site testing. The four key sites Juneau, Philadelphia, Louisville, and Gulf of Mexico all underwent significant testing and evaluation to support the requirements. All sites have achieved operational readiness through IOC as of April 2010. The completion of the sites and approval of separation services enabled the FAA to release the Final Rule for avionics, published on May 27, 2010. An In-Service Decision for Critical Services was approved on September 23, 2010. While safety is shared between multiple programs, a comparison of equipped and non-equipped aircraft should provide benefits unique to the program. Low altitude Gulf of Mexico benefits are unique to the program.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

In FY 2013 NAS Wide deployment of ADS-B will continue with subscription services for surveillance across the NAS and for weather in the Gulf and Alaska. The national deployment of nearly 800 stations will be complete by the end of 2013. Achieving this milestone will serve as the entrance criteria for stakeholders to accelerate the installation of ADS-B Out avionics that meet the performance requirements of 14 CFR §91.227. This will allow for the ADS-B capability to deliver the benefits identified in the business case.

Additionally, ATOP automation platform ADS-B software development will occur in FY 2013. Interval Management conceptual development will be ongoing and may include software development. Implementation of Wide Area Multilateration for surface surveillance will continue. Finally, further development of future applications including Air Traffic Control and Cockpit Applications is planned.

If funded at less than the $271,600,000 level the program office would have to extend the ADS-B schedule. A funding reduction would negatively impact the program schedule and cause a slip in application development putting the NextGen program at risk. The long-term impact can affect the national roll-out for the ADS-B implementation in the NAS and subsequent avionics equipage. Moreover, industry stakeholders will challenge the ADS-B out avionics rule if FAA does not maintain the agreed-to schedule of ADS-B services deployment. This will decrease equipage rates and the identified program baseline benefits.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendation # 28, NAS Acccess

- Complete NAS-wide deployment of ADS-B, Traffic Information Services–Broadcast (TIS-B) and Flight Information Services–Broadcast (FIS-B)
- Provide initial operating capability for surface alerting

Detailed Justification for - 2A14 Weather and Radar Processor (WARP)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Weather and Radar Processor (WARP)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Weather and Radar Processor (WARP)	$2,096	$2,500	$500	-$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. System Annual Security Assessment Requirements	---	$84.0
2. Program Management/Engineering Support Services	---	250.0
3. Benefits Assessment Support Activities	---	166.0
Total	Various	$500.0

For FY 2013, $500,000 is requested for WARP Sustain to continue programmatic support of the WARP "Sustain Configuration." Specific activities include: addressing mandatory System Annual Security Assessment requirements; perform program management and engineering support activities; and conduct assessment of benefits resulting from engineering changes.

2. What Is The Program?

The WARP system addresses the need to provide accurate, reliable, current and forecast weather conditions to air route traffic control center (ARTCC) controllers, traffic management specialists, and center weather service unit meteorologists. This weather data will allow the FAA to provide timely weather advisories and sustain safe and efficient air travel. The WARP program provides accurate weather data to critical NAS systems such as the En Route Automation Modernization (ERAM) and Advanced Technologies and Oceanic Procedures (ATOP). The current WARP system:

- Processes weather radar data so it can be integrated and portrayed on air traffic controllers' displays
- Provides access to radar mosaics and other key weather information for Area Supervisors and Traffic Management Personnel
- Accepts data from advanced weather sensors
- Plots and processes forecasted upper air wind and temperature gridded data
- Provides weather data to other NAS systems

The system became fully operational in December 2002 and provides weather information on controller displays. Due to the WARP program's aging hardware (H/W) and software (S/W) infrastructure (unsupported operating system and HW equipment obsolescence), the existing architecture must be sustained and maintained until it is replaced. This will ensure that the weather processing and distribution capabilities continue to provide data which supports en route controllers, traffic management specialists, and center weather service unit meteorologists who support air traffic.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

There is a critical need to provide accurate, reliable, tactical and forecast weather conditions to air route traffic control center (ARTCC) controllers, traffic management specialists, and center weather service unit meteorologists. This weather data will allow the FAA to provide timely weather advisories and accomplish its mission of safe and efficient air traffic control within the NAS. The WARP program provides accurate weather data to critical NAS programs such as En Route Automation Modernization (ERAM), Advanced Technologies and Oceanic Procedures (ATOP), and User Request Evaluation Tool (URET). The current WARP system addresses the following performance gaps:

- Integrates weather radar data on air traffic controllers' displays
- Provides access to radar mosaics and other key weather information to area Supervisors and Traffic Management Personnel
- Interfaces with advanced weather sensors
- Plots and processes forecasted upper air wind and temperature gridded data
- Provides weather data to other NAS systems

WARP supports FAA safety by providing advisories and information that help aircraft without on-board radar to avoid accidents in convective weather.

The FAA goal of Greater Capacity requires collaboration among multiple disciplines to provide capacity in the United States airspace system that meets projected demand in an environmentally sound manner. WARP supports the goal's objective of making air traffic flow over land and sea more efficient. Specifically, WARP provides air traffic controllers and traffic management unit (TMU) specialists with high-resolution, integrated real-time and strategic graphical weather information. WARP provides common situational awareness by providing data to other FAA systems such as Advanced Technologies and Oceanic Procedures (ATOP) and Dynamic Ocean Track System Plus (DOTS+), and is aligned with the NAS infrastructure. The benefit of having better weather information presented in an integrated manner in the En Route environment is in providing a comprehensive picture of where aircraft can safely fly resulting in a more efficient use of airspace.

WARP Benefits include:

- Reduced delays and the resulting savings in passenger time and airline direct operating costs
- Increased safety due to weather advisories that improve pilot awareness of adverse weather conditions and help aircraft without onboard radar avoid accidents in convective weather
- Decreased need for deviations which result from more precise information about severe weather
- Cost Avoidance that result from the elimination of commercial weather service

4. How Do You Know The Program Works?

WARP continues to provide timely weather data acquisition and dissemination capability to ensure safe air traffic control. WARP provides for full FAA usage of NEXRAD Doppler weather radar information. WARP also provides the most timely and accurate current weather products and forecast models to other NAS systems, significantly improving NAS capacity and safety.

The current targets for this Capital Investment Plan (CIP) are: Reduce the fatal accident rate per 100,000 flight hours by 10 percent over a 10-year period (2009-2018) and by the end of FY 2009, reduce accidents in Alaska for general aviation and all Part 135 operations from 2000-2002 average of 130 accidents per year to no more than 99 accidents per year.

Measurement criteria used in support of "Increased Safety" are as follows:

The Measurement Indicator is: Safety - Accident Rate.
The Baseline is: Fatal accident rate of En Route General Aviation aircraft without on-board weather radar reduced from average of 3.5 per year to 2 per year after introduction of NEXRAD weather from WARP on controller displays.

Actual Results: The FAA recorded two fatal weather-related accidents involving GA aircraft without on-board weather radar encountering thunderstorms while receiving En Route Services in each of the years 2004, 2005, 2006, and 2010. No thunderstorm-attributable accidents occurred in FY 2007, FY 2008 and FY 2009.

Measurement Methodology: National Transportation Safety Board (NTSB) maintains a web portal recording both historical and current accident investigation reports. These reports are reviewed for weather-related aircraft accidents and evaluated to determine whether or not the relay of information about the location and proximity of thunderstorms to the pilot in command could have with some likelihood broken the sequence of events that lead to a fatal accident.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The WARP system is operational at the 21 ARTCCs and at the Air Traffic Control System Command Center (ATCSCC). Each operational WARP system consists of a Radar Acquisition and Mosaic Processor (RAMP) subsystem, a Weather Server, a Communications Subsystem, a Meteorologist's Workstation, Briefing Terminals, an ARTCC Monitor and Control Center (AMCC) workstation, and a Weather Information Network Server (WINS) subsystem. The ATCSCC WARP also includes the FAA Bulk Weather Telecommunications Gateway (FBWTG) server. The primary WARP functions are:

- Integrate timely and accurate weather onto air traffic controller displays
- Support to the Traffic Management Unit and to air traffic control specialists at the ARTCCs and the ATCSCC
- Disseminate weather data to critical NAS subsystems
- Provide current and forecast data to Center Weather Service Unit Meteorologists who support air traffic personnel
- Provide processing tools to consolidate weather data from several sources into a single integrated display that supports air traffic operations

The WARP program enhances safety, reduces weather-related delays, and improves collaborative decision-making. The WARP weather functions furnish timely, accurate and integrated weather products to other NAS systems.

All operational WARP systems must stay current with the NAS while continuing to meet DOT/FAA strategic goals by implementing incremental WARP technical refresh activities addressing critical hardware and software obsolescence. These goals include communications upgrades, mandatory security system test and evaluation (ST&E), implementation of mandatory system authorization package mitigation activities, and the design and development of interfaces to critical NAS systems requiring weather data such as ERAM and Traffic Flow Management System (TFMS). In addition, the WARP system must continue building on its initial limited tech refresh activities focusing on the RAMP and WINS to be fully System Wide Information Management (SWIM) compliant. In FY 2009 the services of the operational WARP systems continued with completion of RAMP and WINS development. In FY 2010 the WARP Program Office addressed the aging infrastructure of the existing WARP hardware and software systems.

A reduction would impact the full implementation of mandatory system annual security assessment activities, and impact the development of the benefits assessment and program management and engineering support services.

Detailed Justification for - **2A15 Collaborative Air Traffic Management Technologies Work Package 2 and Work Package 3**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Collaborative Air Traffic Management Technologies
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Collaborative Air Traffic Management Technologies (CATMT) WP2 and WP3	$35,828	$41,500	$34,420	-$7,080

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. CATMT Work Package 2 (WP2)	---	$21,100.0
2. CATMT Work Package 3 (WP3)	---	13,320.0
Total	Various	$34,420.0

For FY 2013, $34,420,000 is requested, of which $21,100,000 under WP2 will add four new capabilities and $13,320,000 under WP3 will add two new capabilities to the TFM system.

2. What Is This Program?

Traffic Flow Management (TFM) is the nation's primary source for disseminating flight information across the aviation community. The automation and communication mechanisms provided by the TFM system support the decision-making process used to adjust flight schedules and/or routes as necessary. When the National Airspace System (NAS) is impacted by severe weather, congestion, and/or outages, the TFM system has unique capabilities to predict chokepoints and facilitate the collaboration and execution of mitigation initiatives with stakeholders, using common information displays and tools, to minimize NAS delays.

CATMT Work Package 2 will add four new capabilities to the TFM System:

- Arrival Uncertainty Management (AUM)
- Weather Integration (WxInt)
- Collaborative Airspace Conflict Resolution (CACR)
- Airborne Re-Route (ABRR)

Each user requested new capabilities will help continue to reduce the traffic delay impacts of severe weather, excess demand, and NAS equipment outages on the aviation community.

CATMT Work Package 3 will add two new capabilities to the TFM System:

- Collaborative Information Exchange (CIX)
- TFM Remote Site-Re-Engineering (TRS-R)

CIX will eliminate the need to manually input airspace use data into the TFM system by automating its incorporation from the System Wide Information Management (SWIM) network. TRS-R will help reduce the cost of maintaining the TFM remote sites and provide greater ease of use to the traffic management users.

These new additions will help continue to reduce the traffic delay impacts of severe weather, excess demand, and NAS equipment outages on the aviation community.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Flight operations are approaching pre-9/11 levels, and aviation trends indicate that air traffic demand will continue to increase. Domestic, regional and commuter patterns and compositions are changing. Despite this growth, the economic viability of many commercial carrier airlines is uncertain. The TFM portfolio of tools and capabilities is the only part of the national airspace system designed to help the aviation community reduce delays, improve operations, and succeed economically. However, the system cannot accommodate the anticipated growth in demand for services.

CATMT WP 2 will bring newly developed algorithms and technologies to the traffic management community. Its four new components represent state of the art enhancements intended to aid in the reduction of traffic delays due to severe weather, excess demand and NAS equipment outages.

CATMT WP 3 will streamline TFM operations and make the tasks less manually challenging. Its two new components represent state of the art enhancements intended to aid in the reduction of traffic delays due to severe weather, excess demand and NAS equipment outages.

4. How Do You Know The Program Works?

CATMT WP 2 started in FY 2010 and CATMT WP 3 started in FY 2011, as such neither has delivered any of their enhancements as of yet. Metrics are being put into place to measure the contribution of both efforts to the NAS.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$34,420,000 is required for CATMT WP 2 and WP 3. These funds are required to keep the efforts on their pace to complete during FY 2015. A reduction would impact the overall schedule and we will not be able to complete during FY 2015.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 47, Integrated ATM

- Deploy CATMT Work Package 2 capabilities to include:
    - Arrival uncertainty management
    - Weather integration
    - Collaborative airspace constraint resolution
    - Airborne reroute execution

Detailed Justification for - 2A16 Colorado ADS-B WAM Cost Share

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Colorado ADS-B WAM Cost Share
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Colorado ADS-B WAM Cost Share	$0	$3,800	$1,400	-$2,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
In-Service Program Management	---	$1,400.0

For FY 2013, $1,400,000 is requested for the following activities:

- Denver, CO (ZDV) based Air Traffic Control Separation Services supporting operations in and out of the Montrose; Gunnison; Telluride and Durango Airports

2. What Is This Program?

The State of Colorado Department of Transportation (DOT), Division of Aeronautics has determined that a lack of surveillance is one of the main reasons behind economic losses as a result of reduced capacity during Instrument Meteorological Conditions (IMC). The problem is compounded by mountainous terrain, single instrument runway airport configurations and limited ramp space. The base of existing radar coverage is most often at or above 9,000 feet. The lack of more comprehensive surveillance forces controllers to use procedural separation standards for the Instrument Flight Rules (IFR) arriving/departing aircraft. This is a safe means of providing the service, but it is not efficient enough to provide for Colorado's air traffic services needs.

Normally, many arrivals into Colorado Mountain airports are conducted under Visual Flight Rules (VFR). IMC which reduces acceptance rates for mountain airports from 12-17 flights per hour to four per hour. From November to April, when the Special Traffic Management Program (STMP) is in effect, the Colorado DOT estimates 75 aircraft per airport, per day are delayed or diverted, creating daily revenue loss for the state. Delays and denied service during IMC at mountain airports cause additional traffic to be diverted to the north and south within Denver Center airspace. This results in an additional multi-modal burden on the Colorado DOT due to the large number of people traveling by other means to their original destination.

The availability of ADS-R, ADS-B and Multilateration surveillance services integrated with the En-Route Automation Modernization (ERAM) should allow arrival acceptance rates to be maintained with air traffic control support. This will enhance public safety, increase capacity of the FAA NAS system, and provide increased services and economic benefit to the identified four Colorado Mountain Communities.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investment.

3. Why Is This Particular Program Necessary?

Over the last 15 years the Ski Country of Colorado has become an increasingly popular recreational destination. The corresponding increase in air traffic volume has resulted in increased numbers of delays and denied service at mountain airports, especially during bad weather. The FAA has established a reservation system known as the STMP during the peak travel months in an effort to regulate and systematically meter the traffic to the airports. This solution keeps the traffic volume manageable for the Denver ARTCC, but produces extended delays and, in some cases, diversions or denial of Air Traffic Control (ATC) services. The airports and communities of Colorado are losing large amounts of revenue that would be generated by visitors arriving by aircraft. The program will permit radar separation standards to be employed for aircraft in areas not currently covered by existing radars and provide an option in the NAS for a WAM service capability.

4. How Do You Know The Program Works?

Prior to declaring the Initial Operating Condition (IOC) of the En Route Automation Modernization (ERAM) services supported with ADS-B and WAM surveillance the verification and validation of performance will follow a multi-stage testing process established by the FAA's Acquisition Management System. This process includes the successful testing of all critical requirements and a successful safety risk assessment of the system and the supported air traffic operations. Once an IOC is achieved the evaluation of the system will continue with an OSD performed by air traffic controllers and technical operations personnel. The OSD will continue until the system meets all necessary requirements for operation in the NAS.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Funding is required for the purchase of ADS-B/WAM surveillance services to support the Denver ARTCC separation services into and out of the Durango, CO; Gunnison, CO; Montrose, CO; and Telluride, CO airports. A reduction in funding would cause a loss of surveillance services to one or more of these airports. The program will create additional airport revenue from accommodating additional flights and enhanced search and rescue capabilities at these four Colorado airports.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 28, NAS Access

- Deploy phase 2 system that includes WAM and ADS-B at Durango, CO (DRO), Gunnison, CO (GUC), Montrose, CO (MTJ) and Telluride, CO (TEX)

Detailed Justification for - 2A17 Time Based Flow Management (TBFM)

What Do I Need To Know Before Reading This Justification?

- Traffic Management Advisor (TMA) is currently, deployed and operational at 20 ARTCCs, 27 TRACONs, and 33 ATCTs (27 of the Nation's busiest airports).
- The Time Based Flow Management (TBFM) Program is the continuation and support of Traffic Manager Advisor (TMA) which is at the end of its lifecycle.
- Final Investment Decision Approval received for Implementation of the System Re-Architecture and NextGen and Operational capabilities (2010-2014).

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Time Based Flow Management (TBFM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
TBFM - Work Package 2	$0[1]	$38,700	$12,900	-$25,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
TBFM Work Package 2	---	$12,900.0

For FY 2013, $12,900,000 is requested to continue the NextGen and Operational enhancements of the TMA system as follows:

- Support the work to replace the existing hardware and reduce the logistical footprint at the current sites by re-architecting the current system and also work to expand TMA to other sites so additional sites can benefit from the efficiency of time based metering
- Support the design and development of NextGen and Operational initiatives such as Integrated Departure and Arrival Capability (IDAC), display convective weather, and Extended Metering - which will push any arrival delay farther into the En-Route flow therefore providing better fuel burn and predictability along the route of flight
- Support the deployment of automation of the RNAV procedures, and sharing of the TMA information with other National Airspace Systems (NAS)

2. What Is This Program?

Traffic Management Advisor (TMA) is a vital part of the NAS and enhances air traffic operations, by reducing delays and increasing efficiency of airline operations. Currently, TMA is in daily use throughout the NAS. TMA is the only NAS deployed decision support tool currently available for implementation of time-based metering. TMA has been field-tested over the past 10+ years and is already installed in the 20 Air Route Traffic Control Centers (ARTCC) and adapted for most of the major airports served by those centers.

Time Based Flow Management (TBFM) is an evolution of the Traffic Management Advisor (TMA) Program. This system uses Time Based Metering (TBM) software to optimize the capacity in the NAS. TBFM will improve upon TMA and directly address Solution Sets within the 2009 NextGen Implementation Plan. Specifically, TBFM will improve the management of traffic flow throughout the cruise phase of flight through

[1] $20,000,000 was enacted in FY 2011 under NextGen BLI 1A11

point-in-space metering or extended metering, resolve the issue of TMA hardware obsolescence, increase airspace capacity utilization through flexible scheduling, share metering data with other tools/stakeholders, enable more accurate Area Navigation/Required Navigation Performance (RNAV/RNP) routes, enable more efficient departure operations with the integrated departure and arrival concept, and increase traffic manager awareness of severe weather within their area of responsibility. The design, development and deployment of these concepts will be occurring during the 2010-2014 timeframe. These enhancements support the current NextGen OI (Operational Initiatives)

- Current Tactical Management of Flow in the En Route domain for Arrivals/Departures (104115) - TMA displays are used for situational awareness in the current tactical flow management process
- Integrated Arrival/Departure Airspace Management (104122) – Integrating and automating the departure capability with the TMA system
- Point-in-Space Metering (104120) - Extended Metering – adding additional meter points for more efficient Time Based Metering
- Time-Based Metering Using RNAV/RNP Route Assignments (104123) – automating the use of RNAV procedures in the Terminal environment for a more efficient modeling of an aircraft's trajectory

TBFM will develop and deliver on the operational needs such as flexible scheduling that will take advantage of the partial slots that currently causes a loss of efficiency in capacity constrained areas and the need for a system re-architecture which will reduce the logistical footprint of the TMA system. For each airport that is time based metering – there are two monitors, two keyboards and two mice – all of this hardware takes up space and makes it inefficient to run TMA at all needed airports. The reduction will help to continue the expansion of the TMA system to other airports and the expansion of Time Based Metering. All of the work will bring the TMA system into the NextGen future.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The NAS suffers significantly degraded performance during periods of severe weather, limited visibility, volume spikes due to seasonal traffic or special events, and other causes, specifically needing solutions in the following areas:

Reducing under-delivery of capacity at affected airports

- Increasing equity of delay assessed to flights
- Improving prediction of demand
- Decreasing unnecessary traffic flow management restrictions
- Decreasing abnormal delay
- Decreasing avoidable delay

4. How Do You Know The Program Works?

The current TMA is an effective and well-tested decision support tool that allows air traffic management units to schedule and optimize the arrival load for major airports. That scheduling and optimization algorithm, however, generally is confined to the area within about 200 miles of the controlling center. Since TMA is installed at all the centers the algorithms that optimize traffic flows could be expanded, so schedule data can be exchanged and a larger planning horizon developed for more strategic planning.

The TMA program has delivered measured savings by reducing delays and increasing efficiency of airline operations. TBFM is the next step in TMA evolution, providing further delay reductions. While analysis has predicted savings from TBFM implementation, metrics are being put into place to measure its actual contribution once its components are deployed.

TBFM capabilities provide automation, communication and decision support tools to continue and expand the the following capabilities:

- Increased efficient use of existing capacity
- Reduced manual workload
- Increased common situational awareness
- Reduced delay in the terminal and en route airspaces

TBFM capabilities provide additional residual benefits in the way of environmental benefits.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$12,900,000 is required to keep the program on schedule to be completed during FY 2015. Funding at this level will enable TBFM to develop functions that integrate data into TMA from external systems such as Traffic Flow Management System (TFMS) and new weather systems. This will increase the efficiency of arrivals and departures, RNAV/RNP route selection data, and international traffic data. Also, deliver the re-architected TMA system to enhance the current system to support the development of NextGen initiatives and Operational enhancements; and continue the deployment of the FAA TBFM system to continue the efficiency of the system.

Detailed Justification for - **2B01 Airport Surface Detection Equipment – Model X (ASDE-X) Technology Refresh (TR) and Disposition**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Airport Surface Detection Equipment – Model X (ASDE-X) – Technology Refresh and Disposition
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
ASDE-X Technology Refresh and Disposition	$4,192	$2,200	$7,400	+$5,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Hardware/Software Engineering Services	---	$6,300.0
2. Program Management	---	600.0
3. Second Level Engineering	---	500.0
Total	Various	$7,400.0

For FY 2013, $7,400,000 is requested to begin procurement activities for the hardware and software implementation based on the results of the technology refresh study. The ASDE-X team plans to complete a study in FY 2012 to determine the equipment and/or software that needs to be included in the technology refresh. Using the results of the study, the team will also complete planning activities for the technology refresh effort.

2. What Is This Program?

ASDE-X is a surface surveillance system that provides air traffic controllers with a visual representation of the traffic situation on the airport movement area and arrival corridors. It improves the controller's ability to maintain awareness of the operational environment and to anticipate contingencies. ASDE-X Safety Logic (AXSL) uses surveillance information from ASDE-X to determine if the current and projected positions and movement characteristics of tracked aircraft and vehicles present a potential collision situation. Visual and audible alerts are provided to air traffic controllers when safety logic predicts a collision.

The first ASDE-X system was delivered in 2002. Some of the equipment has reached the end of its life and is no longer supportable. The ASDE-X technology refresh program provides for the replacement and upgrade of hardware to ensure the continued operation of the surface surveillance system through its designated lifecycle. The ASDE-X program baseline included costs for the periodic replacement of commercial off-the shelf (COTS) system components; e.g., processors, displays, computer operating systems, and commercially available software (CAS).

As of May 2011, ASDE-X systems are operational at the following 34 airports:

General Mitchell International Airport, Milwaukee, WI	Orlando International Airport, Orlando, FL
Theodore Francis Green State Airport, Providence, RI	William P. Hobby Airport, Houston, TX
Seattle -Tacoma International Airport, Seattle, WA	Lambert - St Louis International Airport,

	St. Louis, MO
Hartsfield - Jackson Atlanta Int'l Airport, Atlanta, GA	Bradley International Airport, Hartford, CT
Louisville International Airport, Louisville, KY	Chicago O'Hare International Airport, Chicago, IL
Charlotte - Douglas International Airport, Charlotte, NC	Washington Dulles International Airport, Chantilly, VA
Detroit Metro Wayne County Airport, Detroit, MI	Phoenix Sky Harbor International Airport, Phoenix, AZ
John F. Kennedy International Airport, New York, NY	Los Angeles International Airport, Los Angeles, CA
Ft. Lauderdale / Hollywood Airport, Ft. Lauderdale, FL	Newark International Airport, Newark, NJ
Boston Logan International Airport, Boston, MA	George Bush Intercontinental Airport, Houston, TX
Miami International Airport, Miami, FL	Denver International Airport, Denver, CO
Philadelphia International Airport, Philadelphia, PA	Minneapolis-St. Paul International Airport, Minneapolis, MN
Dallas/Ft. Worth International Airport, Dallas-Fort Worth, TX	John Wayne-Orange County Airport, Santa Ana, CA
Salt Lake City International Airport, Salt Lake, UT	Ronald Reagan Washington National Airport, Washington, DC
Chicago Midway Airport, Chicago, IL	San Diego International Airport, San Diego, CA
Honolulu International – Hickam AFB Airport, Honolulu, HI	New York LaGuardia Airport, New York, NY
Las Vegas McCarran International Airport, Las Vegas, NV	Baltimore-Washington International Airport, Baltimore, MD

Deployment of the last ASDE-X system to the Memphis International Airport, Memphis, TN was completed in FY 2011.

DOT Strategic Goal - Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

The ASDE-X technology refresh program will maintain the safety and efficiency benefits attained during ASDE-X system deployment. By replacing obsolete and high failure items, the technology refresh effort will maintain the current levels of ASDE-X system availability and reliability. If ASDE-X systems are not operational, safety and efficiency benefits realized during system deployment will be lost.

The ASDE-X system provides both safety and efficiency benefits. The primary benefit, increased safety, is achieved by providing air traffic controllers with improved situational awareness. This results in a reduction of the number of Category A and B runway incursions and accidents. Additionally, the improved surveillance capacity allows for more efficient coordination and communication with aircraft, improved mobility, reduced taxi times and delays, and consequently lower costs for aviation providers and customers.

4. How Do You Know The Program Works?

The ASDE-X technology refresh program will be considered successful if after the implementation of technology refresh equipment, ASDE-X system reliability and availability numbers continue to meet the system specification and requirements especially as the system ages.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

If the ASDE-X technology refresh program is not funded at the required level, ASDE-X systems in National Airspace System (NAS) may see increased system outages. A reduction would result in delays to the technology refresh procurement activities and to the implementation of technology refresh equipment. Operational systems may be impacted when parts of the system start to fail and are no longer supportable.

Detailed Justification for - 2B02 Terminal Doppler Weather Radar (TDWR) – Provide

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Terminal Doppler Weather Radar (TDWR) – Provide
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Terminal Doppler Weather Radar (TDWR) – Provide	$8,583	$7,700	$2,500	-$5,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management/Engineering and Software	---	$645.0
2. Procurement/Production	---	1,855.0
Total	Various	$2,500.0

For FY 2013, $2,500,000 is requested for completing the TDWR algorithm enhancements, for installation of the Antenna Drive Motor modification, for acquisition and installation of production modification kits for the Radar Products Generator (RPG) computer technical refresh project, and for software and siting concept studies to support relocating the New York TDWR.

2. What Is the Program?

The TDWR is an important component of the Federal Aviation Administration (FAA) and National Weather Service (NWS) weather information, alerting and forecasting family of monitoring and predicting systems. The current system is facing serious obsolescence issues and must be updated forthwith to preclude an adverse, potentially disastrous, impact to the current aviation weather safety initiatives.

The primary mission of the TDWR is to enhance the safety of air travel through timely detection and reporting of hazardous weather conditions including wind-shear events, microburst, gust fronts, and thunderstorms in and near an airport's terminal approach and departure zones. TDWRs are installed at higher-density airports with high occurrences of thunderstorms, and provide controllers current information on severe weather so that they can issue warnings to pilots. TDWRs are operational at 46 airports. TDWR weather data is transmitted to FAA automation systems and also to other federal agencies; see below.

- **TDWRs main customers.** The TDWR Service Life Extension Program serves 46 major airports by providing weather data to the Integrated Terminal Weather System (ITWS) which disseminates wind shear products based on TDWR data to OEP primary and OEP secondary ATCTs and to over one thousand airline dispatchers among seven airline companies.

- **TDWRs primary FAA interfaces.** Nine TDWRs receive wind shear and airport wind information from the Low-Level Wind Shear Alert System-Network Expansion (LLWAS-NE++) system. TDWR integrates LLWAS-NE data with its own detections to provide enhanced wind shear protection services at those nine airports. At the 37 airports with no LLWAS-NE, the TDWR receives airport wind data from the Wind Measurement Equipment (WME) (formerly LLWAS-2) or from the Automated Surface Observing System (ASOS). TDWR is also a major weather source for the Corridor Integrated Weather System (CIWS) which further integrates a suite of weather decision aids for en route aviation facilities in the U.S.

- **TDWR serves other federal agencies and the general public.** TDWR provides weather radar data to 34 National Weather Service forecast offices. The TDWR data complements the other radar and non-radar sensor data available to the local Weather Forecast Office (WFO) allowing them to prepare better local forecasts, alerts, warnings and additional products and services provided to the FAA and the general public by NOAA / NWS. The four TDWRs in the Washington, DC area provide data to the Urban Shield Wind Dispersion Project that is operated by the Pentagon Force Protection Agency.

DOT Strategic Goal - Safety

- Reduction in transportation related injuries and fatalities

3. Why Is This Particular Program Necessary?

The TDWR system has been in service since 1994. It is comprised of a substantial number of proprietary software and hardware components, many of which have become obsolete and present significant supportability problems that worsen with time.

Without the Service Life Extension Program, TDWR outages will become more numerous and lengthy, and support costs will rise faster than will be the case with the SLEP.

4. How Do You Know the Program Works?

The TDWRs deployed at commercial airports have increased aviation safety through the accurate and timely detection of hazardous aviation weather conditions. Weather related delays have been reduced, allowing savings in aviation fuel consumption.

Operational benefits of the system include the real-time detection of microbursts, gust fronts, wind shifts, and precipitation, as well as prediction of wind changes that allow improved airfield efficiency when making runway changes. The program will continue to deploy improvements that will lower TDWR operations costs and improve its reliability.

Thus far, the SLEP has eliminated outages due to antenna gear failure, and maintained service availability by replacing parts of the system that are difficult to maintain and support. More of these kinds of solutions are being implemented each day, thanks to prior year SLEP funding.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

FY 2013 funds are required to continue some TDWR SLEP projects and complete others that have been started using prior year funding. Specifically, $2,500,000 is required to complete the TDWR algorithm enhancements and to continue installation of the Antenna Drive Motor modification. The funds will also allow for Radar Product Generator (RPG) computer technical refresh project efforts and the continuation of software to support the RDA Retrofit.

Detailed Justification for - 2B03 Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)

1. What Is The Request And What Will We Get For The Funds?

**FY 2013 – Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)
($000)**

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$21,956	$25,000	$34,500	+9,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Software Design and Development	---	$4,000.0
2. MDM Hardware Procurement	125	4,000.0
3. G-4 Hardware Procurement	4	18,000.0
4. Site Preparation and Installation	---	5,000.0
5. Program Management Support	---	3,500.0
Total	Various	$34,500.0

For FY 2013, $34,500,000 is requested for the following:

$7,500,000 (Terminal Software Enhancements) is requested for continuation of STARS software enhancements which will include system performance, efficiency, safety, and security modifications to the software baseline. The funding will continue to provide for program and system engineering, technical support, and operational/suitability testing of software and system enhancements.

$27,000,000 (Technology Refresh) is requested to fund the replacement of the obsolete Sony Main Display Monitors (MDM) which is the old Cathode Ray Tube (CRT) tube type displays with current state of the art high definition flat panel displays. A total 125 displays will be procured. In addition, four STARS operational sites which currently use the Sun Ultra 5 processor will be tech refreshed with the Sun X-86 processor based technology to support NextGen Automatic Dependent Surveillance – Broadcast (ADS-B) initiative.

2. What Is This Program?

STARS is a joint Department of Defense (DoD) and Federal Aviation Administration (FAA) program to modernize terminal air traffic control automation systems.

STARS is a digital processing and display system that replaces the aging air traffic control equipment at Automated Radar Terminal System (ARTS) IIIA and other high activity Terminal Radar Approach Control (TRACON) facilities and airport traffic control towers. Air traffic controllers use STARS automation and displays to ensure the safe separation of military and civilian aircraft within the nation's airspace. This investment is part of a phased approach to modernizing our terminal air traffic control equipment. The program updates existing TRACONs and towers with state-of-the-art systems featuring large-screen, high-resolution, color displays, and is expandable to accommodate future air traffic growth and new hardware and software. STARS addresses; technology, mobility, and security gaps with the existing systems.

On April 20, 2004, the FAA Joint Resources Council (JRC) directed a phased approach to terminal automation modernization. The JRC approved STARS as a replacement for 47 critical site systems within three years. In February 2009, the JRC reclassified the Dayton, OH facility from a TRACON to a tower, thus reducing the number of TRACONs receiving STARS to 46. The current scope of the STARS program is to sustain and enhance those systems already deployed. To sustain operations STARS requires technology refreshment and software enhancements. A brief discussion of both initiatives follows below:

Technology Refresh: As in any Commercial Off-The-Shelf (COTS) based system, an aggressive hardware technology refreshment program is essential. Planning for technology refreshment enables identification and qualification of affected components before they become inoperable due to obsolescence. For example, the processor currently used in STARS is no longer available from the manufacturer. The consequences of obsolescence have collateral implications in the areas of engineering, training, maintenance and many other disciplines.

Terminal (Software) Enhancements: Funding for Terminal Enhancements addresses issues identified by controllers and operating facilities personnel. This project funds mandatory security enhancements and corrective changes to enhance system performance. Enhancements include addressing evolving safety requirements (e.g. Minimum Safe Altitude Warning system and Conflict Alert) and upgrading interfaces with other systems (surveillance, centers, oceanic). Regular reviews of system performance identify and prioritize issues and schedule the work to be completed in any fiscal year. Software changes that are needed to address changes in hardware are done under this program to support the STARS Technology Refresh activities, and/or the upgrades needed for enhanced performance and capacity.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

STARS is essential for providing safe separation of arrival and departure aircraft in the terminal area of the national airspace system. The STARS system is fully digital and capable of tracking all aircraft within the defined terminal airspace using available FAA or DOD surveillance or, with system upgrades. This system provides functions equivalent to or better than those accomplished by the existing terminal automation systems along with enhanced security. The STARS infrastructure can be expanded and extended to meet increased traffic demands and accommodate the introduction of new automation functions necessary for improved safety, efficiency, and capacity.

Replacing the original Ultra-5 processors, that have reached their end of maintenance, provides technology refreshment which allows for continued STARS system terminal services. The action to remove the Ultra-5's from service is necessary and is driven by expiring battery life, depleted repair capability, parts availability, performance degradation due to impending NextGen requirements. Adequate batteries were procured as a one-time buy to insure utilization of the Ultra-5 processors until FY 2014. A further procurement will not be available.

To enable completion of the Ultra 5 replacement, qualification of a new processor, began in FY 2009 and will continue into FY 2010 – FY 2011. Procurement and replacement of the first block of replacement processors will occur in FY 2011. This will enable current system availability to be maintained and allow the STARS system to support proposed NextGen capabilities as they are fielded. The new generation of processors will also enable STARS to move into a more open architecture providing benefits in increased Mean Time between Failure (MTBF) and potentially lower overall system operating costs.

4. How Do You Know The Program Works?

STARS systems are a vital link in the nation's air traffic control system. Eighteen STARS systems are successfully operating in the National Airspace System (NAS). For example, STARS is operational at Philadelphia TRACON (PHL), a major airport. Over the past five years, the average equipment availability for STARS is 99.9996 percent.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$34,500,000 is required to support the continued high operational availability STARS by incorporating software enhancements/refinements and hardware technology refresh. In addition, STARS supports the automation infrastructure on which to build the future NextGen (ADS-B) operational initiatives. Without the requested funding, STARS will be unable to support NextGen (ADS-B) requirements.

A reduction would reduce the number of sites receiving technology refresh. It extends the duration of technology refreshment performance and increases the risk to service at STARS sites. This reduction would also reduce content of a planned software enhancement build during the FY 2013 timeframe and will increase the cost assessed to other stakeholders, such as ADS-B.

Detailed Justification for - 2B04 Terminal Automation Modernization/Replacement Program (TAMR Phase 3)

What Do I Need To Know Before Reading This Justification?

- TAMR Phase 3 is a continuation of terminal automation modernization accomplished in Phases 1 and 2. TAMR Phase 3 addresses 94 Automated Radar Terminal System (ARTS) IIEs and 11 ARTS IIIEs not replaced or upgraded under phases 1 or 2. TAMR Phase 3 is partitioned into two segments.
- **Segment 1**
  TAMR Phase 3 Segment 1 is a key program that supports FAA's strategic goal of ADS-B critical services in the National Airspace System (NAS). TAMR Phase 3 Segment 1 will upgrade the 11 ARTS IIIE sites with a Standard Terminal Automation Replacement System (STARS) to enable convergence to a single Terminal Automation hardware and software platform by 2017.
- **Segment 2**
  - TAMR Phase 3 Segment 2 is a key program that supports FAA's strategic goal of ADS-B critical services in the National Airspace System (NAS). TAMR Phase 3 Segment 2 will replace 94 ARTS IIE systems with STARS hardware, software, and displays at all Terminal Radar Approach Control (TRACONs) and their associated Airport Traffic Control Towers (ATCTs). TAMR Phase 3 Segment 2 will complete the convergence to a single automation platform in the Terminal domain.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Terminal Automation Modernization/Replacement Program (TAMR Phase 3)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted t
Terminal Automation Modernization/Replacement Program (TAMR Phase 3)	$59,880	$108,750	$153,000	+$44,250

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Task Segment 1	Locations/ Quantity	Estimated Cost ($000)
1. Solution Implementation	---	$82,700.0
2. Program Management	---	8,500.0
3. Systems Engineering	---	5,500.0
4. Site Activation	---	20,000.0
5. Other Government Furnished Equipment	---	5,000.0
6. Telecommunications	---	3,000.0
7. Independent Operational Test and Evaluation (IOT&E)	---	350.0
Total	Various	$125,050.0

Activity Task Segment 2	Locations/ Quantity	Estimated Cost ($000)
1. Solution Implementation	---	$17,050.0
2. Program Management	---	2,000.0
3. Systems Engineering	---	3,900.0
4. Site Activation	---	2,000.0
5. Telecommunications	---	3,000.0
Total	Various	$27,950.0

For FY 2013, $153,000,000 is requested for TAMR Phase 3, which includes $124,700,000 to complete the development of software, equipment purchases, site preparation, equipment installation of the STARS system for Segment 1, and $27,950,000 for TAMR 3 Segment 2 for hardware procurement, testing, site preparation, and equipment installation of the STARS system for Segment 2. In addition $350,000 is requested for Independent Operational Test and Evaluation.

2. What Is This Program?

Terminal Automation systems are essential for controllers to manage the operations at our nation's busiest airports. The automation systems rely on information from radar and weather sensors, along with flight plan information for each aircraft to inform controllers of the aircrafts location and intended path of flight so they can safely and efficiently maintain aircraft separation at or near airports.

The TAMR program provides a phased approach to modernizing the automation systems at the FAA's Terminal Radar Approach Control (TRACON) facilities and their associated Airport Traffic Control Towers (ATCT) throughout the NAS.

TAMR Phase 3 addresses the modernization/replacement of Common Arts automation systems at 105 TRACONs and associated Air Traffic Control Tower facilities with STARS to meet NextGen mid-term goals. The FAA will continue to sustain the automation systems at these sites while monitoring system performance to identify any deterioration in service.

On April 21, 2010, the TAMR Phase 3 Program received Joint Resource Council (JRC) approval to segment the program.

Segment 1
On December 21, 2011 the TAMR Phase 3 Segment 1 Program received a Final Investment Decision from the Joint Resource Council (JRC) to replace 11 ARTS IIIE facilities and associated Air Traffic Control towers with a STARS system in support of ADS-B, and to enable convergence to a single Terminal Automation hardware and software platform by 2017.

The requested funds will be used as follows:

- Transition from CARTS system, and activation of STARS systems at two IIIE sites; Dallas (D10) and Northern California (NCT) with Initial Operating Capability (IOC)
- STARS Equipment installation at two sites; Atlanta (A80) and Southern California (SCT)
- Site Prep activities at four sites; Minneapolis (M98), Potomac (PCT), Denver (D01), St Louis (T75)
- Delivery of 40 thousands lines of STARS operational software code in two software releases
- Operational Test and Evaluation of 40 thousands lines of operational software code in two software releases for delivery to Dallas (D10) and Northern California (NCT)
- Purchase of STARS hardware for two sites; Minneapolis (M98) and Potomac (PCT)
- Purchase of STARS equipment for initial depot spares and provisioning with delivery to FAA Logistics center

Segment 2
The TAMR Phase 3 Segment 2 program will replace 94 ARTS IIE's and associated Air Traffic Control towers with a STARS system and will complete the convergence to a single Terminal Automation hardware and software platform by 2017. The Segment 2 program plans to have its Final Investment Decision in the third quarter pf CY 2012.

In anticipation Final Investment Decision, the requested funds will be used as follows:

- Purchase, installation at William J. Hughes Technical Center, and testing of STARS system for IIE replacements
- Purchase STARS hardware for one IIE key site and five additional IIE sites
- Conduct site surveys at 10 IIE sites
- Site Prep activities at six IIE sites

- STARS Equipment installation at four sites

DOT Strategic Goals - Economic Competitiveness
- Maximum economic returns on transportation policies and investments

3. Why Is This Particular Program Necessary?

Segment 1 - The ARTS IIIE sites have commercial-off-the-shelf (COTS) hardware that is either aging or approaching the end of its useful life and will need to undergo technical refresh in order to support ADS-B critical services in the NAS.

The 11 ARTS IIIE sites must be modernized. Their size and importance to the NAS will not allow them to continue to operate with current functionalities indefinitely. These systems were installed or upgraded to their current configuration in the 2000 - 2002 timeframe.

Additionally, the ARTS IIIEs, due to lack of processing speed and capacity, are suffering from software stability issues. Without resolution, these sites risk significant decreases in system availability, and with that, increased safety risk.

Segment 2 – The ARTS IIE sites have hardware that is aging, is beyond its useful life, and must be replaced to support ADS-B critical services in the NAS.

The 94 ARTS IIE sites must be modernized. These systems were installed in the 1970's, with processors upgraded to their current configuration in the 2000 – 2002 timeframe.

Additionally, the ARTS IIEs, due to lack of processing speed and capacity, are suffering from software stability issues. Without resolution, these sites risk significant decreases in system availability, and with that, increased safety risk.

4. How Do You Know The Program Works?

By replacing the 11 ARTS IIIE sites and the 94 ARTS IIE sites with a STARS solution we expect the system to have an availability of 99.9995 percent. The STARS system is already operational at 51 terminal sites, and over the past five years, the average equipment availability for STARS is 99.9996 percent.

Qualitative benefits (cost avoidance) expected include: cost avoidance to maintain aging equipment, lifecycle benefits of common displays and processors, common hardware for re-use and expansions. Qualitative benefits are expected to enhance controller's situational awareness and lessen risk through efficiency and commonality.

The TAMR System will replace and/or upgrade the existing automation to a state-of-the-art digital, radar and flight data processing and display system, providing new air traffic control workstations and backroom automation equipment to enable safe control of airplanes, continued service and support of ADS-B critical services in the NAS.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$153,000,000 is required to complete the activities in section 1. Failure to fund these activities at the requested level will result in delays to the program, increased operational and maintenance costs to support two terminal automation systems in the NAS, failure to meet ADS-B and NextGen Segment Alpha operational enhancements, and a delay to complete the convergence to a single terminal automation system.

Detailed Justification for - 2B05 Terminal Automation Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Terminal Automation Program
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Terminal Automation Program	$3,892	$2,500	$2,500	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Technical Refresh Implementation	---	$1,600.0
2. Optimization, Enhancements, Engineering Services	---	300.0
3. Program Management	---	300.0
4. System Engineering	---	300.0
Total	Various	$2,500.0

For FY 2013, $2,500,000 is requested to continue procurement of hardware and software to replace obsolete equipment currently in the field and program management support to procure and field replacement Flight Data Input/Output (FDIO) system components at 50 FAA and DoD ATC facilities. Replacement components and software procured in prior years will be deployed at FAA and DoD ATC facilities during FY 2012.

2. What Is This Program?

The FDIO replacement project ensures the continuation of services in the National Airspace System (NAS) by replacing key components (i.e., servers, displays, keyboards, printers, remote control units (RCUs), and Replacement Alpha Numeric Keyboards (RANKS)) as they reach end-of-life or become obsolete. The replacement of FDIO system equipment serves to enhance the capability and sustain system operational availability at the required levels. Also provided is a common IP infrastructure to support future En Route Automation Modernization (ERAM)/System Wide Information Management (SWIM) architectures.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The NAS relies on the continuation of the capabilities provided by FDIO until these capabilities are replaced by future NextGen technologies such as Terminal Flight Data Management (TFDM) system in the 2015 - 2020 timeframe.

The FDIO equipment operates on 1980's technology which limits system capacity and increases the difficulty in maintaining the systems. Since 1998, the program has replaced obsolete/end-of-life components in the system. However, in FY 2010, components procured and replaced between 1998 - 2007 again reached end-of-life or became obsolete requiring another cycle of technical refresh. For example, the Personal Computers, keyboards, CRT monitors, and printers are key components of the system that require replacement.

Replacement of the legacy equipment will benefit the FAA by providing greater operational availability of the FDIO through the use of state-of-the-art equipment.

The FDIO system provides standardized flight plan data, weather information, safety related data, and other information to air traffic controllers at more than 650 NAS facilities. Controllers input flight data to the Host Computer System (HOST) at ARTCC facilities. The FDIO system electronically retrieves the flight data from the HOST and prints this information on paper strips provided to the controllers at the (TRACON, ATCT, and Radar Approach Control (RAPCON)) facilities. This information assists controllers in tracking aircraft and anticipating the arrival of aircraft in the sector under their control. The FDIO system also receives data from the TRACON, ATCT, and RAPCON facilities and relays this data back to the HOST.

4. How Do You Know The Program Works?

The FDIO Program has been replacing obsolete and end-of-life components since 1998. According to the NAS Performance Analysis System (NASPAS), the average adjusted level of system availability between 1998 and 2010 has ranged between 99.942 percent and 99.954 percent, which meets the FAA's target to, "Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the Nation's busiest airports through FY 2012."

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$2,500,000 is required to ensure the availability and reliability of system hardware and software to support current system capabilities and NAS modifications/enhancements. The modifications help improve airport arrival efficiency, and enhance safety and system utility. The funding requested will ensure the continued procurement of hardware and software as well as the installation of hardware and software procured in prior years.

A funding reduction will delay the deployment of technology refresh kits.

Detailed Justification for - 2B06 Terminal Air Traffic Control Facilities – Replace

What Do I Need To Know Before Reading This Justification?

- The FAA has developed a long-term Facility Master Plan for Air Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) infrastructure replacement and sustainment. This plan addresses the facility condition, and the ability to meet current and/or future needs. The proposed list of projects was developed in concurrence with the plan.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Terminal Air Traffic Control Facilities – Replace
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Terminal Air Traffic Control Facilities - Replace	$71,559	$51,600	$64,900	+$13,300

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Phase I – V Funding	---	$57,700.0
2. Advanced Requirements Definition	---	1,200.0
3. Engineering, Siting, and Program Management	---	6,000.0
Total	Various	$64,900.0

For FY 2013, $64,900,000 is requested to fund five phases of facility deployment to continue replacing aging facilities. $3,400,000 is requested for Phase I/II funding for three sites, Philadelphia, PA, Teterboro, NJ, and Tulsa-Riverside, OK; $33,555,913 is requested for Phase III construction for two sites Tucson, AZ, and West Palm Beach, FL TRACON; and $20,744,087 requested for Phase IV/V continuation for nine sites, Boise, ID, Fort Lauderdale Executive, FL, Houston, TX, Kalamazoo, MI, Las Vegas, NV, Oakland, CA, Palm Springs, CA, Traverse City, MI, and West Palm Beach, FL ATCT. Also included in the request $7,200,000 for other direct program costs. Products and services to be delivered include: formal facility requirements documentation, siting evaluations for all ATCT planning locations under consideration, preliminary engineering, and program management.

Replace Terminal Air Traffic Control Facilities:

Phase I/II – Funding of $3,400,000 for three design starts.

Philadelphia, PA - $1,000,000	Teterboro, NJ - $1,200,000
Tulsa-Riverside, OK - $1,200,000	

Phase III - Funding of $33,555,913 for two construction starts.

Tucson, AZ - $27,100,000	West Palm Beach, FL TRACON - $6,455,913

Phase IV/V – Continuation funding of $20,744,087 for nine facilities started in previous years.

Boise, ID - $2,000,000	Ft. Lauderdale Executive, FL - $1,217,400
Houston, TX - $2,680,782	Kalamazoo, MI - $950,000
Las Vegas, NV - $5,879,265	Oakland, CA - $1,645,146

Palm Springs, CA - $2,221,494	Traverse City, MI - $840,000
West Palm Beach, FL ATCT - $3,310,000	

Other - Funding of $7,200,000 is required for other direct program costs.

Advance Requirements Definition - $1,200,000	Engineering, Siting, and Program Management - $6,000,000

2. What Is This Program?

The FAA provides air traffic control services from more than 500 Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) facilities and must continually replace these buildings to ensure an acceptable level of air traffic control services and to meet current and future operational requirements.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

ATCT/TRACON facilities that cannot meet present-day operational requirements are being replaced. New facilities will accommodate future growth, current building codes, and design standards. The average age of an ATCT is 26 years and a TRACON is 22 years, with some as much as 50 years old. As the volume and complexity of terminal air traffic control increases, so does the need to have additional positions in the ATCT/TRACON (i.e., helicopter positions, VFR traffic advisory, runway monitors, etc.). In many cases, control towers and TRACONs built 20 years ago do not meet today's OSHA, operational, and building requirements. The terminal facilities must conform to current building codes and design standards.

4. How Do You Know The Program Works?

Since 2000, 74 facilities have been commissioned, of which 34 were congressionally directed and 40 were FAA requested sites.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$64,900,000 is requested to support design, construction contract awards, and to ensure continuation of equipment procurement, equipment installation, and disposition activities. To avoid impacts to the program schedule, the requested funding will ensure the continuation efforts of replacing aging terminal facilities.

A reduction from the FY 2013 Baseline Funding will impact several tower and TRACON projects, which are planned for FY 2013.

Detailed Justification for - **2B07 ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve	$45,509	$52,000	$25,200	-$26,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Initiate Modernization, Improvements, and Repairs System Eng. Configuration Mgmt. Risk Mgmt.	TBD	$18,600.0
2. Facility Planning and Program Support		1,500.0
3. Facility Condition Assessment		2,400.0
4. In-Service Engineering		2,700.0
Total	TBD	$25,200.0

For FY 2013, $25,200,000 is requested to provide for the following:

- Initiate modifications, improvements, and repairs to ATCT/TRACON facilities, system engineering, configuration management, facility planning, facility condition assessments and program support services, and in-service engineering.

2. What Is This Program?

The ATCT/TRACON Terminal Facilities Improvement Program (TFIP) includes projects that will enable facilities to maintain current operational, environmental, and safety needs in lieu of replacing or relocating the entire facility. This effort will result in a smooth and orderly transition of new equipment into the FAA's terminal facilities. This will also improve the operational efficiency and environment of equipment within ATCT/TRACON facilities. These upgrades and improvements to terminal facilities support the NAS modernization strategy to achieve efficient aerospace systems and operations.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The FAA must continually upgrade and improve aging terminal facilities and equipment to provide an acceptable level of service and to meet current and future operational requirements. Upgrades and improvements include replacing obsolete equipment, such as tower cab consoles, and rehabilitating administrative and equipment space due to facility expansion. Facility expansion includes adding operational positions, training space, base building construction, and environmental equipment, accessibility, structural and electrical upgrades.

Facility improvements must incorporate new requirements for relocated or replaced equipment with minimal impact to existing operations. The power and heating, ventilation, and air conditioning (HVAC) systems at many terminal facilities must be upgraded to handle both the new and old equipment during the in-service change-out. A successful transition of improvement projects is critical. In many towers, there is no room for additional equipment; therefore, base buildings must be expanded.

Facility condition assessments are necessary to determine the overall needs for facility improvements and to prioritize locations for investing improvements. These assessments are an in-depth evaluation of all the components of a facility.

4. How Do You Know This Program Works?

Between FY 2011 – FY 2012, there has been a 1.25 percent increase in FAA maintained facilities rated in "Good" standing and a one percent decrease in those rated in "Poor" standing.

Data Source: Terminal Facilities Information Fact Sheet, dated September 30, 2011.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$25,200,000 is required to initiate modifications, improvements, and repair ATCT/TRACON facilities. This includes system engineering, configuration management, facility planning, program support services, and in-service engineering.

A reduction from the FY 2013 Baseline Funding will impact several sustain projects, which are planned for FY 2013.

Detailed Justification for - 2B08 Terminal Voice Switch Replacement (TVSR)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Terminal Voice Switch Replacement (TVSR)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Terminal Voice Switch Replacement (TVSR)	$11,477	$8,000	$4,000	-$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Voice Switch Procurement	4	$1,900.0
2. Technical Support	---	500.0
3. Program Management Support	---	725.0
4. Logistics and Testing Support	---	300.0
5. Information Security	---	100.0
6. Site Preparation	---	475.0
Total	4	$4,000.0

For FY 2013, $4,000,000 is requested to procure, test, deliver and install four Terminal Voice Switch systems and Voice Switch Bypass (VSBP).

2. What Is This Program?

The ongoing TVSR program involves replacing the aging, obsolete voice switches in the Air Traffic Control Towers (ATCT) and Terminal Radar Approach Control facilities (TRACON). Voice switches enable air traffic controllers to communicate with aircraft as well as other air traffic control facilities. The TVSR program ensures that controllers continue to have reliable voice communications in the terminal environment. The program consists of several multi-year equipment contracts for voice switches, including; Small Tower Voice Switches, Enhanced Terminal Voice Switches, Rapid Deployment Voice Switches model IIA, Voice Switch Bypass Systems, and Interim Voice Switch Replacement. Also included is the Conference Control System at the Air Traffic Control System Command Center (ATCSCC). The program also provides the contract vehicles for the FAA to procure voice switch equipment for new and modernized terminal facilities.

DOT Strategic Goal: Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

New terminal voice switches are required to allow the use of new runway capacity that is being added to the National Air Space (NAS) as well as for all new Air Traffic Control Towers and Terminal Radar Approach Control (TRACON) that require a new Terminal Voice Switch.

These voice switches provide Ground/Ground and Air/Ground communications. Many of the older Integrated Command Switching System (ICSS) systems and key systems used to provide Terminal Equipment Systems are currently being replaced under the Terminal Voice Switch Replacement program (TVSR). The TVSR program has been successful by replacing the older populated integrated digital voice switching systems in Air Traffic Control Towers (ATCT) and Terminal Radar Approach Control (TRACON) that provide non-blocking voice communication between the air traffic control operator positions, radio channels, and interphone land lines throughout the National Airspace Space (NAS) for both FAA and DoD sites located in CONUS and OCONUS.

Terminal Equipment Systems are the services that provide key equipment or switching systems used to direct and control voice communications. This allows the terminal air traffic controllers to select the various communications paths and direct the communications to desired locations. The controller can communicate with another controller position at his/her own facility or another air traffic control (ATC) facility, with aircraft (via radio) and with other locations as required. Voice switching is the mechanism that facilitates communications between Air Traffic Control and the pilots.

4. How Do You Know The Program Works?

This program provides reliable voice communications in support of air traffic terminal operations. The reliability of communications from controller to controller and controllers to pilots is vital to a safe air traffic control system. By providing an essential element of FAA's communications network, this program will support the safety of our transportation system. Approximately $7,300,000 per year will be saved in operational costs by reducing the current annual maintenance cost for electromechanical switches, reducing annual depot support costs, and reducing man-year costs associated with greater reliability.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$4,000,000 is required to procure, test, deliver and install four Terminal Voice Switch systems and Voice Switch Bypass (VSBP). A reduction would reduce the number of Voice Switch Bypasses.

Detailed Justification for - 2B09 NAS Facilities OSHA and Environmental Standards Compliance

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NAS Facilities OSHA and Environmental Standards Compliance ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
NAS Facilities OSHA and Environmental Standards Compliance	$25,948	$24,600	$26,000	+$1,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Environment and Occupational Safety and Health (EOSH) Compliance	---	$16,000.0
2. Fire Life Safety for Airport Traffic Control Towers (ATCTs)	---	10,000.0
Total	Various	$26,000.0

For FY 2013, $26,000,000 is requested to continue the implementation of the following major EOSH programs: Fire Life Safety, Occupational Safety and Health Compliance, Environmental Compliance, Fall Protection, Electrical Safety, Indoor Air Quality, including mold and asbestos, Incident Response, Safety Integration, EOSH Training, Requirements Integration, and Workplace Inspections and hazard abatement.

2. What Is This Program?

National Airspace System (NAS) Facilities OSHA and Environmental Standards Compliance programs provide comprehensive Air Traffic Organization (ATO) wide environmental, occupational safety and health management initiatives to meet federal, state, and local legal requirements in addition to negotiated agreements with employees. The EOSH Services Group is the lead organization within ATO charged with the protection of employees' well-being and the environment. Through the development of policy guidance, technical assistance, employee training, compliance monitoring, and corrective actions, the EOSH Services Group designs, and manages national compliance programs that integrate risk management into each level of the ATO infrastructure life cycle.

The Fire Life Safety program manages the implementation of projects to upgrade ATCTs and other critical NAS facilities to meet current regulatory and industry standards for employee evacuation and fire suppression consistent with the requirements of negotiated agreements. In addition to physical infrastructure upgrading, the program is responsible for developing policy and guidance, fire prevention and emergency action plans, and for training tower occupants, resident engineers, maintenance technicians, and employees on maintenance requirements for fire safety systems. Effective support and protection of the air traffic control environment is essential to limiting the impact of fire, explosion, or related events on NAS operations and facilities that also affect the flying public and FAA employees.

DOT Strategic Goal - Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

Non-compliance with federal, state, and local environmental, safety and health legal and other requirements imposes significant liabilities on the FAA in the form of interruptions to NAS operations, violations of bargaining unit agreements, regulatory fines and sanctions, civil and criminal lawsuits, post-incident response actions, such as costly cleanups, and a decrease in employee morale. Recent examples of non-compliance events include polychlorinated Biphenl (PCB) contamination after an equipment malfunction at an Air Route Surveillance Radar site, and potential employee exposure to asbestos fibers during ceiling tile removal at an Air Route Surveillance Radar site. Monthly, approximately 31 events result in disruptions to NAS operations. Effectively managing environmental and safety risks to ensure that new acquisitions, installations and modifications do not introduce new hazards and maintaining compliance with regulations, requires the implementation of EOSH compliance programs to continually identify and assess risks, integrate risk reduction into system designs, implement controls and best management practices into daily operations, and maintain a workforce with the knowledge to identify and mitigate EOSH risks at their source.

4. How Do You Know The Program Works?

This program implements nationally directed technical compliance programs designed to fully address federal, state, and local environmental and safety regulations and bargaining unit agreements. Within the ATO, the EOSH Services Group directs these programs in close collaboration with the Service Areas and Service Centers. The ATO Workplace Inspections and Hazard Abatement Programs are a good indicator that the program works. The ATO Workplace Inspections Program is responsible for overseeing the annual EOSH inspection of over 11,400 separate facilities nationwide. During these inspections, ATO workplaces are evaluated for both OSH and Environmental compliance and deficiencies are noted as workplace hazards. Workplace hazards are recorded in the FAA Workplace Inspection Tool (WIT) database, along with a risk assessment and an estimated cost to correct each individual hazard. The ATO Hazard Abatement Program then tracks the identified hazards until they are completely abated. As of FY 2011 the FAA WIT is tracking 97,692 individually identified workplace hazards, of which 84,481 have been completely abated.

In FY 2010, the ATO overall case rate of injuries/illnesses per 100 employees was 2.17 with total direct cost of approximately $2,500,000. Also, the Fire Life Safety program initiated upgrades at 20 ATCTs and certified 20 completed upgrades to the Occupational Safety and Health Administration, which significantly increased the protection of the Agency's infrastructure and increased employee safety.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$26,000,000 is required to continue implementing nationally directed technical compliance programs designed to fully address federal, state, and local environmental and safety regulations and binding commitments. Within the ATO, the EOSH Services Group directs these programs in close collaboration with the Service Areas and Service Centers to ensure the safety and health of FAA employees.

Detailed Justification for – 2B10 Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP) ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP) & Antenna Raises and UPS at ASR-9 Sites	$2,994	$6,000	$6,400	+$400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
ASR-9 SLEP		
1. Solution Development	---	$2,500.0
2. Implementation	---	200.0
3. In-Service Management	---	1,200.0
4. Antenna Raises Implementation	---	2,400.0
5. Disposition	---	100.0
Total	Various	$6,400.0

For FY 2013, $4,000,000 is requested to finalize the design and development of Digital Remote Surveillance Communication Interface Processor (SCIP) Replacement (DRSR) and procure test units. Procurement of production units of transmitter backplane and cable sets will be initiated. The program will conduct test and evaluation and initiate procurement of production units of the receiver protector replacement unit.

Also in FY 2013, an additional $2,400,000 is requested to raise antennas and provide Uninterruptible Power Supplies (UPSs) at select ASR-9 sites.

The 135 Airport Surveillance Radar Model 9 (ASR-9) systems provide aircraft detection and weather information to air traffic controllers at major airports, including the highest activity airports (e.g., Atlanta, Chicago, Los Angeles, and Dallas/Ft. Worth). The ASR-9 SLEP Phase 2 program will mitigate supportability problems and reduce the cost to operate these systems.

2. What Is This Program?

ASR-9 SLEP Phase 2 will consist of implementing modifications to the aging ASR-9 radar systems and peripheral equipment to sustain primary surveillance in terminal airspace through 2027. The sustainment of the ASR-9 aligns with the NAS Enterprise Architecture Surveillance Roadmap Decision Points[1], and the Surveillance and Broadcast Services (SBS)/ADS-B backup strategy.[2] Based on this strategy, ASR-9 systems will remain in service through 2025.

The ASR-9 SLEP will mitigate issues of obsolescence, reliability and maintainability, and lifecycle costs for:

[1] https://nasea.faa.gov/products/roadmap/main/display/7/tab/dps/
[2] https://nasea.faa.gov/products/roadmap/main/display/7/tab/assumptions/

- **ASR-9 Communications Infrastructure** – The Remote Surveillance Communications Interface Processor is expensive, obsolete, and is not available in sufficient quantities to meet future TRACON expansions and/or consolidations. This replacement will remove unnecessary assemblies, reducing power consumption and reclaiming stock for future use, where applicable. Additionally, Racal Milgo modems are obsolete and other communications infrastructure components need to be replaced.

- **ASR-9 Monitoring and Control Infrastructure –** The ASR-9 Transmitter Backplane provides the interface between four major circuit cards (control and monitoring [C&M]) that control the transmitter and provide C&M functions to site technicians. The backplane uses a wire wrap-based architecture to support critical signal distributions, which couple with 21 ribbon cable assemblies to interface to various C&M components in support of system functions. A customizable transmitter backplane is required to expand transmitter C&M. Additionally, there are obsolescence issues with the Maintenance Display Unit, which is required to perform maintenance procedures and certain system performance certification procedures. The Maintenance Display Unit utilizes an obsolete Cathode Ray Tube technology and many of the assemblies/parts are no longer procurable. The legacy Maintenance Display Unit is anticipated to be replaced with COTS equipment.

- **ASR-9 Radio Frequency Infrastructure** – Receiver Protector waveguide assemblies provide for the protection of the receiver during periods when the transmitter produces the Radio Frequency (RF) pulse. There is a high failure rate for the Receiver Protector and a replacement is sought that will reduce lifecycle costs.

Antenna raises and UPS installations – This activity will raise the antenna height at sites that have coverage problems. This activity will also provide UPS systems at select sites that have experienced problems with commercial power.

DOT Strategic Goal - Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

ASR-9 terminal service provides for maintenance of separation standards, reduces delays, and improves safety at congested airports. During instrument meteorological conditions the radar provides air traffic controllers' information that allows closer aircraft operations and increases air traffic arrival and departure operations. This particular program, ASR-9 Service Life Extension Program Phase 2, reduces the risk of unscheduled outages and ensures the continuation of maximum service capabilities. In addition, this program will reduce the overall lifecycle operation costs by improving system reliability and maintainability. Antenna raises are needed to mitigate radar coverage problems and UPS installations are needed to mitigate the effects of recurring interruptions of commercial power.

4. How Do You Know The Program Works?

Extending the service life of the ASR-9 system will reduce outages due to performance deterioration and parts obsolescence. Furthermore, the ASR-9 service life extension will increase equipment and service availability. The success of the program will be measured by analysis of ASR-9 outages attributable to system components affected by this modification, air traffic delays due to these outages, and related demand for spare parts. Raising a radar antenna will provide an unobstructed space between the antenna and the area being surveilled. UPS installations have improved the availability of power to radar sites at many locations.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The ASR-9 was procured in the mid-1980s and fielded between 1989 and 1994. The system is expected to remain operational until 2027; however, the radar systems are becoming difficult to maintain. The system hosts hardware and software architectures which are becoming increasingly difficult to procure, and some of which are obsolete, resulting in cannibalization and re-engineering for short term results as a means to repair or refurbish in order to maintain this critical system.

A reduction from the FY 2013 requested funding level will result in increased risk to the ability to award contracts to:

- Initiate procurement of DRSR test units
- Initiate procurement of C&M initial production units
- Initiate procurement of receiver protector replacement units
- Execute antenna raises and UPS installations

Detailed Justification for – 2B11 Terminal Digital Radar (ASR-11) Technology Refresh and Mobile Airport Surveillance Radar (MASR)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – 2B11 Terminal Digital Radar (ASR-11) Technology Refresh and MASR ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Terminal Digital Radar (ASR-11) Technology Refreshand Mobile Airport Surveillance	$4,092	$3,900	$8,200	+$4,300

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
ASR-11 Technology Refresh		
1. Retrofit Installation	---	$806.0
2. Program Management (ASR-11 Tech Refresh)	---	762.0
3. System Engineering (ASR-11 Tech Refresh)	---	632.0
Total	Various	$2,200.0
Mobile Airport Surveillance Radar (MASR)		
1. System Engineering (MASR)	---	$1,287.0
2. Program Management (MASR)	---	1,096.0
3. System Procurement and Development (MASR)	---	3,617.0
Total	Various	$6,000.0

For FY 2013, $2,200,000 is requested to install 11 technologyl refresh retrofit modification kits and complete the ASR-11 Technical Refresh Segment 2 business case in support of the Final Investment Decision goal of September 2013.

For FY 2013, $6,000,000 is requested for MASR to Procure Hardware, System Development, Program Management, and System Engineering. This is the Rough Order of Magnitude funding requirement identified at Investment Analysis Readiness Decision (IARD) for the preferred and lowest cost alternative to meet the stated shortfall.

2. What Is This Program?

The ASR-11 surveillance capabilities provide air traffic personnel with coverage performance suitable for air traffic control of aircraft arrivals and departures at airports throughout the United States. These capabilities permit safe and efficient movement of aircraft in and out of airport terminal areas allowing air carriers to maximize their resources without compromising the safety of air traffic services.

The ASR-11 technology refresh Segment 1 program provides for the replacement and upgrade of known obsolete ASR-11 Commercial-Off-The-Shelf (COTS) hardware and software to ensure the continued operation of the radar system through its designated lifecycle. The program will replace the obsolete hardware cards within the signal data processing card rack with the Advanced Signal Data Processor (ASDP). The ASDP reduces the number of processing cards from 14 to 3.

The technology refresh kits are planned to be retrofitted into all ASR-11 systems previously fielded with the signal data processor (SDP). We have procured 68 retrofit kits thru FY 2011.

ASR-11 technology refresh kits are scheduled to be installed at a rate of one site per month. As of May 2011, ASR-11 technology refresh systems have been installed at the following sites:

FAA (PSF)	Lansing, MI (LAN)
FAA Academy (OEX)	Springfield, MO (SGF)
Flint, MI (FNT)	Lincoln, NE (LNK)
Peoria, IL (PIA)	Ft. Smith, AR (FSM)
Green Bay, WI (GRB)	Augusta, GA (AGS)
Pensacola South, FL (PNS)	Fresno, CA (FAT)
Lafayette, LA (LFT)	Santa Maria, CA (SMX)
Abilene, TX (ABI)	Columbia, SC (CAE)
Boise, ID (BOI)	Santa Barbara, CA (SBA)
Billings, MT (BIL)	Erie, PA (ERI)
Fairbanks, AK (FAI)	Burlington, VT (BTV)

The MASR is planned to eliminate an existing shortfall, which is our lack of a mobile surveillance system that can provide the level of surveillance performance needed to support planned in-service radar relocations, temporary radar service needs and emergency operations in a dense or complex airspace.

This performance shortfall will be accomplished by procuring a terminal surveillance service that can be deployed within known, short-duration timeframes and is compatible with any airport traffic control towers (ATCT), Terminal Radar Approach Control centers (TRACON), Air Route Traffic Control Centers (ARTCC), and their associated automation systems. Loss of primary and secondary surveillance products, due to either catastrophic events or long term outages, would have a definite impact on Federal Aviation Administration (FAA) mission capabilities, specifically in the areas of controller situation awareness, safety, capacity, and industry vitality.

This proposed system architecture is a reusable, service-oriented capability with an emphasis on providing the terminal surveillance service efficiently and quickly. The program goal is to have interfaces for power, mechanical, data, and remote monitoring and control defined to be interoperable with all currently deployed ASR-8, ASR-9 and ASR-11 terminal radars and their associated automation interfaces.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The benefits of the ASR-11 technology refresh retrofit of the ASDP into the 68 production systems will provide a projected $45,500,000 cost savings to the Operations and Maintenance budget by eliminating duplicative software modifications and allowing for more efficient future signal processing software modifications. The retrofitting of the ASDP into the ASR-11 system allows increased processing speed and memory. Taking advantage of this processing capability, the ASDP software, as delivered, will include baseline changes that were not possible in the original Signal Data Processor due to processing and memory limitations. The changes to the signal processing will allow targeting of known shortcomings of the system that will improve the system performance and target detection capability in the presence of wind farms and other anomalous propagation. The ASR-11 Tech Refresh Segment 1 program addresses identified In Service Decision issues and outstanding action items associated with processing throughput and memory capacity issues with the existing Signal Data Processor (SDP).

The benefits of the MASR capability are to eliminate long-term surveillance outages primarily due to airport modernization and construction projects, or a major casualty to the airport radar. Airport modernization and construction often requires the radar to be relocated, causing a multi-month outage. Large-scale radar catastrophic failures, while rare, pose a particularly significant challenge since the majority of deployed radars are no longer manufactured, and complete radar systems are typically not stocked by the logistics depot. The MASR system capability would bridge this gap and provide seamless transition from the existing legacy radar system to the system that will provide terminal surveillance service into the future.

The MASR will eliminate these two critical operational shortfalls in the National Airspace System (NAS):

- Lack of scheduled Response Assets. The MASR can be deployed to provide temporary terminal surveillance services at an airport while the existing surveillance asset is taken off-line for scheduled relocation, airport construction, or any other long term outage
- Lack of disaster Response Assets. The MASR can be deployed to replace terminal surveillance assets that have been taken off-line due to natural or man-made disasters. The MASR system can be transported by truck, rail, or ship, and installed, and certified operational in as few as five days from the initial incident

4. How Do You Know The Program Works?

The ASR-11 technology refresh successfully completed testing as documented by the programs Developmental Test and Evaluation and Operational Test and Evaluation Reports. In addition, the program received approval to deploy, as documented by the In Service Decision (ISD), in January 2010. The program is ahead of the planned deployment schedule with 22 retrofit kits installed to date.

The MASR Program received Investment Analysis Readiness Decision (IARD) on March 22, 2011 from the ATO Executive Council as an ACAT-4 Program and was directed to proceed to Final Investment Decision (FID) using the preferred alternative. The initial Benefit Cost (B/C) ratio presented to the ATO-EC was 3.4. The MASR is on track for FID by March 2012.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

For FY 2013, $2,200,000 is required for ASR-11 technology refresh to install 11 technical refresh retrofit modification kits and complete the ASR-11 technology refresh Segment 2 business case in support of the Final Investment Decision goal of September 2013.

For FY 2013, $6,000,000 is required for MASR for System Procurement, System Development, Program Management, and System Engineering. This is the Rough Order of Magnitude funding requirement identified at Investment Analysis Readiness Decision (IARD) for the preferred and lowest cost alternative to meet the stated shortfall. Final FY 2013 budget value will be defined at FID scheduled for March 2012.

A reduction to the ASR-11 technology refresh will delay installation of retrofit kits beyond the June 2015 milestone date; a reduction to MASR will impact Mobile development completion by September 2013, In-Service Decision (ISD) initial deployment date, and will impact planned in-service relocations.

Detailed Justification for – 2B12 Runway Status Lights (RWSL)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Runway Status Lights (RWSL)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Runway Status Lights (RWSL)-Segment 1	$54,890	$29,800	$35,250	+$5,450

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$2,339.9
2. Implementation	---	1,867.6
3. Hardware Procurement	---	3,460.7
4. Construction	---	18,279.8
5. Optimization/Enhancements/Engineering Services	---	2,830.1
6. ICDLS/Documentation	---	2,688.3
7. Installation / Check out	---	2,121.4
8. Second Level Engineering	---	1,412.2
9. Independent Operational Test and Evaluation (IOT&E)	---	250.0
Total	Various	$35,250.0

For FY 2013, $35,000,000 is requested to continue RWSL implementation and construction activities. These activities include: starting site design for one airport, starting construction at three airports, delivering and installing the system at four airports, and achieving initial operational capability at three airports. Remaining funds will be used for systems engineering, software maintenance, Interim Contractor Depot Logistics Support (ICDLS), spare parts, second level engineering support, initial utility service, information systems security requirements, and contractor support for the program office and all of the above activities. In addition, $250,000 is requested for IOT&E.

2. What Is This Program?

RWSL serves as stop lights on runways and taxiways, signaling when it is unsafe to enter, cross or begin takeoff on a runway. Located along the centerline of a runway or taxiway, Runway Entrance Lights (REL) and/or Takeoff Hold Lights (THL) will illuminate red when a runway is in use, notifying the pilot of a taxiing aircraft to either stop prior to crossing the runway, or yield to the aircraft landing or taking off. RWSL is designed to independently supplement existing air traffic controller tools and procedures without increasing the controller workload by automatically providing a clear, prompt indication of runway status directly to pilots and ground vehicle operators. RWSL acts as an independent safety enhancement and does not replace air traffic control issued clearance. The RWSL system provides a vital layer of redundancy in runway safety and is a back up and reinforcement of controller guidance.

An Initial Investment Decision was approved by the Joint Resource Council in July 2007. A prime contract was awarded October 2008. A final cost and schedule baseline decision was approved January 20, 2010.

DOT Strategic Goal - Safety:

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

A top priority of the FAA is to enhance airport safety while increasing airport capacity. Reducing runway incursions is a major component of this effort. Runway incursions develop quickly and without warning from safe and routine traffic situations on the airport surface. Such time-critical runway incursions usually leave very little time for corrective action. The National Transportation Safety Board (NTSB) issued a safety recommendation to the FAA to "Implement a safety system for ground movement that will ensure the safe movement of airplanes on the ground and provides direct warning capability to the flight crews." RWSL are designed to provide direct indication to flight crews and vehicle operators that it is unsafe to enter a runway or to begin a take off.

4. How Do You Know The Program Works?

This concept has been proven by Lincoln Labs and three prototype sites have been deployed and are being utilized in an operational environment at Dallas Forth Worth (DFW), San Diego (SAN), and Los Angeles (LAX).

5. Why Do We Want/Need To Fund The Program At The Requested Level?

This program is being deployed at 23 of the busiest airports, to provide an additional layer of safety. This program is designed to prevent major catastrophic collisions. A reduction in funding would have a direct result in delaying the deployment of this safety system.

Detailed Justification for - 2B13 National Airspace System Voice System (NVS)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – National Airspace System Voice System (NVS)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
National Airspace System Voice System (NVS)	$4,192	$9,000	$10,250	+$1,250

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$800.0
2. Engineering Support	---	1,500.0
3. Contract Award	---	7,700.0
4. Independent Operational Test and Evaluation (IOT&E)	---	250.0
Total	Various	$10,250.0

For FY 2013, $10,000,000 is requested to fund the contract awarded at end of FY 2012. Segment 1 of the contract will consist of acquiring test systems to achieve the objectives of: (1) demonstrating NextGen capabilities (e.g., resource sharing, load balancing, and enterprise management); and (2) having a production-ready system for deployment to the any of the target environments. Segment 2 will consist of deploying NVS systems to operational NAS facilities. Initial deployments for Segment 2 will focus on Terminal and NextGen future facilities.

An additional $250,000 is requested for Independent Operational Test and Evaluation (IOT&E) efforts.

2. What Is This Program?

NVS will provide voice communications services to Air Traffic Control Specialists (ATCS), supervisors, and ancillary Air Traffic Control (ATC) operators in support of continuous ATC operations in the Terminal and En Route domains of the National Airspace System (NAS). Voice communications connectivity will be provided to aircraft flight crews and Unmanned Aircraft System (UAS) operators through Air to Ground (A/G) radio circuits or equivalent network connections. Voice communications connectivity between ATCS, supervisors and traffic managers will be provided through access to intra-facility and inter-facility G/G voice circuits or equivalent network connections.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The current switch technology deployed in the NAS will not support the expected future NextGen concept of operations for either: networked facilities, or such concepts as dynamic re-sectorization and off-loading during non-peak operations. These capabilities require that lines connected to a controller's workstation can be changed to add or eliminate lines as the geographical boundaries of the sector change. The NVS will support current and future ATC operations as envisioned by both government and industry forecasters. In addition, the current voice switch system is aging and needs to be modernized to mitigate obsolescence.

4. How Do You Know The Program Works?

Voice switching and radio controls that are in the NAS today are providing aircraft separation capabilities. The NVS program will replace the voice components that are becoming obsolete and will provide NextGen capabilities. This program will allow the FAA to achieve voice switching modernization objectives such as a network-based infrastructure as well as evolve toward a flexible communications routing architecture that supports dynamic re-sectorization, resource reallocation, airspace redesign and the NextGen vision (e.g., improving flow capacity).

This program maps to the FAA goal of increased airport capacity to meet reductions in the projected operating costs by: reducing the number of equipment components needing to be inventoried, by reducing the number of switch types; reducing acquisition, training, and maintenance costs by reducing the number of voice-switch designs; improving equipment availability and related inventory issues by reducing obsolete equipment; and reducing potential costs to users from air traffic delays due to projected outages of the existing systems and increased user demand.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$10,000,000 is required to:

Demonstrate the introduction of new capabilities into the ATC environment including:
- Current NextGen features and operational concepts
- Future NextGen features and operational concepts
- NextGen features, future (requirements or functions) into a operational system

Design, engineer and integrate NVS pre-production systems in preparation for Factory Acceptance Test.
An additional $250,000 is required for Independent Operational Test and Evaluation (IOT&E).

A reduction from the FY 2013 baseline funding would delay demonstration of NextGen capabilities and delay pre-production test readiness.

Detailed Justification for - 2B14 Integrated Display System (IDS)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Integrated Display System (IDS)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Integrated Display System (IDS)	$8,683	$8,800	$4,200	-$4,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Procurement, Production and Deployment of IDSR systems	29	$2,287.0
2. Optimization/Engineering Services	---	932.0
3. Program Management/Engineering Support	---	981.0
Total	Various	$4,200.0

For FY 2013, $4,200,000 is requested for the IDS program to procure 158 workstations, and install 226 workstations at 14 Terminal Radar Approach Control (TRACONS) and the associated Airport Traffic Control Tower (ATCT), including Houston (I90), Traverse City (TVC), Gulfport (GPT), Boise (BOI), Southern California (SCT), Pittsburg (PIT), San Antonio (SAT), Allentown (ABE), Wilkes-Barre (AVP), Cleveland (CLE), Harrisburgh (MDT), Las Vegas (L30), Miami (MIA), and Milwaukee (MKE).

2. What Is This Program?

The IDS is a local and wide area network information dissemination and display system that consolidates information from several operational NAS weather subsystems and other operational sources onto a single display, and distributes the data to air traffic controllers and airspace managers at TRACON, Airport Traffic Control Tower (ATCT), and Air Route Traffic Control Center (ARTCC) facilities. These capabilities permit safe and efficient movement of aircraft in and out of airport terminal areas allowing air carriers to maximize their resources without compromising the safety of air traffic services.

The IDSR program provides for the replacement of the legacy Integrated Display Systems-4 (IDS-4) with current technology. The program will replace 2,230 IDS-4 systems at approximately 390 FAA facilities nationwide. The prime contract was awarded in May 2010 and design efforts were completed in early 2011.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The NAS relies on the continuation of the capabilities provided by IDS until these capabilities are integrated into a future flight data system such as the Terminal Flight Data Manager (TFDM) system envisioned by the FAA Enterprise Architecture Roadmap[1] in the 2015 to 2027 timeframe.

[1] FAA Enterprise Architecture Roadmap

The existing IDS-4 system has been operational since 1994 without any technical refresh of hardware/software. As currently configured, the IDS-4 system is unsupportable and lacks the capacity to incorporate software updates. Critical hardware components needed to support DOS-based software are not available from industry and the proprietary software is no longer supported by the vendor. Due to obsolescence issues, Logistic Center spares stocks are being depleted and the single board computer necessary to support DOS based programs is unavailable for purchase. As the age of the equipment increases, the cost of maintenance support increases. Additionally, the lack of repair parts increases the likelihood and frequency of system failures. Increasing system failures will negatively impact ATC workload, increase labor costs, and reduce ATC situational awareness thereby increasing flight delays. Recent obsolescence issues and loss of proprietary software support make it necessary to replace this system to sustain its functionality.

Replacement of the legacy equipment will benefit the FAA by providing greater operational availability of the IDS associated with the use of state-of-the-art equipment thereby reducing delays at the airports. The consolidation of information provided by the IDS enhances controller's situational awareness and reduces the need for multiple displays. Additionally, controllers will be able to provide more dynamic responses to operational changes (ex: real-time weather information communicated to satellite facilities).

4. How Do You Know The Program Works?

Replacing IDS systems with current technology will reduce outages, thereby reducing delays at the airports associated with the sites addressed by this investment. Measurement criteria established upon final investment decision will focus on operational availability, which were assessed on an annual basis beginning in FY 2011.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$4,200,000 is required to to procure 158 workstations, and install 226 workstations at 14 Terminal Radar Approach Control (TRACONS) and the associated Airport Traffic Control Tower (ATCT), including Houston (I90), Traverse City (TVC), Gulfport (GPT), Boise (BOI), Southern California (SCT), Pittsburg (PIT), San Antonio (SAT), Allentown (ABE), Wilkes-Barre (AVP), Cleveland (CLE), Harrisburgh (MDT), Las Vegas (L30), Miami (MIA), and Milwaukee (MKE).

A reduction from the FY 2013 baseline funding will delay the procurement of and installation of the workstations at the 14 sites planned.

Houston (I90)
Traverse City (TVC)
Gulfport (GPT)
Boise (BOI)
Southern California (SCT)
Pittsburg (PIT),
San Antonio (SAT),
Allentown (ABE)
Wilkes-Barre (AVP),
Cleveland (CLE)
Harrisburgh (MDT)
Las Vegas (L30)
Miami (MIA)
Milwaukee (MKE)

Detailed Justification for - **2B15 Remote Monitoring and Maintenance System (RMMS) Technology Refreshment**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Remote Monitoring and Maintenance System (RMMS)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Remote Monitoring and Maintenance System (RMMS) Technology Refreshment	$6,487	$4,200	$4,700	+$500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Equipment Installation and Checkout at ARTCCs	---	$2,400.0
2. Hardware Procurement at OCC sites	---	1,240.0
3. Disposition of the Legacy Equipment	---	60.0
4. Investment Analysis for Phase 3	---	1,000.0
Total	Various	$4,700.0

For FY 2013, $4,700,000 is requested to complete the implementation of phase 2 Remote Monitoring and Logging System (RMLS) National RMM Network (NRN) in the Eastern and Central Service Areas of the National Airspace System (NAS) and finalize the investment analysis for phase 3 Automated Maintenance Management System (AMMS).

2. What Is This Program?

Phase 2 RMLS NRN will provide Maintenance Processor System (MPS) hardware technology refreshment and re-host Maintenance Automation System Software (MASS) on new hardware platforms. The RMLS NRN performs the same monitor and control functionality of the current RMMS. The RMLS NRN will include the following:

- New Server-Based Platforms, installed at the Operations Control Centers (OCC)
- New communication platforms, installed at the Air Route Traffic Control Centers (ARTCC) to replace the existing Maintenance Processor Subsystem (MPS) equipment
- FAA Telecommunications Infrastructure (FTI) will provide the data connectivity from OCC to OCC, from OCC to ARTCC, and from ARTCC to OCC

The MPS equipment will be removed and disposed as the RMLS NRN is placed in service.

Phase 3 Automated Maintenance Management System (AMMS) will automate and integrate legacy operation and maintenance systems, web-based systems, and NexGen systems in a secure net-centric environment.

AMMS will standardize data sharing using updated tools and technology for the interoperability of Tech Ops operation and maintenance systems.

AMMS will effectively share information in near real time with systems outside of Air Traffic Control, using a System Wide Information Management (SWIM) compliant Service-Oriented Architecture (SOA).

DOT Strategic Goal - Economic Competitiveness

- Maximum returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The FAA relies on RMMS to insure all NAS facilities and systems are operational so that flights are safe and are on time. The NAS Defense program and Homeland Security also relies on the data for 24/7 monitoring of the NAS. The MPS equipment has past its useful lifecycle, and is becoming unsupportable, and expensive to repair. The Phase 2 RMLS NRN provides lifecycle replacement of the existing MPS, and supports the FAA NextGen operation of the National Airspace System (NAS) systems and facilities.

Phase 2 RMLS NRN contributes to sustain the adjusted operational availability of 99.7 percent for the reportable facilities that support the 35 busiest airports through FY 2013. When fully operational in FY 2013, RMLS will reduce annual Operations and Maintenance costs by $1 million.

The "Vision 100 – Century of Aviation Reauthorization Act" lists as a goal the need to "integrate data streams from multiple agencies and sources to enable situational awareness and seamless global operations for all appropriate users of the system, including users responsible for civil aviation."

Phase 3 AMMS will use web-based implementations like SOAs, cloud computing, and net-centric operations to reduce the number of Technical Operations legacy systems to a smaller set of integrated, centralized data-sharing entities.

4. How Do You Know The Program Works?

In FY 2007 - FY 2008 the FAA's Remote Maintenance System Engineering Team (RMSET) successfully designed, developed and tested a proof of concept prototype for RMLS. In FY 2010 the logging functions of RMLS was made fully operational across the NAS.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$4,700,000 is required to complete Phase 2 RMLS NRN in FY 2013 and complete Phase 3 AMMS investment analysis, for final investment decision. This ensures a reliable system that can maintain the operation of all systems and facilities in the NAS.

Phase 3 AMMS is dependent on many RMLS components. A reduction from the FY 2013 baseline funding will delay RMLS from becoming fully operational.

Detailed Justification for – 2B16 Mode S Service Life Extension Program (SLEP) - Phase 2

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Mode S Service Life Extension Program (SLEP) - Phase 2
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Mode S Service Life Extension Program (SLEP) - Phase 2	$1,497	$4,000	$4,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Solution Development	---	$1,900.0
2. Implementation	---	10.0
3. In-Service Management	---	2,080.0
4. Disposition	---	10.0
Total	Various	$4,000.0

For FY 2013, $4,000,000 is requested for the completion of design and development of the Long Range Radar version of the Modular Mode Select Bus Modification (MMSBM) and the continuation of the Short Range Radar version of the Modular Mode-S Bus Modification (MMSBM). Procure initial production of High Gain Open Planar Array (HGOPA).

2. What Is This Program?

Mode S SLEP Phase 2 will implement modifications to the aging secondary Mode S subsystems architecture and peripheral equipment to sustain secondary surveillance in terminal and en route airspace through 2028. The sustainment of the Mode S aligns with the Surveillance Roadmap Decision[1], and the SBS (Surveillance and Broadcast Services)/ADS-B backup strategy.[2]

Based on this strategy, at a minimum, the Mode S systems at the 23 long range radar facilities and the top 50 high density terminal facilities will remain in service through 2028.

The Mode S SLEP will mitigate issues of obsolescence, reliability and maintainability, and lifecycle costs for:

- **Beacon Video Reconstitutor -** The Beacon Video Reconstitutor is comprised assemblies/components that have reached the end-of-life, and are not supportable. The FAA cannot repair or reverse engineer these assemblies. There are no other known sources of repair for the BVR assemblies. Without the BVR, these radar sites are precluded from the full Mode Select display functionality. Current separation standards cannot be applied using ASR-8 videos and the ARTS II position symbols (ARTS tags) alone. The lack of analog beacon slash is a major configuration change to what is currently in the field and would adversely affect present ATC procedures. The beacon position symbols alone are not acceptable for target separation.

[1] https://nasea.faa.gov/products/roadmap/main/display/7/tab/dps/
[2] https://nasea.faa.gov/products/roadmap/main/display/7/tab/assumptions/

- **Mode-S Receiver Processor and Interrogator –** The Mode S Receiver Processor and Interrogator subsystems contain many assemblies and components which are becoming increasingly costly to procure and maintain. Hardware and software architectures are bound by legacy 1980's technologies which require refresh to service the growth in complexity of the NAS environment.

- **Mode S Beacon Antenna System** - A five foot beacon antenna was deployed throughout the mid to late 1970's with a projected lifecycle of 20 years. All fivefoot beacon antennae currently servicing the NAS are operating at 10+ years past the intended lifecycle, and support for these obsolete assets is increasingly challenging. The primary means of repair/refurbishment is cannibalization of a limited number of unserviceable five foot beacon antennae for parts. There is an urgent need to manage the supportability issues of the legacy five foot beacon antenna issues.

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Mode S terminal and en route service provides for maintenance of separation standards, reduces delays, and improves safety at congested airports. During instrument meteorological conditions the radar provides air traffic controllers' information that allows closer aircraft operations and increases air traffic arrival and departure operations. Providing for the Mode S service life extension modifications reduces the risk of unscheduled outages and ensures the continuation of maximum service capabilities. In addition, the Mode S service life extension modifications will reduce the overall lifecycle operation costs.

4. How Do You Know The Program Works?

The FAA developed a two-phased strategy to provide the 132 highest traffic airports aircraft surveillance services. Phase 1 was completed in October 2010 four months ahead of schedule. Mode S SLEP Phase 2 will be implemented in a similar fashion to achieve similar benefits (reliability and maintainability improvements).

Phase 2 will build upon previous successes by ensuring that proven Commercial-Off-The-Shelf-Technologies are utilized to the fullest degree possible. Where such products are not available, prototypes will be developed to demonstrate the desired functionality, and will be formally verified for compliance with the Mode S Final Requirements standards and tolerances.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Extending the service life of the Modes S system will reduce outages due to performance deterioration and parts obsolescence. Furthermore, the Mode S service life extension will increase equipment and service availability. Absent the requested funding, the Mode S system will continue to experience elevated maintenance costs and increasing reliability issues as the legacy Mode S subsystem and components continue to age.

A reduction from the FY 2013 funding will result in increased risk to the ability to award contracts for:

- Antenna arrays for test and evaluation
- BVR Replacement
- Development of prototype units for receiver processor and interrogator units

Detailed Justification for – 2B17 - Surveillance Interface Modernization (SIM)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Surveillance Interface Modernization
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Surveillance Interface Modernization (SIM)	$0	$0	$2,000	+$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$964.0
2. System Engineering	---	209.0
3. Software Design Development	---	827.0
Total	Various	$2,000.0

For FY 2013, $2,000,000 is requested to initiate SIM software development for STARS automation system, Program Management, and System Engineering. Key output for FY 2013 is a completed Service Agreement with FAA organization implementing software development for STARS automation system.

2. What Is This Program?

The Surveillance Interface Modernization (SIM) program will upgrade the legacy systems to provide modern interface capabilities that will require the surveillance systems as well as the automation platforms to transition to standard data formats transmitted in Internet Protocol (IP) format over a modern network. The surveillance information will be transferred via FAA Telecommunications Infrastructure (FTI) circuits and equipment to end users who are allowed access to the service-oriented network which will enable net-centric data sharing. This net-centric network provides the needed first step capability for transitioning to the System-Wide Information Management (SWIM). Also, in addition to the legacy data set available today, additional data currently available only at the radar site will also be made available to automation, including the 24-bit aircraft address, the time stamp associated with the position information, and additional resolution bits providing more accurate aircraft position information. It is anticipated by the mid-term that, by converging all legacy radar interfaces and applications to a common industry standard communications architecture and format, the cost of maintaining these interfaces as the NAS transitions to NextGen will be significantly reduced. It is also expected that, as a result of using a more modern architecture, the distribution of all available data at the radar site to both the FAA and external users will be made more effective and efficient, and the application of information security measures more consistent. Finally, the availability of additional radar data is expected to enhance legacy surveillance performance in automation, providing (in the longer-term) more robust support of future operational improvements (OIs), and improved backup capabilities to ADS-B surveillance with a reduced (beacon) radar infrastructure.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Surveillance data from today's legacy radars is distributed to automation systems over serial point-to-point interfaces to the nearest one or two automation facilities using the standard Common Digitizer 2 (CD-2) format. Distribution to additional facilities and external users requires additional physical connections. The point-to-point connectivity and CD-2 format have inherent limitations that restrict the ease of distribution of surveillance information to other users and limit the capability to use reporting accuracy as well as architecture improvements available in more modern reporting formats and distribution schemes.

As part of NextGen, surveillance systems will be required to serve as backup to ADS-B surveillance, and to provide surveillance data critical to other government agency missions (e.g. Department of Defense, Homeland Security), however, they currently cannot be used to support the transfer and distribution of legacy radar data, as legacy systems have not yet been modernized to support the more modern interface requirements. To align with future NextGen requirements additional capabilities are required to be implemented into legacy surveillance systems. These legacy systems will be required to provide data distribution other than point-to-point via modern networking techniques and transition to standard interface message formats with higher reporting precision which also provide additional target information to support future OIs. This program will implement a common industry standard communications architecture and format.

It is anticipated by having all legacy radar interfaces and applications converged to a common data format, the cost of maintaining these interfaces as the NAS transitions to NextGen will be significantly reduced. The number of surveillance interface parts requiring repair and replacement will be reduced.

4. How Do You Know The Program Works?

The objective of program is to converge data formats into a common industry standard communications architecture and format. This will reduce the risk associated with development of communication architecture and formats.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Funding is required at the target level to avoid delay in software development and system engineering products. If requested funding is not provided at this level software development will be delayed affecting planned implementation of surveillance/automation interface modernization at STARS sites.

A reduction to the Surveillance Interface Modernization will delay implementation of software development.

Funding for SIM software development for ARTS automation systems will be requested in future year budget submissions.

Detailed Justification for - **2B18 Next Generation Transportation System – Flexible Terminal Environment - Terminal Flight Data Manager (TFDM)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Transportation System – Flexible Terminal Environment - Terminal Flight Data Manager (TFDM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Terminal Flight Data Manager	$0	$0	$37,600	+$37,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Prime Contractor/Solution Implementation	---	$31,300.0
2. Program Management	---	2,000.0
3. Systems Engineering	---	3,300.0
4. Second Level Engineering Support		500.0
5 Test Support	---	500.0
Total	Various	$37,600.0

For FY 2013, $37,600,000 is requested to award the prime contract for TFDM system development and implementation.

2. What Is This Program?

The TFDM program is an integrated approach to maximize the efficient collection, distribution, and update the data and improve access to information necessary for safe and efficient control of air traffic. The system will collect and portray terminal flight data, as well as traffic management tools, on an integrated display, and will be connected to information and decision support tools.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Controllers currently rely on several data management systems in Air Traffic Control Towers (ATCTs) to provide flight data and traffic management tools in the terminal environment. These systems include, but are not limited to , Airport Resource Management Tool (ARMT), Flight Data Input Output (FDIO), Tower Data Link Services (TDLS), Integrated Display System (IDS), Electronic flight Strip Transfer System (EFSTS), and Advanced Electronic Flight Strip (AEFS). In order to achieve the modernization of the NAS envisioned by NextGen, it is necessary to develop in integrated Terminal Flight Data Management (TFDM) platform that provides the functionality currently available to controllers as well as emerging capabilities anticipated in the modernization of the NAS such as Electronic Flight Strip (EFS) and Terminal Data Display System (TDDS). The first phase of TFDM is designed to integrate the functionality of the existing terminal flight data systems and decision support tools in order to facilitate increased capacity in the terminal environment and reduce ATO operating costs.

4. How Do You Know The Program Works?

TFDM is in the Investment Analysis (IA) Phase. During IA, the Program Office will identify various alternatives to provide the capabilities to meet the TFDM requirements. The FAA will select the most cost beneficial alternative for acquisition and implementation. The Program Office plans to complete the IA and receive approval in FY 2013 to begin acquisition design and development of the selected alternative. Prototype and Human In The Loop simulation activities were conducted under Next Generation Transportation System – Flexible Terminals and Airports Surface/Tower/Terminal Systems Engineering to validate the TFDM concepts and those activities will continue in order to reduce development and implementation risks during TFDM investment analysis and solution implementation. The TFDM system acquisition will also include a comprehensive test and provisioning program to verify the system operates properly in the NAS and is supportable through the life cycle.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$37,600,000 is required to award the prime contract for TFDM system development and implementation and conduct program management and engineering support activities.

TFDM is a key ground infrastructure program for NextGen mid-term operations in the areas of flight planning; push back, taxi and departure; descent and approach; and landing, taxi and arrival. TFDM supports NextGen mid-term Improved Surface Operations as the primary contributor to the NextGen Operational Improvement (OI) 104209: Initial Surface Traffic Management.

A funding reduction will delay the implementation of TFDM.

Detailed Justification for- **2C01 Future Flight Service Program (FFSP) - formerly referred to as Flight Service Automation Modernization (FSAM)**

What Do I Need To Know Before Reading This Justification?

- Future Flight Service Program (FFSP) will replace services currently delivered through multiple contracts including DUAT/S, AFSS (FS21), and Operational and Supportability Implementation System (OASIS). Reduction of funding will negatively impact the acquisition timeline and jeopardize the continued delivery of flight services within the continental US and Alaska.

- The program has gone through multiple name changes as its scope evolved. The Alaska Flight Service Modernization (AFSM) program was canceled and the requirements for the program were integrated into Meteorological and Aeronautical Planning System (MAPS) in an effort to unify Alaska and CONUS under the same automation platform. The MAPS program later became known as the Flight Service Automation Modernization (FSAM). Finally, the FSAM name changed recently to Future Flight Service Program to reflect the program's shift from only acquiring a system to also acquiring services to replace the existing DUAT/S, AFSS and OASIS contracts.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Future Flight Service Program (FFSP)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Future Flight Service Program (FFSP)	$0	$0	$8,000	+$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Screening Information Request	---	$8,000.0

For FY 2013, $8,000,000 is requested for finalization of requirements and related acquisition documentation, release of the screening information request (SIR), and evaluation of proposals for a competitive acquisition of the Future Flight Service Program (formerly referred to as Flight Service Automation Modernization).

2. What Is This Program?

Currently, a combination of entities and automation platforms under multiple programs provide Flight Services that include flight planning, advisory, operations, and search and rescue coordination services in the Continental U.S., Puerto Rico, Alaska, and Hawaii. The programs are OASIS, DUATS and AFSS (FS21).

Flight Services primarily provides weather briefings and flight planning services to pilots. Flight Services also coordinate VFR search and rescue services, provide orientation service to lost aircraft, maintain continuous weather broadcasts on selected Navigational Aids (NAVAIDs), and issue NOTAMs. While flight service functions in Alaska are provided by government personnel, flight service functions in the lower 48 states are provided through a contract with Lockheed Martin, called Automated Flight Service Stations (AFSS). Flight Services in Alaska use the Operational and Supportability Implementation System (OASIS) for automations support. The Flight Service provided in the lower 48, under the AFSS contract, use the Lockheed Martin system Flight Service 21 (FS21). Finally, two contractors under the Direct User Access Terminal/System

(DUAT/S) program provide web portals to allow GA pilots to directly access flight service information, eliminating the need to talk to a flight service specialist.

The FFSP program plans to integrate these programs to provide weather graphics with text-based weather and aeronautical information for pilot briefings. Automated weather, aeronautical and flight planning updates will be integrated with NOTAM and flight planning databases. FFSP will have a web-portal that will provide both FAA personnel and pilots with the same data, increasing access to flight service information. Flight services will continue to be provided by government personnel in Alaska and contract personnel in the lower 48 states.

DOT Strategic Goal – Safety

- Reduction in transportation-related fatalities and injuries.

3. Why Is This Particular Program Necessary?

The FFSP will provide a replacement for services provided by the Lockheed Martin Automated Flight Service Stations in the CONUS and the Operational and Supportability Implementation System (OASIS) in Alaska. The existing contracts for OASIS, DUAT/S and AFSS are planned to end in FY 2015; continued delivery of flight services within the continental US and Alaska is dependent upon the Future Flight Service Program.

Voice Switch: The Voice Switches at the Alaskan flight service stations (FSSs) do not provide capability to handle additional frequency capacity and operational flexibility. As a result, one Alaska FSS cannot assume responsibility for frequencies of another Alaska FSS in case of a catastrophic outage or for flexibility and operational efficiency of providing services.

4. How Do You Know The Program Works?

FFSP is a new acquisition, contract to be awarded during FY 2014. Investment analysis activities in FY 2012 and FY 2013 will analyze the benefits and success criteria for different alternative solutions.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$8,000,000 is required in FY 2013 to finalize requirements and related acquisition documentation, release of the Screening Information Request (SIR), and evaluation of proposals for a competitive acquisition of the FFSP (formerly referred to as Flight Service Automation Modernization).

Reduction of funding will negatively impact the acquisition timeline and jeopardize the continued delivery of flight services within the continental US and Alaska.

With greater service availability, the result will be increased safety to the general aviation community and reduction in accidents. Other benefits include:

- Modernization of the Automation system
- Expansion of situational awareness to improve efficiency
- Increased access for General Aviation users
- Reduced single points of failure
- Reduced operational costs

Detailed Justification for - 2C02 Alaska Flight Service Facility Modernization (AFSFM)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Alaska Flight Service Facility Modernization (AFSFM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Alaska Flight Service Facility Modernization (AFSFM)	$6,287	$4,500	$2,900	-$1,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Alaska Flight Service Facility Modernization (AFSFM)	---	$2,000.0
2. FSS Modernization - In-Service Engineering	---	900.0
Total	Various	$2,900.0

For FY 2013, $2,000,000 is requested to complete relocation of Dillingham operations into the new FSS building; install an engine generator and new fuel tank at Barrow FS; and completed FSS interior upgrades at Kenai, Iliamna and Northway FSSs. Also requested is $900,000 for in service engineering activities.

2. What Is This Program?

The Alaska Flight Service Facility Modernization (AFSFM) program modernizes or replaces the 17 Flight Service facilities in Alaska to ensure the security and sustainment of Flight Services, and develop the infrastructure for continuity of operations. Over 33 percent of the Alaska Flight Service facilities were constructed in the 1970's and require extensive renovations to meet current building codes, fire life safety, Architectural Barriers Act Accessibility Standard (ABAAS) and electrical standards. Specifically, Flight Service buildings will be updated to meet Occupational Safety and Health Administration (OSHA) and Americans with Disabilities Act (ADA) requirements, and the electrical and safety systems will be upgraded to ensure they meet standards. The program benefits FAA flight service specialists and technical operations personnel by providing a safe and secure environment for conduct of flight service operations.

In addition,, the program corrects deficiencies such as substandard lightning, grounding and bonding protection, electrical systems, and/or heating and cooling systems that could disrupt flight service operations by reducing reliability of flight service automation systems.

The AFSFM program conducts on-going analysis of Alaskan Flight Services facilities to identify and prioritize actions required to maintain and sustain each facility. The projects vary each fiscal year depending on priorities and available funding. In coordination with Alaska Technical Operations and Western Service Center personnel, individual Site project plans and schedules are developed to maintain and sustain Alaskan Flight Services facilities.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The existing Flight Service facilities in Alaska are old, suffer from environmental, electrical, structural and safety deficiencies and generally do not meet the American's with Disabilities Act accessibility requirements, as defined and imposed by the Uniform Federal Accessibility Standards and the Architectural Barriers Act Accessibility Standard. These conditions endanger FAA personnel health and safety and increase the risk of service outages.

4. How Do You Know The Program Works?

Each project is managed in accordance with a schedule and cost baseline. Monthly status reports track scheduled activities and funding expenditures. A project is not complete until FAA Technical Operations personnel conduct a Joint Acceptance Inspection of the work performed as compared to the project scope of work, associated standards and policy. Any identified exceptions must be cleared before the project is designated "completed" within the FAA's Corporate Work Plan system.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A funding level less than the required amount would require a re-prioritization of planned projects and result in delays in the completion of projects that were initiated in the previous fiscal year. As noted above the FY 2013 funding request is planned to complete relocation of Dillingham operations into the new FSS building, install an engine generator and new fuel tank at Barrow FSS, and complete FSS interior upgrades at Kenai, Iliamna and Northway FSS. The planned projects are based on expected funding, project cost estimates and available FAA engineering resources to manage and accomplish each project. Funding less than the requested level will result in delays in project initiation and/or completion potentially resulting in an increased overall cost to the project.

Delays due to reduced funding will prevent the expected benefits of this program identified above (i.e. providing a safe and secure working environment for FAA personnel; disruption of flight service operations by reducing reliability of flight service automation systems due to environmental, power or electrical deficiencies) from being achieved.

Detailed Justification for - 2C03 Weather Camera Program

What Do I Need to Know Before Reading This Justification?

- Limited weather information in Alaska contributes to a higher risk of accidents and can result in flight inefficiencies. Without weather information about their destination airport and route of flight, pilots cannot make informed decisions on whether it is safe to fly or continue their flight. This leads to accidents and unnecessary fuel costs.
- The National Transportation Safety Board (NTSB) Safety Study: Aviation Safety in Alaska, November 1995, recommended that the FAA assist the National Weather Service (NWS) with an evaluation of the technical feasibility and aviation safety benefits of remote color video weather observing systems in Alaska. The evaluation identified a need for pictorial views of current weather conditions, which would be accessible to the aviation community.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Weather Camera Program
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Weather Camera Program	$3,194	$4,800	$4,400	-$400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Install Weather Cameras	25	$4,400.0

For FY 2013, $4,400,000 is requested to fund the continued installation of weather camera sites in Alaska. Equipment for 25 sites will be procured and installed. Weather cameras are extremely beneficial in areas with rapidly changing terrain, weather phenomena, and as information about the safety Alaska airports and mountain passes. Weather cameras allow pilots to have weather information about their destination airport and route of flight. Pilots are able to make more informed decisions on whether it is safe to fly before they are airborne and whether to continue flight. This prevents accidents and avoids unnecessary fuel costs.

2. What Is This Program?

The Weather Camera Program improves safety and efficiency by providing weather visibility information to aviation users that is obtained from near real-time camera images. These images, from airports and strategic en route locations, are provided to pilots and flight service station specialists to enhance situational awareness, preflight planning and en route weather briefings. Images are updated every ten minutes and stored for six hours. These images are made available through a user-friendly, web-enabled application. Additionally, the program funds procurement and installation of weather camera sites.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

Additional weather camera installations will contribute to the FAA goal by reducing a subset of Alaska accidents. Following is the program metrics as compared to actual results.

FY 2007 Baseline - .28 accidents per 100,000 operations

FY 2008 Metric - .24 accidents per 100,000 operations FY 2008 results - .21 accidents per 100,000 operations (metric exceeded)
FY 2009 Metric - .22 accidents per 100,000 operations FY 2009 results - .21 accidents per 100,000 operations (metric exceeded)
FY 2010 Metric - .20 accidents per 100,000 operations FY 2010 results – not yet available
FY 2011 Metric - .18 accidents per 100,000 operations
FY 2012 Metric - .17 accidents per 100,000 operations
FY 2013 Metric - .16 accidents per 100,000 operations
FY 2014 Metric - .15 accidents per 100,000 operations

Annual accident analysis is conducted to determine if program metrics are met. Metrics are based on a baseline of an en route or approach and landing low visibility related accident rate per 100,000 operations for non-IFR capable commercial and general aviation aircraft within the state of Alaska.

3. Why Is This Particular Program Necessary?

In the state of Alaska, flying is equivalent to driving in the continental U.S. (CONUS). Alaska's skyways are equivalent to the road infrastructure found throughout the CONUS making the use of small aircraft essential to everyday life. Many times flying is the only means to get children to and from school activities; to transport service providers such as clergy, doctors, dentists, and nurses; to deliver patients to medical facilities; and to supply the communities with groceries, fuel, and mail.

The combination of many pilots and extreme flying conditions has resulted in a much higher accident rate in Alaska. According to the National Institute for Occupational Safety and Health, a disproportionate number of all U.S. aircraft crashes occur in Alaska. Between 1990 and 2006, there were 1,497 commuter and air taxi crashes in the United States of which 520 occurred in Alaska – 35 percent of all commuter and air taxi crashes.

Deficient weather information in Alaska contributes to a higher risk of accidents and flight inefficiencies. Without weather information about their destination airport and route of flight, pilots cannot make informed decisions on whether it is safe to fly or continue their flight. This leads to accidents and unnecessary fuel costs.

4. How Do You Know The Program Works?

The installation of weather cameras improves pilot situational awareness which prevents aviation accidents. Performance metrics for reducing accidents have been exceeded for both years (2008 and 2009) since the program was baselined and measurements began as reflected in Question 2 above.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Statistics indicate that weather cameras have contributed to the actual reduction in aircraft accidents in Alaska at a rate that is better than targeted. Funding for 25 additional weather camera sites in 2013 will continue to reduce aircraft accidents at a rate of .16 accidents per 100,000 operations. A reduction in the baseline level of funding requested will reduce the number camera sites that can be installed which will result in a greater number of aircraft accidents occurring than could be prevented.

Detailed Justification for - **2D01 VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$4,990	$5,000	$2,500	-$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Equipment Procurement	---	$530.0
2. Final funding for on-going projects and initial incremental funding for two new projects	---	1,870.0
3. Logistics/Engineering Support Services	---	100.0
Total	Various	$2,500.0

For FY 2013, $2,500,000 is requested for engineering and technical services support; procurement of two VOR/DME electronics kits; procurement of one VOR Doppler Antenna Kit; final incremental funding for on-going projects to install VOR/DME electronics kits and VOR Doppler antenna kits facilities projects; and initial funding for two new projects.

2. What Is This Program?

The VOR/DME is a ground-based electronic system that provides azimuth and range information to aircraft. When VOR/DME signal transmission deterioration occurs due to site encroachment, such as tree growth, construction of bridges, buildings, etc., it is necessary to restore these facilities to their full service volume. The equipment at most of these sites is over 35 years old, which is beyond the originally estimated service life.

This program replaces, relocates, converts and modifies VOR facilities (including VOR/DME) to improve the VOR performance.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The VOR/DME program maps to the FAA goal of reduced congestion by making air traffic flow more efficient over land and sea. The replacement, relocation, conversion, or modification of VOR facilities will enable FAA to maintain a highly reliable, safe, and efficient ground based VOR and VOR/DME systems until the use of Global Positioning System (GPS) is widespread. The improved availability of this program provides enhanced aircraft routing and increased airport capacity.

4. How Do You Know The Program Works?

VOR equipment currently deployed in the NAS has been there for better than 35 years. The VOR equipment has proven itself as a useful navigational aid for pilots flying within the NAS.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$2,500,000 is required for the following:

- continue engineering and technical services support
- procure two VOR/DME electronics kits
- procure one VOR Doppler Antenna kits
- provide final incremental funding for on-going projects to install VOR/DME electronics kits
- provide final incremental funding for VOR Doppler antenna kits facilities projects
- provide initial funding for two new projects

Detailed Justification for - 2D02 Instrument Landing System (ILS) – Establish

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Instrument Landing System (ILS) – Establish
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Instrument Landing System (ILS) – Establish/Expand	$7,784	$5,000	$7,000	+$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Equipment Procurement	---	$2,480.0
2. Final incremental funding for on-going ILS projects and initial incremental funding for five new projects	---	4,375.0
3. Logistics/Engineering Support Service	---	145.0
Total	Various	$7,000.0

For FY 2013, $7,000,000 is requested for engineering and technical services support; procurement of five ILS systems, final incremental funding for on-going ILS replacement projects and initial funding for five new projects.

2. What Is This Program?

This program replaces older ILS equipment. The ILS provides the pilot with both vertical and horizontal guidance information allowing aircraft to land in weather conditions that would otherwise be prohibited. The ILS also enables airports to meet increasing traffic demands. The ILS includes three components, a localizer which gives lateral guidance to the runway centerline, a glide slope to give vertical guidance and marker beacons to show the aircraft progress as it approaches the landing field. The ILS sends information to instruments in the cockpit so that the pilot can maintain a perfect flight path to the runway even in low visibility. Some planes are equipped with an autopilot which can directly receive ILS signals to automatically guide the plane to a landing.

There are three categories of ILS. Each category is defined by the lowest altitude at which a pilot is able to decide whether to land or abort (decision height) and how far the pilot can see the runway (runway visual range).

- Category I: Decision Height (DH) 200 feet and Runway Visual Range (RVR) 2,400 feet (with touchdown zone and centerline lighting, RVR 1,800 feet)
- Category II: DH 100 feet and RVR 1,200 feet
- Category IIIa: No DH or DH below 100 feet and RVR not less than 700 feet
- Category IIIb: No DH or DH below 50 feet and RVR less than 700 feet but not less than 150 feet
- Category IIIc: No DH and no RVR limitation, requires an autopilot

Approximately 1,200 runway ends are equipped with an ILS in the U.S. Of these, approximately 125 are more than 25 years old and may be replaced because they have exceeded their expected service life and their original manufacturer no longer provides support. The FAA is aggressively pursuing implementation of satellite navigation but until that transition is complete, the ILS remains the world standard for providing approach and landing services. In the next decade, more than 700 currently deployed ILS will exceed their service life.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The ILS along with required approach lighting systems directly impact both system safety and capacity. The ILS provides the pilot with vertical and horizontal guidance allowing aircraft to land safely in both Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC). The ability to land in IMC reduces the number of weather caused flight delays, diversions, over-flights and cancellations, therefore, increasing the capacity of the airport. A precision approach capability allows an airport to remain open to traffic when it would otherwise have closed; thereby avoiding weather caused flight delays. Additionally, replacement of aging ILS equipment will improve reliability and availability, therefore reducing the outage rate and the maintenance man-hours.

4. How Do You Know The Program Works?

ILS equipment currently deployed in the National Airspace System (NAS) has been there for better than 40 years. The ILS has proven itself as a navigational aid for pilots landing within the NAS.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$7,000,000 is required for engineering and technical services support; procurement of five ILS systems; final incremental funding of on-going ILS replacement projects and initial funding of five new projects. A reduction would defer engineering and technical support.

Detailed Justification for - 2D03 Wide Area Augmentation System (WAAS) for GPS

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Wide Area Augmentation System (WAAS) for GPS
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Wide Area Augmentation System (WAAS) for GPS	$94,810	$95,000	$96,000	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. GEO Satellite Acquisition	---	$26,680.0
2. Technology Refresh	---	21,600.0
3. NAS Implementation	---	24,120.0
4. Technology Evolution	---	4,800.0
5. Technical Engineering Program Support	---	14,800.0
6. Surveys and Procedures	---	4,000.0
Total	Various	$96,000.0

For FY 2013, $96,000,000 is requested for the following:

GEO Satellite Acquisition, $26,680,000 - Lease payments are ongoing for the 3rd and 4th GEOs as well as the Gap Filler. Funds will sustain the current 3rd and 4th as well as the Gap Filler leases.

Technology Refresh, $21,600,000 - Communication upgrades will be implemented. Design work will be underway on the L5 transition software upgrade.

NAS Implementation, $24,120,000- A goal of 500 WAAS procedures is planned for development along with surveys and flight inspections sufficient to meet this goal. In addition, operational implementation team activities include; data collection by operators, benefits analysis, and development of WAAS-specific operations within the NAS. A principal focus in FY 2013 will be on terminal area operations.

Technology Evolution, $4,800,000 – Support WAAS Integrity Performance Panel threat model assessments, ionospheric evaluation, and safety analyses. Support ongoing GNSS evolutionary architecture studies in cooperation with GPS Modernization efforts. A major focus for FY 2013 will be to begin to the software development for the L5 algorithms and associated test.

Technical Engineering/Program Support, $14,800,000 - Technical assistance contracts support program management, planning, software and hardware development, finance, system performance assessment, logistics, training, test and evaluation, reliability-maintainability-availability (RMA) analysis, quality assurance (QA), human factors, earned value management (EVM), security, safety engineering, and specialty engineering.

Surveys, $4,000,000 - Developing Localizer Performance with Vertical Guidance (LPV) procedures is a necessary step toward realizing the benefits from WAAS. The FAA Strategic Plan initiative calls for development of 500 new procedures in FY 2011, and that initiative will continue in future years. Based on historical data, it is estimated that 650-700 approach surveys will be required each year to support this number of usable procedures. LPV and Localizer Performance (LP) procedures developed in a current fiscal year require surveys conducted the two years prior. Surveys contracted in FY 2013 will be delivered in 2014 and used to support procedure development in FY 2015.

Planned Milestones:

- GIII Receiver Acceptance/Delivery
- Provide funding for three (3) WAAS geostationary satellite leases
- Release 4 (Build Merge/L5 Development Phase I) deployment
- Publish 500 WAAS Approaches

2. What Is This Program?

WAAS, a satellite based navigation technology, allows any qualifying airport in the NAS to have vertical and horizontal guidance without expensive legacy navigation hardware installed at each runway. WAAS increases safety and enhances capacity in the NAS at a reduced lower cost than all other alternatives. WAAS continuously broadcasts a GPS like signal in space for horizontal and vertical navigation across the NAS. WAAS consists of a network of 38 precisely surveyed ground reference stations that monitor the global positioning system (GPS) satellite signals. The ground reference stations are distributed across the continental United States and Alaska at FAA facilities. Three master stations collect the reference station data and calculate corrections and integrity messages for each GPS satellite. The WAAS messages are broadcast to user receivers via leased navigation transponders on two commercial geostationary (GEO) satellites. The user receiver on the aircraft applies the corrections and integrity information from the WAAS message to obtain the precise navigation service. Today, WAAS users can conduct en route operations over 100 percent of the NAS. In addition, they can conduct precision approach operations to qualifying airports throughout 95 percent of the 48 contiguous states without the requirement of conventional ground based navigation hardware.

WAAS is the first navigation aid capable of providing vertical guidance, or three dimensional guided instrument approaches, to pilots during all phases of flight, in all weather conditions at all locations throughout the NAS. WAAS increases the availability of vertical guidance to all aviation operations. WAAS reduces accidents and saves lives (Flight Safety Foundation Report shows that reliable, accurate vertical guidance can reduce landing accidents by seven-fold). WAAS increases airport capacity. A highly accurate and reliable navigation signal available throughout the NAS to all aircraft is a capacity multiplier. The WAAS investment increases the availability of highly accurate and reliable horizontal and vertical navigation to all users. Similarly, proposed expansion of the NextGen Air Transportation System requires precise Position Navigation and Timing (PNT) satellite navigation capabilities to facilitate access to more airports and runways.

WAAS is also currently supporting early opportunities for many of the NextGen capabilities. Early operational opportunities identify those users and applications of WAAS enabled navigation services that support proposed NextGen operational capabilities and concepts of operations to be used within the near term period of 2011 to 2015. Early operational opportunities represent a goal for expediting NextGen applications. The primary opportunities are in the RNAV and RNP areas of developing satellite-based navigation routes and terminal operations to improve safety, enhance efficiencies and minimize environmental impacts.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

The FAA is required by law to establish, operate, and maintain navigation capability for all phases of flight. Many of the aircraft flying in the national airspace system (NAS) lack seamless navigation capability and many runways in the NAS lack navigation aids that deliver stable vertical guidance in all weather conditions. The FAA provides vertically guided navigation to less than 18 percent of all public use runway ends in the NAS. FAA cannot afford to provide horizontal and vertical navigation for precision approach operations for all runway ends using ground-based navigation equipment such as the Instrument Landing System (ILS).

The FAA determined that the safest, most efficient and cost-effective means of providing this service is via a satellite-based navigation capability. WAAS increases the accuracy, continuity, availability, and integrity of Global Positioning System (GPS) data, with concomitant improvements to air traffic system capacity and safety. WAAS also provides aviation service far exceeding that of currently fielded navigational aids.

By increasing procedures and expanding WAAS coverage, customers will equip with WAAS receivers and increase the total benefit realized by WAAS. WAAS will reach over $980 million in safety benefits and $4.7 billion in efficiency benefits over the program life-cycle. Benefits of $177 million for VOR are realized by WAAS enabling reduction or avoidance of the expensive and high maintenance cost ground based navigation aids. Reductions in the number of ground based navigation aids and the associated cost savings began in 2010. A minimum operating network of ground based navigation aids will be retained. These benefits are accrued over the life cycle and are in undiscounted constant year dollars for FY 2009.

WAAS enables feeder airports to have reliable landing capability in all weather conditions, permitting feeder airports to establish scheduled transport operations and unloading major hub airports during bad weather. Airports can also exploit WAAS's inherent flexibility of providing vertical guidance at both runway ends for any runway to maintain or increase arrivals depending on changing traffic and weather conditions. WAAS directly interfaces with the Department of Defense's (DoD) GPS modernization investment. It is estimated that several million WAAS enabled receivers have been sold for non-aviation purposes with no encouragement from the FAA to non-aviation industries such as maritime, surveying, recreation and agriculture.

WAAS provides a clear path to achieve levels of accuracy, integrity, and availability required by an ADS-B sensor. WAAS has been used as the ADS-B on-board sensor in all demonstrations to date. The development of a common WAAS/ADS-B avionics suite using the same WAAS-based position sensor will reduce the overall cost to the user and will facilitate the widespread, rapid, and cost-effective deployment of both WAAS and ADS-B.

4. How Do You Know The Program Works?

WAAS provides customers with an enhanced satellite navigation signal enabling operations in all meteorological conditions during all phases of flight. WAAS provides any WAAS equipped aircraft with a highly accurate navigation capability at all locations and altitudes within the National Airspace System (NAS). The WAAS navigation signal allows pilots to fly with reduced position uncertainty regardless of location or altitude within the NAS providing enhanced safety. In terminal area and approach operations, a Flight Safety Foundation Report found that there is nearly an eight fold reduction in approach accident rates (53 per million for non-precision approaches vs. seven per million for precision approaches) when non-precision vs. precision approaches were used. Specifically, 141 accidents could be prevented over a 20 year period and save over 250 lives when using WAAS for vertically guided approaches at airports where stable vertical guidance is not available or not used today. WAAS provides vertical and horizontal guidance with an aviation safety component enabling pilots to make stable, vertically guided approaches to all qualified runway ends in the continental United States and most of Alaska. Presently precision vertically guided approaches using ILS are only available at 1668 of the nation's 19,000 runway ends.

- WAAS Applications for emergency management service helicopters will help reduce the significant accident rate for this community with development of safer and more effective Instrument Meteorological Conditions (IMC) approaches to hospitals and trauma centers.
- The development and implementation of WAAS LPV approaches and WAAS-enabled routes, especially in the terminal area, will and has significantly improved safe access to airports and helicopter landing areas while de-conflicting this traffic from busy major or hub airports, as envisioned by NextGen.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The FAA mission to transition to Performance Based Navigation is heavily dependent on the WAAS program to be fully implemented. Funding reductions will directly impact the ability of the WAAS Program to transition from ground-based to satellite-based navigation. WAAS is a key enabler for NextGen programs

(ADS-B, RNAV/RNP, etc.) and supports the following solution sets: Trajectory Based Operations, High Density Airports, and Flexible Terminals and Airports. In 2008, the Department of Defense announced the sunset of the current GPS L2P signal used to generate WAAS messages. This will require WAAS to replace L2P with the L5 signal. WAAS is a streamlined, cost-effective program relative to other programs of comparable size and scope.

WAAS is a large-scale system requiring involvement with stakeholders and users including the Department of Defense, FAA (ADS-B, RNAV/RNP, Airspace Modernization), ICAO, aircraft manufacturers, avionics vendors, and airlines. The WAAS program is a leader in Satellite-Based Navigation System (SBAS) development, certification, and implementation. WAAS provides guidance and support to other SBAS providers such as European Geostationary Navigation Overlay System (EGNOS), Multi-Functional Satellite Augmentation System (MSAS), and GPS Aided Geo-Augmented Navigation (GAGAN) resulting in a global, interoperable Satellite-Based Navigation System (SBAS). In addition, WAAS is coordinating with other countries/regions (Russia, Australia, China, South America, Southeast Asia) in the development of SBAS capability. Funding reductions will directly impact the ability of the WAAS Program to meet its commitments to stakeholders and users.

WAAS is one of a very few FAA systems whose reach goes far beyond the aviation community. GPS chipsets used across all applications have WAAS built-in and enabled. Example applications include marine, agriculture, automotive, and telecommunications.

The requesting level is needed to be able to provide funding for survey acquisition and procedures development in FY 2013. Requested level is required or else it would result in the obliteration of the FAA Destination 2025 goal for increased safety, reduction of general aviation fatalities, and reduction of the fatal accident rate per 100,000 hours by 10 percent over a 10 year period.

Funding at the requested level is also needed for program technology evolution efforts of the WAAS integrity performance panel (WIPP) during a time of increased solar activity. Increased analysis and expertise will be required during this time to address the anticipated effects on WAAS by the solar activity. Dual frequency document development will be impacted and will affect WAAS's efforts to align with the DOD modernization effort. Efforts to define GNSS evolutionary architectures as well as provide input to DoD's GPS modernization program will be curtailed.

Requested funding is also needed to support the technical engineering/program support for WAAS's technical assistance contracts in the areas of: program management, planning, software and hardware development, software and safety assurance, finance, system performance assessment, logistics, training, test and evaluation, reliability-maintainability-availability (RMA) analysis, quality assurance (QA), human factors, earned value management (EVM),security, safety engineering, and specialty engineering.

Detailed Justification for - 2D04 Runway Visual Range (RVR)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Runway Visual Range (RVR)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Runway Visual Range (RVR)	$4,990	$5,000	$4,000	-$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Final incremental funding for on-going RVR replacement projects and initial incremental funding for 14 new replacement projects	---	$3,550.0
2. Logistics/Engineering Support Service	---	450.0
Total	Various	$4,000.0

For FY 2013, $4,000,000 is requested for engineering and technical services/support; final incremental funding of on-going RVR projects and initial funding of 14 new RVR replacement projects.

2. What Is This Program?

This program replaces older RVR equipment with new solid state RVR equipment. The RVR provides air traffic controllers and pilots with critical meteorological visibility data that is used to allow take-offs or landings during limited visibility conditions. Approximately 20 percent of all RVR systems in the National Airspace System (NAS) exceed their 20 years of Economic Service Life (ESL). Consequently, there is an increasing likelihood of loss of service due to life-cycle issues associated with the older RVR systems currently in the NAS. Furthermore, the older RVR equipment is mounted on rigid structures. If struck accidentally during departure or landing, severe damage to aircraft and possible loss of life could result.

The older RVR systems are being replaced with new-generation RVR equipment that will eliminate the emerging life-cycle issues (i.e., Reliability, Availability, and Maintainability) associated with the older RVR systems currently in the NAS. Furthermore, the new-generation RVR equipment is mounted on frangible, low-impact-resistant structures that break away if struck accidentally by aircraft during take-off or landing.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The two main areas from which cost savings can be expected are:

- Reduced Flight Disruption: Weather caused flight disruptions – delays, diversions, over-flights, and cancellations – impose economic penalties on both aircraft operators and users. Favorable RVR information is required to land during category II, III and many category I precision approaches. This allows an airport to remain open to traffic when it would otherwise have closed, avoiding weather-caused flight disruptions. These benefits are calculated by estimating the number of flight disruptions avoided multiplied by the unit cost for a flight disruption. The unit cost for a flight disruption is based on assumed operating scenarios that describe the flow of events when a flight is disrupted.

- Improved Safety: The benefit realized is the reduction or elimination of fatalities and costs associated with aircraft accidents involving low-impact resistant structures versus aircraft accidents involving rigid approach structures. Use of low-impact-resistant structures reduces fatalities and the severity of damage to aircraft that accidentally strike these structures during departure or landing.

4. How Do You Know The Program Works?

The Federal Aviation Administration (FAA) has been deploying RVR equipment for more than 40 years. The RVR has proven itself as an extremely useful navigational aid for pilots flying within the NAS.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$4,000,000 is required for engineering and technical services/support, final incremental funding of on-going RVR projects and initial funding of 14 new RVR replacement projects.

Detailed Justification for - **2D05 Approach Lighting System Improvement Program (ALSIP)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Approach Lighting System Improvement Program (ALSIP)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Approach Lighting System Improvement Program (ALSIP)	$4,990	$5,000	$3,000	-$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Equipment procurement	---	$2,034.0
2. Final incremental funding for on-going ALSIP replacement projects and initial incremental funding for one new replacement projects	---	950.0
3. Logistics/Engineering Support Service	---	16.0
Total	Various	$3,000.0

For FY 2013, $3,000,000 is requested for engineering and technical services/support; procurement of eight Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) systems, final incremental funding for on-going MALSR and High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) projects and initial funding for one new MALSR replacement projects.

2. What Is This Program?

Many of the older approach lighting systems in the National Airspace System (NAS) have rigid structures. Aircraft that accidentally strike these structures during departure or landing can incur substantial damage. The National Transportation Safety Board (NTSB) recommended replacing the rigid approach lighting structures with low-impact resistant structures that collapse or break apart upon impact.

This program procures and installs frangible approach lighting equipment for the ALSF-2 and MALSR. An ALSF-2 is installed on runways requiring Category (CAT) II/III precision approaches. An MALSR is installed on runways requiring CAT I precision approaches and Special Authorization CAT II operations. The entire ALSF-2 and MALSR systems are replaced when non-frangible structures are replaced. Both the ALSF-2 and MALSR provide pilots with visual information on runway alignment, height perception, roll guidance, and horizontal reference.

DOT Strategic Goal – Safety
- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

Improved Safety: This program reduces fatality incidents and costs associated with aircraft accidents involving rigid approach lighting structures, through the use of low-impact-resistant structures.

Reduce Flight Disruption: Weather-caused flight disruptions – delays, diversions, over-flights, and cancellations – impose economic penalties on both aircraft operators and users. An operational MALSR or ALSF-2 allows an airport to remain open to traffic, when it would otherwise have closed, avoiding weather-caused flight disruptions. These benefits are calculated by estimating the number of flight disruptions avoided multiplied by the unit cost for a flight disruption. The unit cost for a flight disruption is based on assumed operating scenarios that describe the flow of events when a flight is disrupted.

4. How Do You Know The Program Works?

The Federal Aviation Administration (FAA) has been deploying the current MALSR for better than 40 years. The MALSR has proven itself as an acceptable navigational aid for pilots flying within the NAS.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$3,000,000 is required for engineering and technical services/support; procurement of eight MALSR systems, final incremental funding of on-going MALSR and ALSF-2 projects and initial funding of one new MALSR replacement projects.

Detailed Justification for - 2D06 Distance Measuring Equipment (DME)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Distance Measuring Equipment (DME)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Distance Measuring Equipment (DME)	$4,092	$5,000	$5,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Distance Measuring Equipment (DME) Procurement	---	$3,425.0
2. DME Replacement Projects	---	1,440.0
3. Logistics/Engineering Support Services	---	135.0
Total	Various	$5,000.0

For FY 2013, $5,000,000 is requested for engineering and technical services/support; procurement of 25 DME systems, final incremental funding for on-going DME projects, and initial funding for 18 new DME projects.

2. What Is The Program?

DME is a navigational aid that provides slant range distance information to aircraft en route and for instrumental landing approaches. Low Powered DME (LPDME) is used in lieu of outer marker beacons for precision and non-precision approaches. This program replaces older LPDME and older marker beacons at existing ILS locations with new solid state LPDME.

Obsolete tube-type LPDME collocated with the instrument landing systems (ILS) and terminal non-directional beacons is decreasing system efficiency. Replacement parts are largely unavailable. Furthermore, an increase in the number of aircraft utilizing the equipment contributes to LPDME saturation and a shutdown of the system. The capacity of older systems is less than 50 aircraft simultaneously and the mean time to repair can be greater than one hour.

The older equipment does not meet present availability and maintainability requirements. The Federal Aviation Administration (FAA) requires navigation systems availability of 99.95 percent or greater. Previous LPDME are unreliable, maintenance intensive and lack required Remote Maintenance Monitoring (RMM) capability.

The procurement and installation of upgraded, state-of-the-art DME, improves efficiency by reducing the downtime required for the maintenance and repair of the antiquated DME. This state-of-the-art DME equipment can handle more than 100 aircraft simultaneously, thus increasing airport capacity by a factor of two. The availability of the new LPDME is greater than 99.95 percent and has a mean time to repair is less than one-half hour, a mean time between failures is 14,231 hours, and a mean time between outages is 15,193 hours.

Additionally, the program supports a Commercial Aviation Safety Team (CAST) recommendation to discontinue step-down non-precision approach procedures whenever possible. The CAST, a group including FAA, airline and airport personnel, identified 451 runway ends for installation. However, FAA recommends implementation of only 177. This number would cover 80 percent of all operations. For safety reasons, the industry wants to discontinue step-down non-precision approach procedures whenever possible. The use of LPDME supports this operational goal for older, less-equipped aircraft, until these older aircrafts are outfitted with more advanced equipment.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The LPDME program maps to the FAA goal of reduced congestion by increasing airport capacity to meet projected demand. The equipment can handle more than 100 aircraft simultaneously, thus increasing airport capacity by a factor of two. Cost savings can be expected at a location by discontinuing relevant step-down non-precision approach procedures.

Additional savings will accrue by eliminating the cost to lease land for the replaced marker beacons and the higher maintenance cost associated with the older equipment being replaced. In addition, new equipment has the required RMM that can be maintained and certified remotely.

4. How Do You Know The Program Works?

The FAA has been deploying the current LPDME for more than five years. It has proven itself as a useful navigational aid for pilots flying within the National Airspace System (NAS).

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$5,000,000 is required for engineering and technical services/support; procure 25 DME systems, final incremental funding of on-going DME projects and initial funding of 18 new DME projects.

Detailed Justification for - 2D07 Visual Navaids – Establish/Expand

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Visual Navaids – Establish/Expand
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Visual Navaids – Establish / Expand	$3,792	$3,400	$3,500	+$100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Precision Approach Path Indicator (PAPI) Equipment	---	$2,130.0
2. Final incremental funding of on-going PAPI replacement projects and initial incremental funding of five new replacement projects	---	1,145.0
3. Logistics/Engineering Support Service	---	225.0
Total	Various	$3,500.0

For FY 2013, $3,500,000 is requested for engineering and technical services/support; procurement of 20 PAPI systems, final incremental funding of on-going PAPI projects and initial funding of five new projects.

2. What Is The Program?

Visual Navaids are necessary to assist pilots in visually acquiring the runway environment. These lighting systems facilitate the transition from cockpit instruments to external visual references during the final landing phase. Different categories and types of approaches require different visual navaid equipment.

The program supports a Commercial Aviation Safety Team (CAST) recommendation to implement a visual precision-like vertical approach capability on various airport runways. The CAST, a group including Federal Aviation Administration (FAA), airline and airport personnel, has identified 781 runway ends that require implementation of a visual precision-like vertical approach capability. This capability will reduce the number of the controlled flight into terrain accidents during approach and landing. The FAA has agreed to implement this capability at the 170 highest priority runways. The FAA will procure and install Precision Approach Path Indicator (PAPI) equipment to satisfy the CAST requirements. A PAPI is a visual glide slope indicator systems that provides visual approach slope information to pilots enabling them to make stabilized descent and approach clearances over obstructions.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

The Visual Navaids improves Safety - Safety benefits stem from the reduction of accidents. Safety benefits are estimated by comparing incidents and costs of non-precision approach accidents with the same for precision-like approach accidents to estimate a differential cost per approach. Use of a precision-like landing capability of a PAPI will reduce accidents during landing.

Reduced Controlled Flight Into Terrain - Controlled flights into terrain causes fatalities and imposes economic costs on aircraft operators. The visual precision-like vertical landing capability of the PAPI reduces the number of controlled flights into terrain.

The Airline Pilot's Association and General Aviation requests that PAPI equipment be installed at validated approaches within federally controlled airspace.

4. How Do You Know The Program Works?

The FAA approved and began deployment of the PAPI in the 1980's. For more than 20 years the PAPI has served as the preeminent visual glide slope indicator for pilots flying within the National Airspace System (NAS).

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$3,500,000 is required for engineering and technical services/support; procurement of 20 PAPI systems, final incremental funding of on-going PAPI projects and initial funding of five new replacement projects.

Detailed Justification for - 2D08 Instrument Flight Procedures Automation (IFPA)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Instrument Flight Procedures Automation (IFPA)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Instrument Flight Procedures Automation (IFPA)	$599	$2,200	$7,100	+$4,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Technology Refresh/Computers/Servers	---	$1,500.0
2. Technology Refresh/COTS Software Upgrade	---	2,600.0
3. Technology Refresh/Workflow Implementation	---	3,000.0
Total	Various	$7,100.0

For FY 2013, $7,100,000 is requested to begin IFPA technology refresh activities to include purchase of Commercial Off-The-Shelf (COTS) workstations and servers and design and configure business process workflow Commercially Available Software (CAS).

2. What Is This Program?

IFPA is a suite of next generation Information Technology (IT) tools. These tools create products using fully integrated solutions for visual and instrument flight procedures. IFPA consists of the Instrument Procedure Development System (IPDS), Instrument Flight Procedures (IFP) database, Airports and Navigations Aids database (AirNav), Obstacle Evaluation (OE) system, and the Automated Procedures Tracking System (APTS). The IPDS tool is being developed in modules, with the first module providing space-based navigation (RNAV and RNP) procedure design capability. IPDS module two will provide ground-based navigation procedure design capability and the legacy design tool will be replaced and decommissioned. IPDS module deployments began in FY 2010 and will continue through FY 2012.

DOT Strategic Goal – Organizational Excellence

- Diverse and Collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

IFPA provides the following benefits:

- Increases the airport arrival capacity for eight major metropolitan areas, and at the OEP airports when visibility is restricted
- Modernizes systems in support of both visual and instrument flight procedure development such as approaches, standard terminal automation replacement system, airways, and departures
- Increases automated capabilities for all types of precision and non-precision flight procedures, including conventional ground-based equipment and space-based area navigation (RNAV)
- Provides an integrated obstacle evaluation application, replacing a manual process

- Provides new capability because existing systems cannot generate and integrate the necessary physical, temporal and spatial information needed to develop, inspect and publish flight procedures as well as evaluate the impact of obstacles

In addition to supporting FAA Flight Plan goals and strategic initiatives, IFPA provides additional benefits as follows:

- Capability for ongoing maintenance of over 21,000 instrument flight procedures in use at over 4,000 paved airports, accommodating requirements for precision approaches and departures using Global Positioning System/area navigation, Wide Area Augmentation System (WAAS) and Local Area Augmentation System (LAAS).
- Efficient response to Air Traffic Obstacle Evaluation (OE) requests, evaluating affects on instrument flight procedures, alleviating manual effort currently required for 50,000+ OE requests annually. In addition, application of TERPS rules as part of automated obstacle evaluation will be an important benefit.
- Conversion of legacy software to OMB, DOT and FAA recommended architecture, providing opportunities for improved integration as well as a foundation for anticipated flight procedure demand well beyond FY 2010.

4. How Do You Know The Program Works?

Program benefits have been attained in FY 2008 through FY 2010, and are on track for FY 2011.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

IFPA is a key component in evolving the National Airspace System (NAS) into a performance-based system. Such an evolution requires an investment in systems integration and the automation of aviation data for safety and reliability purposes, as well as an automated electronic means of information sharing. COTS workstations were deployed in early FY 2008 to all procedure developers. The approved program baseline calls for a technology refresh beginning in FY 2012 and extending through FY 2016.

A reduction from the FY 2013 IFPA baseline funding would result in the program not being able to complete the purchase of COTS computers and servers planned for FY 2013, as well as delaying the COTS software upgrades and CAS workflow implementation.

Detailed Justification for - **2D09 Navigation and Landing Aids – Service Life Extension Program (SLEP)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Navigation and Landing Aids – Service Life Extension Program (SLEP)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Navigation and Landing Aids – Service Life Extension Program (SLEP)	$5,988	$7,000	$8,000	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Equipment Procurement	---	$2,125.0
2. Final incremental funding of on-going replacement projects and initial incremental funding of 31 new replacement projects	---	5,775.0
3. Logistics/Engineering Support Services	---	100.0
Total	Various	$8,000.0

For FY 2013, $8,000,000 is requested for engineering and technical services/support; procurement of ALSF-2 Runway Lamp Monitoring System (RLMS)/Lamp Holders sets, final incremental funding of on-going projects and initial funding of 31 new replacement projects.

2. What Is The Program?

On average, 60 percent of the Navigation and Landing Aids-Service Life Extension Program (SLEP) aids are greater than 23 years old and exceed their 20 years of Economic Service Life (ESL) by three or more years. Because many of these systems exceed their ESL, service disruptions are possible. This program renovates or replaces NAVAIDS at sites where there is a high risk for failure of these systems and that failure would result in denying use of the primary precision approach capability during outages of these systems. Visual NAVAIDS include:

- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) for a Category I approach
- High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) for a Category II/III approach
- Runway End Identifier Lights (REIL)

This program also supports product improvements, modifications and technological upgrades to other visual NAVAIDS components. Ongoing efforts include:

- Improve approach lighting system semi-flush fixtures
- Replacement of existing MALSR green threshold and white steady burning incandescent lamps with LED lamps

The older navigation aids are being replaced with new generation navigation aids that will eliminate the emerging life-cycle issues associated with the older navigation aids currently in the National Airspace System

(NAS). Additionally, the existing MALSR and ALSF-2 in-pavement steady burning approach lights will be replaced. Replacing aging, obsolete visual navigational aids and other ground-based navigation and landing aids maintains current en route, approach, and landing capabilities at various airports throughout the United States.

This program also supports Instrument Landing Systems (ILS) sustain and replace efforts at non-OEP sites where primary precision approach capability outages are most likely. ILS components include electronic devices (i.e., localizers, glide slopes, distance measuring equipment, etc). Older ILSs (Mark 1F) removed from OEP airports are reinstalled at lower activity airports to replace an existing Mark 1D and Mark 1E ILS.

This program also supports various other efforts that are related to the replacement of navigation equipment, such as: replace guide wires for light station, replace cable between light stations, replace aluminum light towers, replace DME antenna pedestal, convert antenna arrays, re-cable localizer antenna, equipment relocate, replace glide slope wooden tower, replace localizer antenna platform, and repair pier with navigation equipment; undertake new technology initiatives, and provide engineering and technical services support.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The replaced and upgraded equipment will help to reduce runway downtime and technician time associated with maintenance and repair of the visual and navigation aids. Additionally, the new in-pavement steady burning approach lights will require less maintenance, thus reducing runway downtime. These benefits will increase safety and airport capacity. The installation of RLMS' will reduce the need for technicians to physically monitor the ALSF-2's during adverse weather conditions.

4. How Do You Know The Program Works?

Under this program the Federal Aviation Administration renovates or replaces the older equipment within the NAS with newer equipment that performs the same functionality or service. The replacement of the current equipment with new equipment merely preserves the functionality or service already existent. Furthermore, the technological changes are minimal, if any at all, between the old and the new equipment. Finally, the functionality or services being performed is the same as that for the past 50 plus years.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$8,000,000 is required for engineering and technical services/support; procurement of ALSF-2 Runway Lamp Monitoring System (RLMS)/Lamp Holders sets, final incremental funding of on-going projects and initial funding of 31 new replacement projects.

Detailed Justification for - **2D10 VASI Replacement – Replace with Precision Approach Indicator**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – VASI Replacement – Replace with Precision Approach Indicator ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
VASI Replacement – Replace with Precision Approach Path Indicator	$3,992	$8,000	$4,000	-$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Precision Approach Path Indicator (PAPI) Equipment	---	$698.0
2. Final incremental funding of on-going replacement of VASI projects and initial incremental funding of 16 new replace VASI projects	---	3,167.0
3. Logistics/Engineering Support Services	---	135.0
Total	Various	$4,000.0

For FY 2013, $4,000,000 is requested for engineering and technical services/support; procurement of 12 PAPI systems, final incremental funding of on-going visual approach slope indicator (VASI) replace PAPI projects and initial funding of 16 new replacement projects.

2. What Is This Program?

Both the VASI and PAPI are visual glide slope indicator systems that provide visual approach slope information to pilots enabling them to make stabilized descent and approach clearances over obstructions. The VASI, which was initially deployed within the National Airspace System (NAS) in the 1960's, requires replacement with more modern systems. The FAA began replacing the VASI with the PAPI in the 1990s.

The VASI is no longer the visual slope indicator standard for the International Civil Aviation Organization (ICAO). The ICAO recommended that all airports serving international operations replace the VASI lights with PAPI lights to standardize on the visual vertical guidance information.

This program procures and installs PAPI systems to replace the older VASI systems and support the ICAO recommendation. There are approximately 975 remaining VASI systems serving international and non-international runways in the NAS that require replacement.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

This replacement program:

- Fulfills the need to replace the aging VASI systems within the NAS
- Supports the ICAO standard to install PAPI systems at all international runways

- Responds to Airline Pilot's Association and General Aviation requests for PAPI equipment at validated approaches within federally controlled airspace
- Reduces maintenance person-hours
- Eliminates the currently supply support deficiencies related to lack of uniformity between various VASI configurations

4. How Do You Know The Program Works?

The Federal Aviation Administration (FAA) approved and began deployment of the PAPI in the 1980's. For more than 20 years the PAPI has served as the preeminent visual glide slope indicator for pilots flying within the NAS and as the international standard.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$4,000,000 is required for engineering and technical services/support; procurement of 12 PAPI systems, final incremental funding of on-going VASI replace PAPI projects and initial funding of 16 new replacement projects.

Detailed Justification for - 2D11 Global Positioning System (GPS) Civil Requirements

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Global Positioning System (GPS) Civil Requirements
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Global Positioning System (GPS) Civil Requirements	$38,423	$19,000	$40,000	+$21,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Technical Oversight	---	$3,000.0
2. L1C Implementation	---	6,400.0
3. OCX Civil Signal Monitoring	---	28,600.0
4. Civil Studies	---	2,000.0
Total	Various	$40,000.0

For FY 2013, $40,000,000 is requested to accomplish the following activities:

- Continued development of the satellite architecture and system design for the L1C signal and new GPS monitor station receivers to collect the L1C, L1-C/A, L2C, and L5 measurements, establish new user avionics receiver standards, and algorithm description documents for the signal monitoring algorithms located at the processing facilities. This effort will also include site surveys, design of the terrestrial communications system, and implementation planning required prior to fielding of the ground infrastructure.
- Continued design, procurement, integration, testing and factory acceptance of GPS monitor station and the processing facility equipment. The design and prototyping of the signal monitoring software algorithms will also continue.
- Continued test and evaluation planning, data collection to support prototyping, and logistics support planning for the GPS monitor station and processing facility equipment. Documentation will be developed to establish the operation standards and training needs for the GPS Signal Monitoring system.
- Technical oversight, GPS Directorate Civil Applications (GPC) and National Coordination Office (NCO) support.

2. What Is The Program?

The civil signal monitoring requirements are documented in the Civil Monitoring Performance Standard (CMPS). Implementation of the L1C signal will consist of system design and development activities performed by the GPS-III and OCX prime contractors, managed by the USAF GPS Directorate. In FY 2011, the work required to implement L1C is expected to consist of system design and development activities and program management. The GPS Signal Monitoring system will consist of a worldwide network of 18-21 GPS monitor stations connected to two processing facilities. The monitor stations must be installed at worldwide geographically dispersed locations such that every GPS satellite can be continuously monitored from at least two monitor stations. The monitor stations will collect real-time measurements of the GPS signals (L1C, L1-C/A, L2C, and L5) and forward this information to the processing facilities where a suite of software algorithms will monitor the accuracy, integrity, continuity, and availability of performance to verify that modernized GPS is suitably safe for use.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Currently, the GPS operational control segment does not monitor all civil signals so it may take several hours to detect an anomaly on an unmonitored signal. The Civil Signal Monitoring capability closes this gap by providing monitoring for all existing civil signals and the new civil signals being implemented through GPS modernization. Civil Signal Monitoring provides a real-time interface between the GPS Operator and the status of the entire GPS civil signal outputs. Failure to fund this effort would contravene formal direction received by the Department of Transportation (DOT) to serve as the implementing agency for civil unique capabilities by the GPS program

4. How Do You Know The Program Works?

GPS Civil Signal Monitoring fills a shortfall in the current GPS system to ensure all civil signals are monitored. When implemented, the L1C signal will be directly observed and usable, the Civil Signal Monitoring analysis will be directly displayed to GPS operators.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

This project has been directed by DOT to fulfill responsibilities to fund civil unique capabilities (L1C and Civil Signal Monitoring) under the National PNT Policy NSPD-39, December 2004. The FAA serves as the implementing agency to fund the civil unique requirements per a Memorandum of Agreement (MOA) with the Department of Defense (DoD) and DOT. DoD has awarded a contract for the GPS work jointly funded by DoD and FAA. Failure to provide funding may require DoD to delay or stop work on the Civil unique items.

Detailed Justification for - 2D12 Runway Safety Areas – Navigational Mitigation

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Runway Safety Areas (RSA) – Navigational Mitigation
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Runway Safety Areas (RSA) – Navigational Mitigation	$19,960	$25,000	$30,000	+$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$700.0
2. Procurement of NAVAIDs	---	7,500.0
3. Installation of NAVAIDs	---	21,800.0
Total	Various	$30,000.0

For FY 2013, $30,000,000 is requested to conform to RSA standards contained in AC 150/5300-13 Airport Design. RSA compliance provides a measure of safety in the event of an aircraft's excursion from the runway by significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots and veer-offs.

2. What Is This Program?

The FAA runway safety program includes numerous programmatic elements intended to improve the overall safety of the runways and RSA. The RSA must be free of all objects that are three inches above the grade and are not frangible. The program will focus on and accelerate efforts to complete RSA improvements. One key element of this program is RSA Sterilization. Current standards for RSA Sterilization include provisions for clear areas, surface drainage, and weight supportability. The FAA currently owns and operates numerous NAVAIDs that violate the RSA clear area provision of 14 CFR Part 139. Although measured incremental progress has been made to correct these FAA-owned NAVAID RSA violations, a concerted, focused initiative must now be launched to ensure compliance of FAA owned NAVAIDs with 14 CFR 139 pertaining to RSA. PL-109-115 requires the FAA to complete RSA compliance with 14 CFR 139 not later than December 31, 2015 which is inclusive of FAA owned NAVAIDs.

The initiative to correct FAA-Owned NAVAID violations in RSA will take the corrective action on those Navigation systems that are not in compliance with the RSA requirements. The scope of the work to be accomplished will range from the installation of frangible connections on identified structures to the relocation of facilities within RSA if no other solution is available. The objects are in two classifications: those fixed by function and those not fixed by function. Those objects that are fixed by function and will not be able to perform their intended function if relocated, in all likelihood, may receive a waiver with the addition of frangible mounting. Those objects that are not fixed by function will have to be moved outside of the RSA. Below is a listing of objects by classification.

Objects fixed by function:

- Runway End Identifier Lights (REIL)
- Precision Approach Path Indicator (PAPI)
- Visual Approach Slope Indicator (VASI)
- Inner Marker (IM)

- Approach Light System (ALS)
- Runway Visual Range (RVR)
- Access Roads
- Radar Reflectors
- Power Panels (case by case)
- Integrated Control Cabinets (ICC)
- Engineered Materials Arresting System (EMAS)
- Glide Slope Antennas
- Antennas
- Maintenance Stands (Frangible Connections)

Objects not fixed by function:
- Localizer (most cases when not possible to relocate)
- NAVAID Buildings (power sheds)
- Transformers
- Power Panels (case by case)

The activities associated with this effort will be prioritized according to the major airport hubs, their supporting reliever airports and then other airports with reported NAVAID violations. The FAA has identified approximately 2,384 violations that need to be addressed at various airport locations. These activities are required to be completed by the end of Calendar Year 2015.

DOT Strategic Goals – Safety
- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

The primary benefit is the prevention of loss of life from aircraft striking non-compliant NAVAIDS located in designated RSAs.

Large NAVAIDs that are not moved or made frangible can pose a considerable safety risk to aircraft and passengers when struck during an overrun. For example, in June 1975 a Boeing 727 crashed into several non-frangible approach lighting systems (ALS) towers while attempting to land at John F. Kennedy Airport in New York. Of the 124 persons aboard, 113 died of injuries received in the crash. Another example, in November 1976, an aircraft taking off at Stapleton International Airport in Denver Colorado collided into two non-frangible ALS structures resulting in 14 injuries.

In response to the Stapleton incident, the National Transportation Safety Board (NTSB) recommended that FAA expedite retrofitting of ALS structures with frangible materials so that the improvements would be completed within three to five years. However, more than 30 years later, we found that non-frangible ALSs remain in RSAs and continue to pose a safety risk to aircraft and passengers. For example, the Air Traffic Organization (ATO) is aware of several non-frangible ALS structures located within the RSAs at Sacramento International Airport, but it has no funded efforts to remove them or make them frangible.

4. How Do You Know The Program Works?

The FAA has relocated and/or modified NAVAIDs at more than 60 RSAs over the last three years through grants provided by the Airport Improvement Program (AIP). However, to address projects that do not meet the criteria for the AIP grants program, the FAA request additional funding to focus on accelerating the completion of NAVAID improvements by the end of Calendar Year 2015.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$30,000,000 is required to address 300 RSA projects of varying size and complexity currently identified for completion prior to December 31, 2015 in accordance with the 2006 DOT Appropriation (PL-109-115). The schedule for project completion will be largely dependent on the funding provided each year.

Detailed Justification for - 2E01 Fuel Storage Tank Replacement and Monitoring

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Fuel Storage Tank Replacement and Monitoring
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Fuel Storage Tank Replacement and Monitoring	$6,287	$5,400	$6,600	+$1,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Tank System Modernization and Replacement	Various	$5,983.0
2. Engineering and Program Support	Various	617.0
Total	Various	$6,600.0

For FY 2013, $6,600,000 is requested to fund:

- $4,688,000 for two Air Route Traffic Control Center (ARTCC) fuel storage system upgrades
- $1,595,000 for three Prime Power/Terminal Radar Approach Control (TRACON) fuel storage system upgrades
- $186,000 for general fuel system replacements
- $131,000 for modification efforts in response to environmental regulatory requirements

Based on current funding profile, the FST program has prioritized requirements for field services. Implementation of Air Route Traffic Control Center (ARTCC) fuel storage system upgrades and Prime Power/TRACON) modernizations are primary program initiatives. System upgrades are implemented to increase operational readiness and for lifecycle sustainment.

For FY 2013, the FST Program has scheduled two ARTCC FST System upgrades, one Prime Power upgrade, and two TRACON upgrades.

2. What Is This Program?

The Fuel Storage Tank (FST) Replacement and Monitoring Program designs, fields, and sustains bulk liquid storage systems in support of critical FAA operations across the NAS. FST systems are fielded at facilities that cross every FAA line of business and all operational divisions.

The majority of FAA FST systems support electrical generator operations that provide primary and emergency power supplies for critical NAS facilities. The FST is also deployed to service bulk liquid storage requirements for lubricating oils, building heater and boiler system fuels, service vehicle fuels, liquid wastes, and similar NAS operational requirements. The FAA active tank system inventory includes over 3,800 units that must be continually sustained.

The FST Replacement and Monitoring Program operate under three primary objectives. The FST Program: 1) sustains NAS operational readiness; 2) mitigates environmental damage and regulatory non-compliance; and 3) manages system lifecycle.

The FST Program interacts with and supports numerous organizations in sustaining bulk liquids storage requirements.

- The Program office coordinates FST systems fielded as subcomponent of larger FAA stakeholder projects (new ATCT installations, ASR replacements
- The Program acts as the Subject Matter Expert repository for all FAA organizations and provides technical oversight, support, guidance and resources to the FAA Service Areas, Service Centers, District Offices, and Systems Support Center (SSC) for tank system construction, installation, operations, and removal

The FST Program serves as the primary coordination point for FAA storage system construction, installation, removal, and operations with outside regulatory authorities/agencies (U.S. EPA, state programs, county and municipal governments, building code officials, fire protection officials, and airport operating authorities). This coordination supports the Department and Agency goals for environmental stewardship and eco-friendly solutions.

DOT Strategic Goal – Environmental Sustainability

- Reduced transportation related pollution and impacts on ecosystems.

3. Why Is This Particular Program Necessary?

The FST Program reduces potential FAA environmental liabilities. The FST lifecycle sustainment initiative supports the FAA goal of greater capacity by avoiding aircraft delays due to NAS equipment outages.

Executing an FST lifecycle sustainment program achieves the cost benefits of: sustaining system availability for NAS operations; reducing the risk of leaking FST systems; minimizing adverse impacts to personal and environmental safety; precluding regulatory fines of up to $32,500 per day.

4. How Do You Know The Program Works?

Monthly reporting indicates fuel systems continually achieve minimum goal of 99.7 percent sustained operational availability.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The FST lifecycle sustainment programs maps to FAA goal of greater capacity by avoiding delays due to NAS equipment outages. Executing an FST lifecycle sustainment program achieves the cost benefit of sustaining availability of the systems for NAS operations, reducing the risk of leaking FST systems, minimizing adverse impacts to personal and environmental safety, and precluding regulatory fines of up to $32,500 per day.

Detailed Justification for – 2E02 Unstaffed Infrastructure Sustainment (UIS) Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Unstaffed Infrastructure Sustainment
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Unstaffed Infrastructure Sustainment	$14,072	$18,000	$18,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Structural Improvement	---	$15,400.0
2. In Service Engineering	---	2,600.0
Total	Various	$18,000.0

For FY 2013, $15,400,000 is requested to sustain approximately 80+ unstaffed infrastructure projects located in all three Service Areas for Communication, Navigation, Surveillance, Weather and Support Services. In addition, $2,600,000 is requested to support in service engineering activities.

The sustainment projects include upgrades, modernization, refurbishment and replacement of National Airspace System (NAS) antenna and equipment towers buildings, shelters, roofs, storage buildings, plumbing, heating, ventilating and air conditioning (HVAC) equipment, electrical panels and distribution wiring, locks and alarm sensors and lighting, access roads, grounds, fencing, storm water controls, parking lots, security lighting, and walkways.

2. What Is This Program?

The UIS Program proactively sustains infrastructure supporting the NAS to enable the delivery of NAS systems required availability. Proactive NAS sustainment includes both major repairs and replacement of real property and structures which are normally not staffed.

The FAA owns thousands of buildings whose sole purpose is to house, support and protect the NAS Communications, Surveillance, Weather and Navigation aids. These structures are failing. They suffer from leaking roofs, deteriorated foundations and walls, inadequate air conditioning systems and electrical systems, and severely eroded roads that hinder access by FAA technicians. A majority of these 36,000 plus structures were built during the 1940's and 1950's. The backlog will continue to grow and continue to threaten the FAA's ability to add capacity, unless funding for maintenance is increased.

The Unstaffed Infrastructure Sustainment (UIS) Program proactively sustains infrastructure supporting the NAS to enable the delivery of NAS systems required availability. Proactive NAS sustainment includes major repairs to and replacement of real property and structures which are normally not staffed. Sustainment of the unstaffed infrastructure includes:

- Major repair and replacement of FAA property including: access roads, grounds, fencing, storm water controls, parking lots, security lighting, and walkways
- Major repair and replacement of FAA facilities including: buildings, shelters, roofs, storage buildings, plumbing, heating, ventilating and air conditioning (HVAC) equipment, electrical panels and distribution wiring, locks and alarm sensors and lighting

- Major repair, refurbishment and replacement of NAS antenna and equipment towers

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The UIS program is striving to reduce the backlog of deferred maintenance by approximately 10 percent annually. The majority of unstaffed facilities provide surveillance, communications, weather, and air traffic assistance to remote areas in a very efficient and cost saving manner. While no labor costs are necessary to operate these facilities, the facilities require periodic upgrades. The program extends the service-life of the buildings and equipment, preventing system outages and providing cost savings for FAA, the airline industry and the public.

Ten percent of the FAA's owned buildings have been found by inspections to have life safety hazards that must be addressed to satisfy OSHA and FAA Safety Management System requirements. The funding requested provides the only FAA capability to complete the inspection of buildings critical to the FAA's mission, to train FAA employees to resolve the existing life safety issues, and to evaluate the mitigation work assuring that the FAA is fulfilling the requirements of its mission, public law, executive orders, DOT and FAA policy. Not addressing these problems leaves the Agency at risk of sudden long term loss of NAS services, and open-ended litigation liability.

4. How Do You Know The Program Works?

As a result of the continued sustainment at the Unstaffed Infrastructure facilities that house the NAS equipment, NAS outages have decreased at OEP airports. Neglecting to fund and perform these ongoing sustainment activities leads to deferred maintenance and can generate unscheduled outages.

The UIS Program supports the FAA's greater capacity goal by providing major repairs to or replacements of existing FAA-owned unstaffed facilities and structures serving the NAS. The NAS requires reliable and continuous operation of surveillance, navigation, communication, and weather equipment. In addition the infrastructure protects the electronic equipment from weather hazards, radio interference, and unauthorized entry. Failure of the infrastructure will result in NAS equipment failures directly reducing capacity of the NAS.

The benefits of increased funding to the UIS Program will be:

- Improved availability of Air Traffic Control (ATC) services as a direct result of building improvements (e.g. Heating Ventilation and Cooling [HVAC] replacement, electrical system upgrades) that provide a safe and optimum operating environment for electronic systems
- Extended operational service life of NAS remote facilities that house and protect critical systems and equipment
- A safe and secure work environment for the Air Traffic Organization (ATO) personnel
- Identification of opportunities for consolidation, modification, or reuse of existing assets in alignment with NextGen implementation requirements

5. Why Do We Want/Need To Fund The Program At The Requested Level?

FY 2013, $18,000,000 is required to reduce the number of NAS outages and repair facilities in poor condition.

The additional funding being sought is necessary to convert the program's current reactionary model to a proactive enterprise portfolio management system that prioritizes critical component sustainment activities against impact to overall NAS operations. This change will enable the UIS Program to clear out a growing backlog of sustainment work. The additional funding also will allow better coordination of the UIS spend plan with Communications Services to avoid the additional costs of upgrading, modernizing or replacing facilities into which new communication equipment has already been deployed (i.e., avoiding multiple mobilizations, and additional costs from removal and reinstallation of already deployed new communications equipment).

Funding will also support modification, acquisition or development and population of tools to better support program decision making and project/funding prioritization, project tracking, facility and infrastructure condition, and upward reporting. Perhaps most significantly, less reactive sustainment shall allow for the cost effective integration of NextGen with the existing and emerging unstaffed NAS communication infrastructure.

Detailed Justification for - 2E03 Aircraft Related Equipment Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aircraft Related Equipment Program
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aircraft Related Equipment Program	$8,982	$11,700	$10,100	-$1,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Flight Inspection	---	$9,000.0
2. Advanced Fly-by-Wire Simulator Technical Refresh	---	1,100.0
Total	Various	$10,100.0

For FY 2013, $10,100,000 is requested for the following:

Flight Inspection: $9,000,000 is requested for ongoing modifications/upgrades to FAA's flight inspection aircraft, avionics, and mission equipment. Of the $9,000,000 request, $2,500,000 will be used to continue the Beech aircraft fleet modernization program; $1,000,000 to begin acquisition of Automatic Dependent Surveillance-Broadcast (ADS-B) equipment for Challenger aircraft to operate in Europe; $1,000,000 to sustain the current generation Automatic Flight Inspection System (AFIS) and $4,500,000 to continue development of the NextGen AFIS (NAFIS).

Advanced Fly-By-Wire (FBW) Simulator Technical Refresh: For FY 2013, $1,100,000 is requested to continue a technology refresh of the FBW simulator. The request is for a technology refresh to install an Airbus 380 (A380) aerodynamic performance model. This upgrade will enhance existing capabilities by providing key expansion of operational research initiatives necessary to support operational procedures and regulatory guidance development. Fundamentally, operational research will be conducted to leverage these advanced technologies to enhance aviation safety. This technology refresh of the FBW simulator will accomplish the following objectives:

- Provide FBW simulation with existing and emerging cockpit configurations
- Integrate FBW simulator system with ground operations and automation
- Perform FBW data collection for applied research

2. What Is This Program?

Flight Inspection: This program supports the FAA's Flight Inspection (FI) mission by ensuring FI aircraft are equipped with the necessary capabilities and systems to inspect, certify, sustain, and modernize the NAS and evolving NextGen requirements. The FI mission is to evaluate and certify instrument flight procedures and to evaluate and certify both ground-based and space-based navigational equipment. This mission requires aircraft equipped with specialized test equipment -Automatic Flight Inspection System (AFIS), and NextGen AFIS (NAFIS). This program provides the technical equipment upgrades and/or replacements to existing aircraft, avionics, and mission equipment to meet performance requirements.

Advanced Fly-By-Wire Simulator Technical Refresh: The FAA's Airbus 330/340 aircraft simulator entered into service at the Mike Monroney Aeronautical Center (MMAC) on February 27, 2009. Since the initial acquisition of the simulator, numerous initiatives and enhancements to avionics software and hardware components have been proposed to keep pace with the advancement of new technologies. Equipment upgrades and technical refresh are required for expected future NAS improvements in aircraft and avionics capabilities. If maintained in its current state, the Airbus 330/340 simulator will not be able to support critical research of future Next Generation Air Transportation System (NextGen) initiatives that would directly benefit implementation of operational procedures and regulatory guidance.

Solutions to current supportability issues have been identified with the following projects: Advanced Head-Up- Display (HUD), Synthetic Vision System (SVS), Automatic Dependent Surveillance-Broadcast (ADS-B) Forward- Field-of-View (FFOV) upgrade, ADS-B autopilot upgrade, and Airbus 380/350 aerodynamic performance model upgrades.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

Flight Inspection: The FI mission ensures FAA navigational systems, facilities, and tools are sound and operating according to specifications. The FI aircraft fleet is composed of 30 specially equipped aircraft. Currently, 68 percent of the flight inspection (FI) fleet is limited in its support capabilities. This program not only provides for expanded capability across the fleet, but the useful life of the aircraft, avionics, and mission equipment is extended from 20 years to more than 30 years.

Flight Inspection is a key component of FAA's safety and increased capacity initiatives and evolving the NAS into a performance-based system. A performance-based NAS allows civil aircraft to navigate airspace more safely and with greater flexibility than the current ground-based system. Performance based initiatives will be achieved through implementation of Required Navigation Performance (RNP) Area Navigation (RNAV), in addition to the Ground-Based Augmentation System (GBAS) formerly known as LAAS and the Satellite-Based Augmentation System (SBAS) formerly known as WAAS. To meet these safety and greater capacity objectives, the FI aircraft fleet must be updated to continue to certify an expanding number of RNAV RNP, GBAS, and SBAS approaches at the lowest possible cost.

Advanced Fly-By-Wire Simulator Technical Refresh: Technical refresh enhancements will allow future research that provides regulators with performance data analysis for safe implementation of new technology. It will also provide simulation realism and high fidelity capability for Human-in-the-Loop data across all aviation safety areas. Furthermore, it will provide human factor evaluations of cockpit issues related to work load, operating procedures, and shared Air Traffic Management (ATM) responsibilities.

In the absence of a technical refresh, the FAA will not be able to conduct high fidelity data collection for analysis of emerging technologies to ensure continued worldwide leadership in aviation safety.

4. How Do You Know The Program Works?

Flight Inspection: In the last 20 years the Aircraft Related Equipment program has overcome numerous challenges in the engineering, manufacturing, and development of new technologies that provide the necessary mission equipment and support required of FAA-owned flight inspection aircraft to commission new facilities or NAS systems and to certify the flyability of new or amended Instrument Flight Procedures. Flight Inspection services are provided both domestically and internationally. This program is key to successfully meet both the legacy and NextGen flight inspection workload demands with minimal or no impact to the NAS or international commitments.

Flight Inspection productivity has increased by two percent and this program will continue to support expansion in the number of Instrument Flight Procedures (IFPs) published and support existing NAS periodic flight inspection requirements within the periodic window and/or grace period.

Continue to support military flight inspection operations world wide to include the Global War on Terror (GWOT) and operations such as Enduring Freedom and Iraqi Freedom. In calendar year 2010, FAA aircraft flew more than 140 sorties internationally, covering inspection of approximately 400 navigational aids, and more than 685 instrument procedures at 32 airfields in 27 different countries.

Advanced Fly-By-Wire Simulator Technical Refresh: The FAA Airbus 330/340 simulator is Level D certified in accordance with AC 120-40B/JAR-STD 1A and the International Qualification Test Guide (IQTG) for Airplane Simulator Qualification. The FAA National Simulator Team tests, inspects, and approves any change that affects the certification of the simulator.

The Airbus simulator is specifically designed to collect high-fidelity data for the purpose of safety analysis programs. The Airbus simulator provides real-time pilot responses, work-load, pilot/controller interface, and avionics integration with new operational procedures, i.e. HUD, Enhanced Flight Vision System (EFVS), Synthetic Vision System (SVS), ADS-B, and Electronic Flight Bag (EFB).

Since the certification of the A330/340 simulator in February 2009, it has been used in Closely Spaced Parallel Operations (CSPO) safety studies, Guided Missed Approach procedure studies, Required Navigation Performance (RNP) validations, Simultaneous Offset Instrument Approach (SOIA) validation, and Flight Management Guidance and Envelope Computer (FMGEC) system validations. Additionally, ADS-B preliminary research and development utilizing installation on an EFB has been used in assessments of the Cockpit Display of Traffic Information (CDTI) to facilitate In-Trail-Procedures (ITP) and CDTI Assisted Visual Separation (CAVS) HITL workload. The National Transportation Safety Board (NTSB) utilized the A330 to create an aircraft mishap playback to collect aircraft performance data and evaluate HITL factors.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Flight Inspection: The Aircraft Related Equipment (ARE) program ensures the FAA's flight inspection aircraft fleet is equipped with systems required for inspecting, certifying, modernizing and sustaining the NAS and evolving NextGen requirements. ARE should be funded at the requested level in order to continue multi-year initiatives and to implement new NextGen starts as planned without negatively impacting the flight inspection support required by non-NextGen (legacy) facilities, systems, and equipment across the NAS. The FAA will continue to ensure the safe operation of over 5,000 Navigational Aids (NAVAIDS), the periodic re-certification of over 21,000 Instrument Flight Procedures (IFPs), and up to 3,000 new and amended IFPs annually. In addition, flight inspection aircraft will be modified to operate in the NextGen NAS (ADS-B/SBAS/GBAS/DoD JPALS) and the evolving international environment.

Advanced Fly-By-Wire Simulator Technical Refresh (AVS)

The technical refresh programs are requested to be implemented according to schedule due to their interdependencies on each other. Additionally, the scheduling follows the roadmap of NextGen initiatives.

An additional reduction in budget would delay installation of Advanced HUD and SVS. Low visibility testing of ground operations and terminal approaches would be delayed impacting future approvals of low visibility operating requirements. This would impact the ability to collect needed data to support safety analysis for implementation of these technologies into the NAS.

Detailed Justification for - 2E04 Airport Cable Loop Systems – Sustained Support

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Airport Cable Loop Systems – Sustained Support
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Airport Cable Loop Systems – Sustained Support	$6,986	$5,000	$5,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Site Engineering and Fiber Optic Installation	28	$4,150.0
2. Program Management	---	750.0
3. Engineering Support/Design/Documentation	---	100.0
Total	Various	$5,000.0

For FY 2013, $5,000,000 is requested for advanced engineering, construction activities, and Fiber Optic Transmission Systems (FOTS) equipment installations for Boston (BOS), Ronald Reagan National (DCA), Charlotte/Douglas (CLT), Memphis (MEM), Cleveland (CLE), Austin (AUS), Dallas-Ft. Worth (DFW), Denver (DEN), Portland (PDX) and Spokane (GEG). In FY 2013, intermediate engineering and construction efforts will be underway at Newark (EWR), Baltimore Washington (BWI), Ft Lauderdale (FLL), Miami (MIA), Tampa (TPA), Anchorage (ANC), Oakland (OAK), Ontario (ONT), Van Nuys (VNY) and Seattle (SEATAC). In FY 2013, preliminary engineering and planning efforts will be starting for John F Kennedy (JFK), Dulles (IAD), Pittsburgh (PIT), Omaha (OMA), Salt Lake City (SLC), San Francisco (SFO), San Diego (SAN) and Honolulu (HNL).

2. What Is This Program?

The program replaces existing on-airport, copper-based, signal/control cable lines that have deteriorated. The primary focus will be on projects at airports with high traffic counts and enplanements. The obsolete underground telecommunications cable infrastructure systems are vulnerable to failure and have caused flight delays related to these cable outages. These lines feed airport surveillance radar, air/ground communications, and landing systems data and information to the Air Traffic Control Tower (ATCT), and operational and maintenance information to FAA-staffed facilities. Where cost-effective, the program will install fiber optic cable in a ring configuration to provide communications diversity. The ring configuration allows information to flow from either side if there is a break in the cable. The program takes advantage of opportunities to save cost by coordinating projects with major construction projects (e.g. tower relocations and runway projects).

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

All surveillance, navigation, landing, and Air/Ground communications systems at National Airspace System (NAS) airports are endangered because of the condition of the underground cable (either copper or aged multimode fiber) supporting these systems.

Many of the control/signal cables serving critical airport facilities are 25 to 50 years old (exceeding expected service life) and are badly deteriorated. The copper cable used to sustain the airports infrastructure that meets the FAA specifications is in short supply and not logistically supported. Copper cable in the gauge required not readily available from the industry and is costly since it has to be special order in large quantities. This makes the NAS vulnerable to catastrophic failure. Additionally, the cable infrastructure supporting newly developed NAS systems must be upgraded with fiber optics or the deteriorated cable replaced in order to meet these new NAS requirements. This relates to the higher capacity demands of future NAS systems. The sustainment performed under the ACL program addresses these issues.

4. How Do You Know The Program Works?

The cable loop program maps to FAA goal of increased capacity by reducing or eliminating communications cable related outages. The program also supports the goal of increased on-airport safety by reducing or eliminating runway incursions. System reliability and safety are enhanced due to increased system performance from diverse paths provided by the airport cable loop ring configurations. Standardizing installation configurations and fiber optic equipment will simplify logistics, configuration management, training, procurement, and depot support.

The FAA can realize savings in costs, resources, and time. Using fiber optic cable instead of copper reduces the possibilities of interference and impedance faced by deteriorated copper wire currently in use. Fiber optic cable is impervious to extremes in weather, lightning strikes, electromagnetic pulses, and electromagnetic interference. By using fiber optic cable and equipment, known as Fiber Optic Transmission Systems (FOTS), the agency will be assured of bandwidth and capacity to serve future requirements.

The program measures the delays associated with cable outages on airports and analyzes them from previous years to determine success in trying to reduce delays by two percent a year on average. The impact of one project may not be seen immediately as a typical project takes 2.5-4 years to complete. We are presently reducing cable related outages for OEP airports by 3.42 percent averaged annually based on the original data record from 1998 of 128 delays.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Failure to fund the Airport Cable Program at the FY 2013 $5,000,000 level in the near term will impede the ability of the FAA to improve, sustain and/or upgrade the communications infrastructure at airports across the nation.

Detailed Justification for - 2E05 Alaskan Satellite Telecommunications Infrastructure (ASTI)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Alaskan Satellite Telecommunications Infrastructure (ASTI)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Airport Cable Loop Systems – Sustained Support	$12,076	$15,500	$6,800	-$8,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Replace/Upgrade Modems, Multiplexers, Switches and Radio Equipment	---	$1,521.0
2. Design and Install Network Management Hardware and Software	---	864.0
3. Conduct Testing and Evaluation	---	624.0
4. Engineering, Technical and Program Management	---	3,045.0
5. Logistics Support	---	603.0
6. Training	---	143.0
Total	Various	$6,800.0

For FY 2013, $6,800,000 is requested to continue the ASTI Technology Modernization and complete key site testing activities including engineering and integration work efforts. Goals include conducting and completing First Article Test and conducting Key Site Test. The final investment analysis decision for the ASTI Technology Refresh was received in June 2011 and implementation is currently underway. This funding request is necessary to complete modernization efforts in allotted five-year implementation schedule and achieve improved availability.

2. What Is This Program?

The ASTI program (formerly known as ANICS Phase I) was implemented to achieve system-wide National Airspace System (NAS) inter-facility telecommunications throughout Alaska including circuit connectivity for the following NAS services:

- Remote Control Air Ground and Remote Communications Outlets for voice communication with pilots
- EnRoute and Flight Service Station Radio Voice Communications
- EnRoute and Terminal Radar Surveillance Data; Digitized Radar Data and Digitized Beacon Data
- Flight Service Station Flight Service Data processing System and the Digital Aviation Weather Network
- Weather Advisories, Briefings, and Products supporting Automatic Surface Observation System (ASOS), Automated Weather Observation System (AWOS), and AWOS Data Acquisition System (ADAS)
- WAAS Reference Station
- Automatic Dependent Surveillance-Broadcast (ADS-B)

ASTI also provides Alaska with 90 percent of the inter-facility communications for critical, essential, and routine air traffic control services. In recent years, aggressive system technical service efforts have been required to maintain overall system availability and reliability. The loss of performance capability, along with increased maintenance and higher costs make it necessary to replace outdated technology platforms.

The ASTI Technology Modernization program provides for the replacement and upgrade of critical system components due to aging and obsolescence. The program will raise system availability to required levels (0.999), reduce the frequency of system alarms and outages, and reduce the level of FAA maintenance.

The ASTI funding request is consistent with the December 2009 FAA CFO Business Case submittal and Independent Government Cost Estimate for the ASTI Modernization effort. The final investment analysis for the ASTI Technology Refresh was completed June 2011.

DOT Strategic Goals – Safety

- Reduction to transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

ASTI is needed to address the current system deficiencies:

- Availability has fallen significantly below 0.9999 and continues to decline
- Critical systems components are no longer supportable for required system operations
- Environmental destruction of system components
- Lack of support infrastructure for training, second level engineering support, and logistics

The ASTI technology modernization effort will increase system availability to 99.99 percent. ASTI will improve and sustain the availability of the infrastructure and reduce future operations and maintenance costs by $18,800,000 from FY 2010 - FY 2019. Additional qualitative benefits include:

- Improved training for FAA technicians and other operations personnel
- Improved second level engineering support
- Improved logistics support system
- Modern and flexible system to support emerging NAS requirements
- Improved Information Systems Security (ISS)

4. How Do You Know The Program Works?

The ASTI network is already a part of the NAS (facility type "SACOM"). Phase I site construction began in 1994 and the last sites were completed in 1999; Phase II site construction began in 2001 and completed in 2007. Modernization is required to ensure future system availability to meet critical air traffic requirements.

ASTI is in the implementation phase with Final Investment Decision (FID) completed in June FY 2011. The ASTI program is on schedule with antenna replacements and radome installations. ASTI is on track to meet upcoming FY 2012 and FY 2013 Activity Targets that include continuing effort to upgrade satellite communications equipment at 64 facilities (September 2013) and completion of installation of two radomes (September 2013).

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The funding request of $6,800,000 is required for the continued ASTI Technology Modernization effort to achieve system-wide component replacements/upgrades at 64 locations (including four hubs). The most serious concern surrounds a potential failure at one of the hubs. If the Anchorage ARTCC hub converters fail, 50 of 52 RCAGS at the ARTCC would not be available leaving the ARTCC without air-to-ground communications.

A reduction to the FY 2013 requested funding level would delay implementation of system-wide upgrades and impact First Article and Key Site Tests since sufficient lead time is required for equipment ordering.

Detailed Justification for - 2E06 Facilities Decommissioning

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Facilities Decommissioning
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Facilities Decommissioning	$6,387	$5,000	$5,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Facility Disposition	225	$4,450.0
2. Program Management	1	550.0
Total	Various	$5,000.0

For FY 2013, $5,000,000 is requested to fund the final disposition of decommissioned infrastructures and associated property restorations, conducting Environmental Due Diligence Audits (EDDAs), and investigate required work as listed below:

- Final disposition of decommissioned infrastructures and property restorations, meeting all applicable laws, including, but not limited to: the appropriate removal and disposal of hazardous materials; appropriate disposal of debris, evaluation of impact upon cultural preservation, historic preservation, wetlands, natural resource protection issues
- Conducting Phase I EDDA reports for government owned properties, as required by the General Services Administration (GSA) and other applicable laws
- Investigating and documenting the structures to be removed at each site and associated restoration

2. What Is This Program?

The June 2005 GAO report "Air Traffic Operations, the Federal Aviation Administration Needs to Address Major Air Traffic Operating Cost Control Challenges," states that FAA needs to expand its efforts to cut operational costs to address an expected gap between budget forecasts and expenses. The report recommends accelerating ground-based navigational aids decommissioning.

In recent years FAA has decommissioned many redundant or underused facilities. Funding was identified in FY 2007 to begin the divestiture (including environmental testing, infrastructure demolition, and property restoration) of these facilities. In addition, under the Next Generation Air Transportation System (NextGen) program, FAA plans to decommission entire classes of facilities such as Non-Directional Beacons and Remote Communications facilities.

DOT Strategic Goal - Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

This program is necessary to complete the life cycle of the project/program. The program results in the final disposition of decommissioned buildings, access roads and other real property. This program provides the expertise and oversight to enable all discontinued FAA facilities to be handled in a comprehensive and systematic approach. The future NextGen facilities will require disposition of legacy systems in order to meet the Cost Benefit Analysis derived from facility disposal. The program has the structure in place to provide for those needs.

4. How Do You Know The Program Works?

This program has experienced great success since FY 2005 to present. Funded work results in the release of decommissioned real property from FAA inventory and associated cost avoidance of: property lease fees; property maintenance fees (grass cutting, snow removal, etc.); utility fees and communications frequency fees. There are also monetary gains for the US government in the sale by GSA of FAA property no longer needed. The cumulative 10 year cost avoidance for reduction of real property in 2011 was $5.6 million.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$5,000,000 is required to fund the final disposition of decommissioned infrastructures and associated property restorations, conducting Environmental Due Diligence Audits (EDDAs), and investigate other required work. The work this funding level will support is approximately 225 projects. The current backlog of inventory is projected to increase every year due to the discontinuance of ground based NAS facilities.

Detailed Justification for - 2E07 Electrical Power System – Sustain/Support

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Electrical Power System – Sustain/Support
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Electrical Power System – Sustain/Support	$89,321	$77,581	$85,000	+$7,419

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Battery Set Replacement	60	$5,700.0
2. Power Conditioning System (UPS)	13	5,270.0
3. DC BUS Systems	20	3,700.0
4. ACEPS EnRoute Critical Power Systems	3	24,400.0
5. Lightning Ground Bonding Protection System	4	2,300.0
6. Power Cable Replacement	7	16,000.0
7. Engine Generator Replacement	89	15,475.0
8. Critical Power Distribution Systems	2	1,600.0
9. Alternative Energy Sustainment	7	500.0
10. Power System Sustain Support (PS3)	8	10,055.0
Total	Various	$85,000.0

For FY 2013, $ 85,000,000 is requested to accomplish the following:

- PS3 ensures that electrical power is reliable and that availability meets NAS requirements
- PS3 directly impacts all NAS service areas having air traffic control equipment and responsibilities
- Back up Power provides an average of 40 hours of uninterrupted operation each year to every system in the NAS. Each system would fail to provide any service for a total of 40 hours per year without access to backup power
- Sustainment is implemented with national contracts for the supply and installation of replacement infrastructure
- The Joint Resource Council (JRC) awarded a 10 year baseline (FY 2009-FY 2018) that provides proactive power sustainment for 92 percent of NAS value (300 top airports + En Route)

The National Airspace System (NAS) power system infrastructure is critical to both maintaining existing capacity and increasing the capacity of the NAS in the future. The current infrastructure is failing to deliver the power reliably, resulting in outages and delays. The FAA must maintain the current Air Traffic Control (ATC) system capacity by replacing unreliable power system equipment to avoid increasing power outages and service interruptions in the future.

Analysis of NAS outage data shows a significant link between delays and the reduced reliability and aging of the NAS power system infrastructure. Failure of the aging power infrastructure has led to significant delays and resulted in investigations by the National Transportation Safety Board and the Department of Transportation Inspector General. The Power Systems Group is proactively addressing this situation to mitigate future risk from NAS power outages. Reliable distribution, conditioning and standby power systems must be in place to operate the NAS as well as to maintain the capacity of the NAS during commercial power outages.

a. NAS Batteries: Batteries serve as a backup power source for key NAS facilities including navigation aids and communications. These batteries provide limited power during major power system disruptions and maintain the function of key systems while the NAS transitions to a safe level of reduced operation. The PS3 sustains in excess of 4,000 battery installations with periodic replacement to assure reliability.

b. Uninterruptible Power Supply (UPS): A UPS is a device that conditions commercial power and prevents power disruptions and surges from adversely affecting electronic system performance. An UPS is necessary within an Airport Traffic Control Tower to ensure the continued performance of the facility and eliminate power disruptions to critical infrastructure. PS3 currently sustains 1,783 UPS with an expected service lifecycle of 20 years. A significant portion of the UPS inventory requires replacement due to reliability and supportability issues attributable to age. UPS batteries require refurbishment on a four year cycle.

c. Direct Current (DC) Power Systems: DC power systems are used to provide a low cost, shorter term alternative to an engine generator. Critical safety electronic system availability is increased and commercial power disturbances of up to several hours no longer disrupt air traffic operations. The PS3 sustains 541 DC Power systems with a service lifecycle of up to 15 years.

d. En Route Power Systems: The FAA operates 23 En Route Center power systems. Because of the critical role of the En Route Centers in the NAS, 100 percent of the power systems require sustained funding to maintain service life. The Los Angeles Air Route Traffic Control Center outage highlighted a system flaw or single point of failure that can lead to the loss of all critical and essential power and significant delays to air traffic. Each ARTCC requires $8,000,000 to correct this situation. The delivery of this correction will take several years to complete due to funding and disruption constraints. ARTCC Critical and Essential Power System (ACEPS) has a payback period of less than six months.

e. Lightning Protection Grounding, Bonding and Shielding (LPGBS): LPGBS program provide a systematic approach to minimize electrical hazards to personnel, electromagnetic interference and damage to all FAA facilities and electronic equipment from lightning, transients, ESD, and power faults. The LPGBS program reflects investigation and resolution of malfunctions and failures experienced at field locations. The requirements thus are considered the minimum necessary to harden sites sufficiently for the FAA missions to prevent delay or loss of service, to minimize or preclude outages, and to enhance personnel safety. The requirements in the document have been coordinated with industry standards, and in some cases exceed industry standards where necessary to meet the FAA missions.

f. Power Cable: Of the $4.6 billion NAS power system infrastructure, $2.2 billion represents the power cable at airports essential to the operation of all air traffic. Seventy-five percent of this cable is well beyond the condition and age that commercial power companies would continue to operate. This has led to major airport disruptions. A proactive program is planned to tackle this significant risk. The top 300 airports require 18 million feet of power cable to sustain operations. Seventy percent of these power cables are at a high risk of failure, which could lead to extended delays and outages. Replacement of this cable costs $120 per foot and would normally be expected to last 30 years. The FAA aims to extend the life of this cable to 60 years with precise identification of candidate cables for replacement. Even with a 60 year life the annual cost of the cable replacement is estimated to be $35 million. Several Operational Evolution Plan airports are operating with cable between 50 and 60 years old and are experiencing significant failures and delays. Replacing unreliable terminal power cables will be given the highest priority in this request.

g. Engine Generators: Engine generators serve as a backup power source for essential NAS electronic systems when commercial power becomes unreliable due to a weather system, natural disaster or other electrical outage beyond FAA control. Without an engine generator, an FAA site may expect 10 or more hours per year of commercial power failure and hence significant NAS disruption. The PS3 sustains 3,565 NAS engine generators with a useful service life of 24 years. Maintenance of the aged inventory has increased five fold in six years with a significant reduction in reliability and availability.

h. Critical Power Distribution System (CPDS): CPDS provides within a NAS facility to operate and sustain designated critical electronic equipment and systems that directly support Air Traffic Control (ATC) functions.

i. System Engineering: Systems engineering is an interdisciplinary field of engineering that focuses on how electrical power systems in the NAS should be designed and managed. Systems engineering within the power services group focuses on defining and documenting customer requirements, administering the design phase, system validation, quality control, quality assurance, safety improvement, and system life-cycle.

j. Power Systems Sustained Support (PS3): PS3 ensures that electrical power is reliable and that availability meets NAS requirements. PS3 directly impacts all NAS service areas having air traffic control equipment and responsibilities. Back up Power provides an average of 40 hours of uninterrupted operation each year to every system in the NAS. Each system would fail to provide any service for a total of 40 hours per year without access to backup power. Sustainment is implemented with national contracts for the supply and installation of replacement infrastructure. Training Facility options and architectural drawings are included in this effort.

k. Alternative Energy Systems (AES): AES Program integrates and sustains a broad range of clean energy technologies to meet NAS operational demands. Utilization of AES technologies reduces the Agency carbon footprint and helps to achieve Executive goals for reduction of fossil fuel dependencies. Alternative energy generation systems include any of the following: Biomass; Waste to Energy; Landfill Gas; Geothermal Energy; Solar Energy; Ocean Energy; Hydropower; Hydrokinetic; Wind Energy; and Fuel Cell.

Prioritization: Projects will be prioritized to provide the maximum reduction of risk of loss of NAS service. This will utilize the magnetized impact priority model developed by the Air Traffic Organization (ATO) for the Power Services Group. This model prioritizes sustainment projects to the locations in the NAS that would result in the most disruption.

2. What Is This Program?

PS3 is a infrastructure sustain and renewal program. Other NAS programs fund the initial purchase and installation of components for backup power systems and power regulation and protection equipment.

PS3 supports system sustainability by providing emergency power systems that are necessary to allow continued operation of air traffic control facilities when there is an interruption in commercial power sources. These power systems also protect sensitive electronic equipment from commercial power surges and fluctuations. After new equipment/facilities have been commissioned, the Power program replaces, refurbishes and renews components of their emergency power system and cable infrastructure when necessary to maintain and improve the overall electrical power quality, reliability, and availability.

Program elements include replacing, refurbishing, or sustaining: the large battery systems used for critical power and power-conditioning systems; uninterruptible power systems; DCBUS; ACEPS; CPDS; engine generators; airport power cable; and lightning protection and grounding systems. Projects are prioritized using NAS metrics of capacity, demand, passenger value of time, and other specific expert information.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The PS3 program is critical to both maintaining and increasing NAS capacity by sustaining the reliability and availability of NAS equipment. These actions avoid system and equipment failures that result in costly delays. Without reliable NAS power systems, ATC electronics cannot deliver their required availability and commercial power disruption results in flights being kept on the ground, placed in airborne holding patterns, or being re-routed to other airports. The PS3 program also prevents expensive damage to critical ATC electronic equipment. Without backup power it is not possible to deliver Air Traffic operations with the required availability.

4. How Do You Know This Program Works?

The target for this Capital Investment Plan (CIP) program is to sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the Nation's busiest airports through FY 2018. Currently PSG has maintained operational availability for the Nation's busiest airports at 99.9 percent.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The PS3 program is critical to both maintaining and increasing NAS capacity by sustaining the reliability and availability of NAS equipment. These actions avoid power disruptions to NAS equipment that result in costly delays. Without reliable NAS power systems, air traffic control electronics cannot deliver their required availability and commercial power disruption results in flights being kept on the ground, placed in airborne holding patterns, or being re-routed to other airports. The PS3 program also prevents expensive damage to critical air traffic control electronic equipment.

Detailed Justification for - 2E08 Aircraft Fleet Modernization

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aircraft Fleet Modernization
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aircraft Fleet Modernization	$0	$9,000	$2,100	-$6,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aircraft Purchase	---	$2,100.0

For FY 2013, $2,100,000 is requested to complete procurement of three aircraft. New aircraft must be purchased to ensure that ASIs are fully qualified to check flight operations of commercial operators. Currency and proficiency of ASIs will sustain the high level of safety for general aviation and air carrier operators and reduce fatal accidents. The three aircraft will be representative of a wide variety of aircraft types registered for air carrier and general aviation use in the United States.

2. What Is This Program?

The Flight Standards Inspector Aircraft program provides ASIs with the necessary level of performance and proficiency in their role of regulatory requirements.

The three new aircraft will replace older aircraft which are approaching the end of their useful life in terms of their assigned role. This is because of the rapid changes that have occurred, during the last five years, in NAS technology, navigational aids, avionics and cockpit displays, making these aircraft obsolete in terms of their current roles. These factors do not currently impede routine or safety of flight operations, however the advent of modern technological developments in the field of navigational aids, avionics and flight displays require a new generation of on-board equipment to effectively prepare and evaluate ASIs for operations within the evolving Communication, Navigation and Surveillance/Air Traffic Management (CNS/ATM) environment.

The replacement aircraft will provide benefits not only to the FAA Flight Standards Program, but also to the aviation industry as a whole. Modern avionics platforms are vital to the effective instructing, and evaluating of flight proficiency levels of ASI's and will ensure the ASI standards remain at the same level as their peers in the commercial aviation industry. Additionally, modernization will enable the ASIs to keep abreast with advancing technologies so that the required level of aviation leadership is compatible with industry.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

New aircraft must be purchased to ensure that ASIs are fully qualified to check flight operations of commercial operators. Currency of ASIs will sustain the high level of safety for general aviation and air carrier operators and reduce fatal accidents. The older aircraft being replaced are approaching the end of their useful life in terms of their assigned role. Suitable replacement aircraft will provide a significant and urgently required benefit to the FAA Flight Standards Program and also to the aviation industry as a whole. A state of the art avionics platform that can be used effectively for instructing, and evaluating the flight proficiency levels of ASIs will ensure that ASI standards are maintained at the same level as their peers in the commercial aviation industry. Modern equipment will also enable the ASIs to keep abreast of the evolving FAA/NASA initiatives, as set out in the CNS/ATM program, and eventually within the Free Flight environment, so that the ASIs can maintain the required level of professional leadership in supporting the NextGen program in the National Airspace System (NAS).

Presently the FAA uses four main tracks to provide this currency and proficiency flying. These include rental aircraft, rental simulators, flight time in conjunction with out-of-agency flight courses and the Flight Standards aircraft. The type specific flying is carried out using rental aircraft and simulators. The aircraft used for the FAA Flight Standards Program must be representative of a wide variety of aircraft types registered for air carrier and general aviation use in the United States. This is because their main purpose is to provide the ASIs with practical real time Pilot in Command (PIC) experience that includes the physical, cognitive and emotional interaction with the aircraft and its operating environment. As the most important part of this interaction relates to the proper management of busy controlled airspace procedures, the aircraft should be capable of performing at comparable levels as compared with the modern general aviation and air carrier type equipment that occupy most of the controlled environment within the NAS.

4. How Do You Know The Program Works?

Legacy aircraft are incapable of providing ASIs with the knowledge to support NAS technology, navigational aids, avionics and cockpit displays such as will be required with NextGen and are currently in use by industry. The new aircraft will be equipped with these modern avionics suites and will allow the ASIs the ability to gain the proficiency needed in their regulatory duties in the NextGen NAS. Additionally, these new aircraft will have a high reliability and dispatch rate that will ensure fewer cancellations. Furthermore, past experience and research shows that each aircraft will support 910 hours per year of support. As a result of these new aircrafts capabilities ASI's have received initial and recurrent training requirements that mirror modern technology, avionics equipment, and flight procedures. This superior level of training has been key to their success in meeting mission requirements. The acquisition of these aircraft will allow the agency to continue this success as the program grows and expands.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

In order to complete procurement of three aircraft in FY 2013, $2,100,000 is required. Modern avionics platforms are vital to the effective instructing, and evaluating of the flight proficiency levels of ASIs, which ensures that ASI standards are maintained at the same level as their peers in the commercial aviation industry. A reduction in funding would eliminate one of the aircraft and delay proficiency and training needs of the ASIs. Also, the cost of maintaining an older aircraft will increase. The FY 2013 funding concludes the FAA's procurement of the three aircraft.

Detailed Justification for - 2E09 FAA Employee Housing and Life Safety Shelter System Service

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – FAA Employee Housing and Life Safety Shelter System Service
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
FAA Employee Housing and Life Safety Shelter System Service	$0	$2,500	$2,500	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Baseline Program and Asset Management Tools	---	$50.0
2. Logistics and Contracting	---	500.0
3. Construction and Materials	---	1,200.0
4. Inspection	---	750.0
Total	Various	$2,500.0

For FY 2013, $2,500,000 is requested to sustain quarters and shelters including establishment of a facilities management system to enable cost-effective facilities management. Refurbishment of facility structures and roofs, mechanical systems, HVAC systems, roads and grounds, and other infrastructure directly related to housing and shelters would be planned and accomplished to provide safe, healthy and habitable housing and shelters.

Primary locations are Alaska, Grand Canyon and American Samoa. Other housing and shelters are located throughout the United States, including the U.S. Virgin Islands. Because there are relatively few roadway systems in Alaska, barge and heavy-lift aircraft are the primary methods for delivering cargo, resulting in high costs for logistics and construction.

The American Society of Home Inspectors (ASHI), a recognized professional organization for home inspectors in North America. Intent is to develop an internal database, using a facilities/asset management tools (e.g., National Park Service and US Fish and Wildlife Service use variations of IBM Maximo).

2. What Is This Program?

FAA Employee Housing and Life-Safety Shelter Services manage, sustain, and buy/build/lease adequate housing and shelters to accomplish the FAA mission. Included would be establishment of a standard housing and shelter services policy, internal cost controls, life-cycle planning, exploration of use of commercially-managed housing services, and infrastructure management (including roads, community heating systems, water supply, sewage treatment/disposal, and other utilities).

DOT Strategic Goal – Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

In remote locations or overseas, FAA owns, or in a few cases leases, approximately 260 dwelling units that are used for three purposes: (1) to provide permanent housing for FAA employees in remote locations, (2) to provide temporary quarters for FAA employees at remote locations (for example Islands in the Bering Sea), and (3) to provide a system of life-safety emergency shelters in harsh environments (i.e., remote arctic and mountaintop locations). Employees who use these facilities provide air traffic control services, National Airspace System (NAS) facilities maintenance services. Additionally aviation inspectors and flight standards routinely use temporary lodging. All employees work to ensure safe, efficient, and expeditious movement of air traffic. Adequate and reasonably priced housing is not commercially available for employees and their families. The scope affects all of FAA because it applies to ATO and non-ATO, housing and shelter services. FAA Housing and Life-Safety Shelter System Services are a critical element of the Human Resources Management Plan.

Employee Housing and Life Safety Shelter System Services introduces a life-cycle approach for facilities management and sustainment.

Key principles of facility life-cycle management would be applied via a detailed database to establish a management system. This system would track and implement routine, cyclical and major sustainment/refurbishment projects for these facilities. Similar methods are employed for NAS facilities, but FAA Housing and shelters have deteriorated due to pattern of deferred maintenance resulting from assignment of low priority. This results in ultimately higher costs to restore building structures, mechanical components, HVAC systems, and supporting infrastructure.

Establishment of a program with a planned funding path will allow for economy of scale for well-planned management of facilities.

4. How Do You Know The Program Works?

A similar, but less comprehensive, program was in place from FY 1992 until FY 2001: The proposed element within FAA's Capital Investment Plan (CIP) would fully encompass life-cycle management of all types of housing; including permanent living quarters, temporary lodging and emergency shelters. Supporting buildings and infrastructure are included (e.g., community service facilities, water systems, community heating systems, and sewage systems).

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The required funding level will enable a proactive, multi-year approach to facilities management and life-cycle sustainment. Likewise, this will result in overall cost savings through early solutions and program-level management. Evidence shows up to a ten-fold savings if properly funded sustainment programs were to be instituted. For example, a repair to a sewage system initially estimated at $20,000 was deferred for several years. When the project was finally initiated due to impending system failure, the cost exceeded $200,000.

The estimated multi-year funding is comparable to that expended by the National Park Service and the US Fish and Wildlife Service in similar, remote locations, particularly in Alaska.

A reduction from the FY 2013 housing baseline funding would defer a single project and slightly increase risk for facility damage resulting in a higher remediation cost in subsequent years.

Executive Summary – Facilities and Equipment, Activity 3.

1. What Is The Request And What Will We Get For The Funds?

The Facilities and Equipment (F&E) Activity 3 program is requesting $161,500,000 for FY 2013, a decrease of $11,600,000 (7 percent) below our FY 2012 enacted level. This funding supports modernization of non-air traffic control facilities, business systems, and equipment. The programs support safety, regulation, security, information technology security, and regional and service center building infrastructure and support.

The Aeronautical Medical Equipment Needs (AMEN) program is requesting $3 million to perform major upgrades of outdated lab equipment at the Civil Aerospace Medical Institute (CAMI) in Oklahoma City, Oklahoma. The individual program justification for AMEN provides more details. In addition, the Aviation Safety Knowledge Management Environment (ASKME) is a suite of information technology (IT) tools designed to support and enable Aircraft Certification (AIR) to more efficiently certify new aircraft and modifications to existing aircraft. In FY 2013, ASKME is requesting $12.8 million to perform technical evaluations, airworthiness directives development, engineering design approval, electronic filing service, and work tracking software activities.

A key outcome expected to be achieved in the budget year with the requested resources includes increasing functionality enhancements of existing systems to allow FAA to be proactive in analyzing safety data.

2. What Is This Program?

This Activity is a subset of F&E programs that support modernization of the tools and support infrastructure used to perform Aviation Safety, Regions and Centers, Information Security, and Security and Hazardous Materials activities. Activity 3 also provides funding for the procurement and modernization of systems that allow the agency to archive safety-related data and perform complex analyses in support of critical aviation safety issues.

Activity 3 efforts contribute to the following DOT Strategic Goals:

- Safety: Reduction in transportation-related injuries and fatalities
- Economic Competitiveness: Maximum economic returns on transportation policies and investments
- Environmental Sustainability: Reduced transportation-related pollution and impacts on ecosystems
- Organizational Excellence
- Diverse and collaborative DOT workforce
- Open government

3. Why Is This Particular Program Necessary?

Our number one priority is safety, and the majority of Activity 3 programs support our safety, security, and statutory functions. These programs support the efficient and effective processes we use to meet the increasing demands of a growing National Airspace System (NAS). Several programs in this portfolio directly support external mandates. For example, the NAS Recovery Communications (RCOM) and Information Security programs are both presidentially- and congressionally-mandated.

4. How Do You Know The Program Works?

Funding for Activity 3 programs has been requested in the budget for almost two decades. We believe our approach for funding these programs is succeeding because these programs have successfully achieved their performance measures over time. For example, RCOM has a Continuity of Operations Plan (COOP) that is tested regularly and serves as a major element of our training exercises in this area. In addition, the Information Security program, which is responsible for tracking and reporting cyber security incidents in compliance with the provisions of the Federal Information Security Management Act (FISMA) of 2002 and National Institute of Standards and Technology (NIST) Special Publication (SP) 800-61. In 2010 the Cyber Security Management Center (CSMC) detected over 1.4 billion cyber alerts/attacks generated against DOT infrastructure. To date, the FAA alone has had 160 special threat events and continued vigilance is required to ensure FAA information security.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Funding for Activity 3 programs is critical for accomplishing our safety, security, and statutory mission effectively and efficiently. If F&E funding is reduced, implementation of Activity 3 programs would be delayed, and the costs of these improvements would increase over time. We would prioritize reductions in Activity 3 programs with respect to the ATC requirements identified in Activity 1 and 2 programs. Activity 3 investments would be reduced in a manner that would enable FAA to sustain ATC safety and services at levels expected by the public, the military, and our other stakeholders. Further reductions would require larger funding cuts in mission support activities.

Detailed Justification for - 3A01 Hazardous Materials Management

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Hazardous Materials Management
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Hazardous Materials Management	$19,960	$20,000	$20,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Superfund Sites Remediation (WJHTC)	---	$6,100.0
2. Investigation and Remediation (Alaska)	---	13,300.0
3. Investigation Other Sites and Program Management	---	600.0
Total	Various	$20,000.0

For FY 2013, $20,000,000 is requested to continue the management and remediation of approximately 100 of the 800 contaminated areas of concern (AOCs) that require investigation, remediation, and closure activities.

- $6,100,000 for remediation activities at 19 AOCs at the National Priority List (NPL) "Superfund" site at the William J. Hughes Technical Center, Atlantic City, New Jersey
- $13,300,000 for investigation and remediation at 133 AOCs in the former legacy Alaskan Region
- $600,000 for investigation and remediation of 13 AOCs at the Mike Monroney Aeronautical Center, Oklahoma City, Oklahoma, and the Central Service Area, the Eastern Service Area and the Western Service Area (not including the Alaskan Region)

2. What Is This Program?

The FAA operates the Hazardous Materials (HAZMAT) Management program to clean up approximately 800 contaminated areas of concern at approximately 200 distinct sites nationwide that require investigation, remediation, and closure activities. Site investigations at the identified sites have revealed that toxic contamination resulted from a variety of hazardous substances, including cleaning solvents, degreasing agents, pesticides, asbestos, polychlorinated biphenyls (PCBs), and heavy metals.

DOT Strategic Goals - Environmental Sustainability
- Reduced transportation related pollution and impacts on ecosystems.

3. Why Is This Particular Program Necessary?

The FAA has mandatory cleanup schedules in place as part of enforcement agreements with regulatory agencies. These agreements require the FAA to remediate contaminated soil and groundwater. Extensive contamination at the William J. Hughes Technical Center (WJHTC) prompted the United States Environmental Protection Agency (EPA) to place the site on the EPA National Priorities List (NPL or Superfund) as one of the nation's most environmentally dangerous sites. Other contaminated sites (many of which are located in Alaska) and the requirements of the HAZMAT Management program account for a large portion of unfunded environmental liabilities documented in FAA's financial statements.

To achieve compliance with all federal, state, and local environmental cleanup statutes, including the Resource Conservation and Recovery Act of 1976, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and the Superfund Amendments and Reauthorization Act of 1986, FAA must continue mandated program activities. The FAA's program activities include investigating sites; remediating site contamination; and obtaining closure of sites.

4. How Do You Know The Program Works?

The target is to remove five percent annually of the total sites listed in the HAZMAT Management program's published Environmental Site Cleanup Report (ESCR).

The FAA exceeded its goal of closing eight sites in FY 2010 with 20 sites being closed, and met our goal of closing seven sites in FY 2011.

The United States Environmental Protection Agency (EPA) lists federal facilities that require remediation actions on the Federal Hazardous Waste Compliance Docket (FHWCD). Currently, there are 73 DOT facilities listed on the Docket, of which 70 are FAA facilities, the most of any DOT organization. Of the 70 sites FAA is responsible for, 66 have achieved No Further Remedial Action Planned (NFRAP) status from EPA. The FAA is currently conducting investigation, remediation, and closure activities at the four FHWCD sites that have not achieved NFRAP status. Those sites are:

- Kirksville ARSR, Air Force Station
- Mike Monroney Aeronautical Center
- Ronald Reagan Washington National Airport
- William J. Hughes Technical Center

The HAZMAT Management program continues to maintain the DOT's goal of a status of "No Further Remedial Action Planned" (NFRAP) at 94 percent of FAA sites listed in the Federal Agency Hazardous Waste Compliance Docket. On an annual basis, the Environmental Site Cleanup Report (ESCR) is prepared to monitor the progress of site identification and remediation efforts throughout the Agency.

A 2002 cost benefit analysis determined a benefit ratio of 3.7 and an internal rate of return of 12.6 percent for the HAZMAT Management program.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$20,000,000 is required to continue the management and remediation of the 800 contaminated areas of concern. To achieve compliance with all federal, state, and local environmental cleanup statutes, including the Resource Conservation and Recovery Act of 1976, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, and the Superfund Amendments and Reauthorization Act of 1986, FAA must continue mandated program activities.

$20,000,000 is required to:

- Continue to attain 94 percent "No Further Remedial Action Planned" closure documentation for FAA listed on EPA's Federal Hazardous Waste Compliance Docket by conducting contaminant investigations, implementing site remedial projects, and completing regulatory closures at the four remaining Docket sites: Kirksville ARSR, Air Force Station; Mike Monroney Aeronautical Center; Ronald Reagan Washington National Airport; and William J. Hughes Technical Center.
- Continue to perform investigations and remediation projects at all other identified contaminated sites in accordance with federal and state mandates and enforcement agreements to limit future liability to the Agency and foster environmental stewardship.

Detailed Justification for - 3A02 Aviation Safety Analysis System (ASAS)

1. What Is The Request And What Will We Get For The Funds?

FY2013 – Aviation Safety Analysis System (ASAS)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aviation Safety Analysis System (ASAS)	$14,571	$30,100	$15,800	-$14,300

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Hardward/Foftware System/Services	---	$15,800.0

For FY 2013, $15,800,000 is requested to support the Aviation Safety Analysis System (ASAS) Registration and Certification Infrastructure for System Safety (RCISS). ASAS RCISS will provide technology refresh of equipment for the existing infrastructure as it continues to develop and implement Information Technology (IT) services. The ASAS RCISS program will continue to deploy these IT services in the following areas:

- Mobile Technologies
- Remote Connectivity Telecommunications
- Consolidated Server/Storage Area Network (SAN) systems
- Enterprise Software
- Disaster Recovery

These services ensure continuity of operations for critical and non-critical safety systems. Additionally, these services ensure that critical safety data are safeguarded against loss by providing a secure, reliable and timely back up of data. These new services support the coming integration of AVS' safety data when data are no longer associated with a system. In this new environment, safety workers assemble data as needed from various data sources to support new business processes. Data in these data stores requires critical recovery response.

2. What Is This Program?

- **Purpose and Beneficiaries:**

This program consolidates all previous IT infrastructure programs that supported the Associate Administrator for Aviation Safety's (AVS) safety workforce. It also enhances the current AVS infrastructure while leveraging components across the AVS services. ASAS RCISS provides all IT infrastructure components to the AVS safety workforce, ensuring standard and reliable accessibility to safety data. The program is designing and deploying the next generation infrastructure to meet AVS business needs by addressing its mobile safety workforce requirements and changes in the aviation industry. The program focuses on providing safety data to the AVS workforce while they are mobile (off-site) and conducting safety inspections and investigations of airlines, manufacturers, pilots, accidents, etc. ASAS RCISS' enterprise infrastructure provides the access methods to all AVS national safety applications developed by SASO or ASKME, and all other national safety programs deployed within AVS.

The ASAS RCISS infrastructure directly contributes to the success of AVS in meeting its mission goals as it is developed, implemented and administered as a single system. The infrastructure will become most effective in supporting the safety workforce when all of its components are optimized.

DOT Strategic Goal – Safety:

- Reduction in transportation related injuries and fatalities.

Description of Activity:

Over the course of the next several years, RCISS Segment 2 will be performing technology refreshments on the enterprise infrastructure that was established during RCISS Segment 1.

RCISS encompasses the following six key components:

- Devices for AVS' 7,000+ Safety Workforce (including mobile devices) - Activities include lifecycle replacement of existing devices
  - Provides equipment designed to meet operational demands
  - Replaces outdated or malfunctioning devices
  - Supports growth of AVS safety workforce (nearly 1,000) from Segment 1 to Segment 2

- Telecommunications - Activities include lifecycle replacement of existing devices and procurement of additional equipment and services where telecommunications bandwidth is deficient.
  - Improves accessibility and speed in utilizing national safety systems and supports centralized server infrastructure
  - Provides enhanced services for the transmission of safety data
  - Replaces outdated or malfunctioning equipment
  - Provides enhanced communication infrastructure for Disaster Recovery environment

- Enterprise Services (Hardware and Software which allow components of the infrastructure to work together) - Activities include lifecycle replacement of existing devices and software
  - Improves management and operation of the infrastructure through enhanced monitoring, consolidation of equipment and data collection
  - Improves infrastructure reliability
  - Maintains Service Oriented Architecture (SOA) infrastructure and services that lower development costs for AVS national safety applications

- Application Data Servers (Hosting of national AVS safety applications) - Activities include lifecycle replacement of existing servers
  - Continues implementation of application servers supporting national AVS safety applications
  - Replaces or upgrades outdated or malfunctioning servers
  - Provides additional processing power and data storage for Registry Data Center and AVS Data Center required to support new (SASO and ASKME) and legacy AVS safety applications
  - Provides enhanced data center environmental upgrades to increase reliability, maintainability and availability (RMA)

- COTS Software (Operating System Software, Database Software) - Activities include maintenance of enterprise software licenses
  - Ensures continued vendor support for software
  - Evaluate future software to support safety workforce, enterprise management services and all other aspects of the infrastructure

- Contractor Support - Activities include assistance in refining and streamlining the ASAS RCISS enterprise infrastructure:
  - Provides specialized technical expertise in the enhancement of select component areas, e.g., mobile technologies and data center optimization

3. Why Is This Particular Program Necessary?

The ASAS RCISS program addresses AVS' need to design and implement its next generation enterprise IT infrastructure to support AVS personnel responsible for promoting aviation safety through regulation and oversight of the civil aviation industry. ASAS RCISS addresses the need for redesigning the current infrastructure to support data storage, data access, data integration, connectivity, availability and disaster recovery created by the changes in the aviation and IT industries.

The next generation ASAS RCISS IT infrastructure supports the AVS safety workforce in their effort to reduce aviation accidents by making real-time safety data immediately accessible to and from all involved, e.g., inspectors, engineers, investigators, and medical examiners.

Additionally, work load capacity, performance, and reliability of the workforce is increased and enhanced by the ASAS RCISS IT Infrastructure. It also enables AVS to modify its IT infrastructure to respond to changing business processes without additional staffing requirements, such as allowing for a more mobile workforce and the creation of virtual workplaces.

4. How Do You Know The Program Works?

The ASAS RCISS program provides detailed reports about Information Technology (IT) investments and their progress over time to the FAA, the Office of Information Technology (AIO), and makes reports publicly available on the Federal IT Dashboard. The ASAS RCISS program assesses actual program results against baseline expectations determining if performance and benefit targets as well as customer needs are being met. The program management team continues to conduct surveys and data calls to monitor actual investment costs, schedules, benefits, performance, and mission outcomes.

The team has an integrated master schedule that provides a holistic view of the program and its components. ASAS RCISS uses Earned Value Management techniques and metrics to assess actual results against appropriate measures of effectiveness. As variances occur, ASAS RCISS prepares and executes corrective action plans and/or contingencies to head off substantial variances.

Surveys pertaining to equipment usage revealed that at least 90 percent of respondents said the mobile toolkit met or exceeded their expectations. Of the respondents who utilized the mobile toolkit, 84 percent approved of its unique user interface and 79 percent were fully satisfied with its handwriting recognition feature.

The results of questionnaires on the subject of Training and Support showed that 93 percent of respondents indicated training met or exceeded their expectations. Therefore, few users sought technical support beyond required training.

When questioning users about their accessibility to AVS Data Systems, the team found that while slightly more than 11 percent did not use these services at all and less than five percent indicated access to these systems did not meet their expectations, the strong majority (84 percent) of toolkit users confirmed its ability to provide access to the two most common business applications (Lotus Notes Email and Work Related FAA/AVS Web Sites) met or exceeded their expectations.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

ASAS RCISS benefits support the DOT and FAA Flight Plan goals of Increased Safety and Organizational Excellence. ASAS RCISS enables the safety benefits promised by the SASO and ASKME programs by providing the IT infrastructure required by those programs. The data developed, manipulated, analyzed, and reported on by the SASO and ASKME programs will reside on the ASAS RCISS IT infrastructure. Without the ASAS RCISS infrastructure, SASO and ASKME will not be able to realize their full capabilities. Reducing funding for ASAS RCISS will reduce the benefits that the ASKME and SASO programs deliver to provide safety for the flying public. The realization of enhanced capabilities for both ASKME and SASO depends on the ability of the ASAS RCISS infrastructure to deliver the performance improvements shown on the Federal IT Dashboard. In FY 2013, the SOA component of ASAS RCISS will continue to provide reusable services across the enterprise.

The SOA component enables the following benefits that ASKME and SASO depend on:

- Sharing of commonly used computer functions including single sign-on, data layer access, and user authentication, among many others
- Reduction of time an IT Project or Program spends developing and testing solutions, since the solution has pre-built and in-use software components
- Interoperability of various software modules resulting in productivity gains by end users, because the automated process replaces potential manual data sharing processes
- Quicker COTS software integration and integration of legacy software applications with new software applications

A reduction would directly impact ASAS RCISS' ability to maintain and enhance its SOA and disaster recovery. Delaying implementation of these components beyond FY 2013 will cause the RCISS Program to miss published milestones. It could cause ASKME and SASO to miss critical published milestones as well and delay realization of safety benefits.

Detailed Justification for - **3A03 Logistics Support System and Facilities (LSSF)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Logistics Support System and Facilities (LSSF)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Logistics Support System and Facilities (LSSF)	$11,477	$10,000	$10,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Prepare infrastructure and implement primary and back-up sites	---	$3,512.7
2. Continue Enterprise Change Management activities	---	3,656.6
3. Program support contracts and labor	---	2,463.4
4. Information Security	---	367.3
Total	Various	$10,000.0

For FY 2013, $10,000,000 is requested for program management, training, implementation, and enterprise change management.

2. What Is This Program?

Logistics Center Support System (LCSS) is a mission support information technology procurement to re-engineer and automate the FAA's logistics management processes. The program aims to modernize the FAA's supply chain and replace the 20-year old Logistics Inventory System (LIS) through two segments (18 and 27 months respectively).

- **Segment 1 (Blueprinting)** – evaluates the current logistics management business processes and develops a Business Case for re-engineering current processes to match industry best practices and the selected commercial off-the-shelf (COTS) enterprise resource planning (ERP) system
- **Segment 2 (Implementation)** – implements policy changes and deploys the COTS ERP solution

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

Anticipated FY 2013 Accomplishments

- Successful launch of initial system functionality
- Establishment of primary system interfaces
- Coordination of policy and procedure changes
- Conduct initial end-user training

3. Why Is This Particular Program Necessary?

The FAA provides a safe, secure, and efficient global aerospace system, contributing to United States national security and promoting aerospace safety. In support of this mission, the FAA Logistics Center (FAALC) manages the central NAS inventory warehouses and distribution facilities for the FAA. It provides routine and emergency logistics products and services to 8,000 FAA customers at 41,000 facilities and

28,000 sites as well as to the Department of Defense (Air Force, Navy, and Army), state agencies, and foreign countries. It provides logistics support for 80,000 parts and services and supplies, tracks, and accounts for Capital and Operations-funded parts totaling $740 million. The current system used to support this mission is the Logistics and Inventory System (LIS). LIS is an agency-developed legacy mainframe application that lacks the capability and flexibility to accommodate the near term or future long-term supply support needs necessary to maintain the NAS. LIS was built using Natural and COBOL languages and was deployed in 1990. Over the last two decades more than 39,000 changes have been implemented in LIS.

LCSS Core Capabilities

- ✓ Supply Chain Management (SCM)
- ✓ Enterprise Asset Management (EAM)
- ✓ Maintenance Repair & Overhaul (MRO)
- ✓ Advanced Planning System

LCSS Core Capabilities

- ✓ Supply Chain Management (SCM)
- ✓ Enterprise Asset Management (EAM)
- ✓ Maintenance Repair & Overhaul (MRO)
- ✓ Advanced Planning System

Its archaic architecture lacks the scalability to support the increased performance requirements projected by the NAS architecture.

The goal of the LCSS Program is two-fold: replace the current LIS system and greatly increase the efficiency of the FAA's supply chain management process by leveraging an ERP system using best industry practices.

LCSS will be a COTS ERP implementation. In addition to gaining the technological benefits associated with adopting object oriented software design, service oriented architecture (SOA), relational databases and a web-based user interface; this system will provide the robust operational business practices and industry standard business processes to the FAA that are needed to support the NAS and meet the objectives outlined in the flight plan.

The implementation of LCSS directly supports the agency initiative of improving the NAS supply chain through modernization of the supply chain infrastructure. The benefits of acquiring an industry leading COTS solution from the commercial supply chain industry will provide significant capability improvements. These benefits directly accommodate the agency goal to increase capacity and meet the projected demand.

4. How Do You Know The Program Works?

The program's technical solution was identified after extensive market research vetted by Gartner, Forrester, and AMR. The solution is a commercial-off-the-shelf (COTS) containing industry standard best practices for supply chain management. An independent third party assessment found that 80 percent of the 64 core functional requirements could be met without extensions or customizations. The program achieved a Final Investment Decision in April 2010 and kicked off Segment 1 in June 2010. Segment 1 that comprises comprehensive business process reengineering and the development of the user acceptance prototype is scheduled to complete end of calendar year 2011. So far the completed deliverables from Segment 1 have further validated the high functional fit of the COTS software and the program's ability to realize its outlined benefits.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Funding at the required level is needed to complete the final segment of the currently baselined program. The program will have a Final Investment Decision for Segment 2 (Implementation) and will require funds to meet its baseline and contract obligations for a FY 2014 completion. Additionally, not implementing LCSS on schedule will mean extending the lifecycle for the legacy LIS system that LCSS replaces, and will be an additional operating expense.

Detailed Justification for - 3A04 National Air Space Recovery Communications (RCOM)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – National Air Space Recovery Communications (RCOM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
National Air Space Recovery Communication (RCOM)	$14,970	$12,000	$12,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. VHF/FM and HF Radio Equipment	---	$3,487.4
2. Emergency Operations Network (EON)	---	2,716.5
3. Emergency Operations Facility	---	2,073.4
4. Communications Support Team (CST)	---	136.2
5. Secure Communications (COMSEC)	---	1,497.9
6. Information Technology Support	---	1,368.7
7. Other C^3 Tasks	---	719.9
Total	Various	$12,000.0

For FY 2013, $12,000,000 is requested for NAS RCOM. For this amount the Command and Control Communications (C3) program will provide the FAA the minimum command and control communications capability necessary to direct the management, operation, and reconstruction of the National Airspace System (NAS) during local, regional, or national emergencies when normal common carrier communications are disrupted. The C3 program will also provide minimum capabilities for Continuity of Operations (COOP) for the FAA.

2. What Is The Program?

The C3/NAS RCOM program provides both emergency and routine capabilities. These capabilities are based on both FAA needs and national security mandates. FAA specific needs are taken from the public safety mission to maintain a continuously viable National Airspace System. The national security mandates are contained in executive orders, national security defense directives, federal preparedness circulars, and other national policy edicts.

- $3,487,400 to continue funding of the Very High Frequency (VHF)/ Frequency Modulated (FM) and national High Frequency (HF) radio network modernization efforts. $3,045,300 for the procurement and installation of Very High Frequency (VHF)/ Frequency Modulated (FM) radio equipment, and $442,000 for the national High Frequency (HF) radio network modernization effort. Existing regional networks will continue to operate in the 25 kHz mode until all antiquated infrastructure equipment has been replaced with 12.5 kHz equipment
- $2,716,500 to continue funding Emergency Operations Network (EON). Support includes the continued development of Google Earth layers, Secure Instant Messenger, EON Dashboard, EON Off-line, and the EON Data Discovery platform
- $2,073,400 to continue funding Emergency Operations Facilities activities which includes, the development of audio/video display systems, national situational awareness view, Domestic Event Network (DEN), incident monitor, emergency notification system, conference bridge, and help desk support

- $136,200 for support of the Communications Support Team (CST) emergency response activities and related communication equipment
- $1,497,900 for continued funding of Secure Communications (COMSEC) activities and exercises to ensure continued system viability related to all secure telephone, secure facsimile, and secure classified communication equipment
- $1,368,700 for continued funding of C3 Information Technology (IT) Activities used to maintain the IT infrastructure for COOP sites and the Emergency Operations Network
- $719,900 to support other C3 efforts and supporting tasks to comply with National Communication Systems 3-10 requirements

DOT Strategic Goal - Organizational Excellence
- Enhance cyber security and privacy and improve governance of IT resources.

3. Why Is This Particular Program Necessary?

The Command and Control Communications (C3)/Recovery Communications (RCOM) program enables the FAA and other Federal agencies to exchange and collaborate information both, classified and unclassified, to promote national security. The C3/RCOM program also supports the Washington Operations Center Complex and modernizes several "continuity of operations" sites, which ensures FAA executives command and communications during times of crisis. Where applicable, C3 is an OMB SAFECOMM compatible program that encompasses multiple independent procurement projects, which are currently at various stages in the acquisition lifecycle.

In 1995, the National Telecommunication and Information Administration (NTIA) required a decrease in the frequency bandwidth used by the current VHF/FM network. As a result, the older VHF/FM radios that are configured to the outdated frequency separation requirements can no longer be utilized. In addition, the current system lacks coverage and integration with current VHF/FM equipment. This makes it difficult, and often impossible, to communicate over long distances. Network hardware has been fielded for approximately 20 years, long past its expected life cycle. For example, the cost to repair one module is more than the purchase of a new modern radio, yet for compatibility reasons, the repair of outdated equipment is continued.

The FAA, Emergency Operations, and C3 have a mission to develop web-based emergency operation information-sharing tools that create a common operational picture and support effective decision-making. A secure, highly available, and flexible infrastructure has been created for effective collaborative communications, continuity of operations, and adaptive situational awareness for enhancing decision support.

This new infrastructure has been built upon existing FAA networks and technologies and the operations framework is built upon the lessons and best practices learned from previous and existing initiatives. It is called Emergency Operations Network (EON). EON requires a technical refresh.

The FAA's Washington Operations Center Complex (WOCC) operates on a continual basis, 24 hours a day seven days per week and provides the FAA with the ability for critical personnel to manage and exchange information during a disaster/crisis. Since the last re-design in 2002, the required personnel needed to staff the WOCC has changed, this changes the way critical personnel need to effectively communicate. TSA operations are no longer part of the WOCC watch. ATO, AIO and other FAAL LOB's actively work out of the WOCC in a collaborated effort for maintaining a command and control environment.

The C3 program office has Presidential and Congressionally mandated responsibilities to provide reliable communications support to the White House, Department of Transportation, FAA and other government agencies during national security events, disaster recovery efforts, accident investigations, government exercises, and special invitational events.

Other efforts within the C3 program also revolve around National Security and are classified. There are several operational command and control centers within the Washington area and other sites around the country that require modernization. Since September 11, 2001, the C3 program has had its responsibilities increased to meet the current national security demands.

4. How Do You Know The Program Works?

The C3 program performs annual exercises to ensure that COOP sites are functioning properly and improving. Emergency and non-emergency communications are tested regularly. Site installations for VHF/FM have proceeded according to goal and knowledge sharing products have been developed and released with much success.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Funding the C3/NAS RCOM program at the current level will ensure that the FAA fulfills its mission to maintain emergency communications in the event of a crisis and meet national security mandates. Furthermore, current funding levels will allow the FAA to replace aging VHF/FM radios and meet NCS Directive 3-10, FAA Emergency Operations Plan (FAA Order 1990.1), the National Telecommunications and Information Administration (NTIA) narrow-banding, and the OMB/DHS SAFECOM compatibility requirement.

The C3 program office provides critical communications for both daily NAS operations and disaster/crisis management by providing:

- Increased command and control by national leaders in the FAA and other agencies
- Quicker response to natural and wartime disasters thereby helping avoid loss of life and property
- Increased efficiency of flying time by FAA flight inspection aircraft and other public and private aircraft
- Ensure COOP will be maintained
- OMB/DHS SAFECOM compatibility

The new C3 equipment will directly benefit the FAA in the form of lowered periodic and correctional maintenance costs of the old and technologically obsolete C3 equipment in the field. The C3 program also provides the FAA with OMB/DHS SAFECOM compatible emergency communication systems, ensuring interagency interoperability.

Detailed Justification for - 3A05 Facility Security Risk Management

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Facility Security Risk Management
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Facility Security Risk Management	$16,966	$16,000	$14,200	-$1,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Construction/Installation for Security Upgrades	Various	$3,000.0
2. Equipment Design/Installation	Various	3,000.0
3. Engineering Design/Equipment Installation (MMAC and NCT)	2	7,000.0
4. Security upgrades at 12 Security Level-1 and Security Level-2 facilities	Various	1,200.0
Total	Various	$14,200.0

For FY 2013, $14,200,000 is requested to support the continuing effort for the following upgrades:

- Construction/ Installation for security upgrades
- Security Equipment Installation at Mike Monroney Aeronautical Center (MMAC)
- Engineering design and equipment installation at MMAC and Northern California TRACON (NCT)
- Security upgrades at 12 Security Level 1 and Security Level 2 facilities

2. What Is This Program?

In 1999, the FAA established the Facility Security Risk Management (FSRM) Program. The Program implements standardized facility protective measures at all FAA staffed facilities. These measures include personnel access control (via card readers, fencing, gates and security guards), surveillance (cameras), vehicle access control (barriers), visibility enhancements (lighting) and x-ray machines. The FSRM Program participates in construction of facilities that secure FAA personnel and assets; such as guard houses, and facility retrofitting to protect against blast (explosive attacks). Finally, the FSRM Program manages contracts that provide maintenance of installed security systems regardless of age, manufacturer or condition. In addition to the protection of FAA personnel and assets, another Program goal is one of standardization across the NAS. The standardization of security equipment and processes will result in a substantial cost savings to the FAA. To aid in NAS-wide standardization, the FSRM Program facilitates security system installation for not only ATO facilities, but also for facilities serving the Aviation Safety (AVS) and Airports (ARP) Lines of Business within the FAA. FSRM is participating with NextGen Planning in identifying security needs and vulnerabilities of future NextGen facilities to ensure that the safety and security of FAA assets and personnel are maintained as FAA prepares for the Future of Flight.

DOT Strategic Goal - Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

Aviation assets are attractive targets for those who would seek to harm and terrorize Americans. FAA facilities are vulnerable to outside intruders if not properly protected. Security vulnerabilities jeopardize air traffic services critical to the National Airspace System. Threats to aviation safety are ever increasing and ever adapting. FSRM, in conjunction with FAA Security and Hazardous Materials (ASH), ensures that FAA has an operational and administrative environment that provides reasonable safeguards against disruptions that could occur if FAA facilities were attacked. Homeland Security Presidential Directives (HSPD) 7, Critical Infrastructure Identification, Prioritization and Protection mandates that agencies identify, prioritize, and coordinate the protection of critical infrastructure and key resources against terrorist acts. The work of FSRM is part of that effort.

The FSRM Program is instrumental in ensuring that FAA efficiently and cost effectively implements all issued Presidential Directives aimed at securing federal facilities and personnel. With regard to HSPD 12: "Policy for a Common Identification Standard for Federal Employees and Contractors", through the national Security System Design and Integration Contract, managed by FSRM, card readers throughout the NAS are being replaced with those that will read the common ID media required by the Directive. Through HSPD 16, National Strategy for Aviation Security, the federal government intends to "deter and prevent terrorist attacks and criminal or hostile acts in the Air Domain." The installation of security measures by the FSRM Program accomplishes the goal of this Directive.

4. How Do You Know The Program Works?

FSRM has contributed to obtaining security accreditation at over 980 FAA facilities. This was accomplished by the Program's management of national contracts through which security measures such as X-ray machines, cameras, card readers, gates, vehicle barriers, etc. were installed. The installation of the measures led to security accreditation of the facility as required by FAA Order 1600.69. The impact of those upgrades has been to reduce the risk of the facility to intrusion and unauthorized entry. Additionally, the installation and standardization of security equipment across the NAS has led to cost savings to the FAA.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$14,200,000 is required in order to sustain the work of securing FAA facilities. Securing the facilities requires funding to continue the following:

- Construction/Installation of security measures at all FAA staffed facilities
- Security engineering design and equipment installation at MMAC and NCT
- Security equipment installation at MMAC
- Security upgrades at 12 Security Level 1 and Security Level 2 facilities

A reduction in the funding required would reduce the number of facilities at which required security upgrades could be performed.

Detailed Justification for - 3A06 Information Security

1. What Is The Request And What Will We Get For The Funds

FY 2013 – Information Security
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Information Security	$15,170	$15,200	$14,000	-$1,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Information Systems Security (ISS)	---	$12,000.0
2. National Airspace System (NAS) Enterprise ISS (NEISS)	---	1,000.0
3. Federal Identity and Access Management (FIAM – formally LAACS)	---	1,000.0
Total	Various	$14,000.0

For FY 2013, $14,000,000 is requested for the following:

$12,000,000 is requested to provide funds for Information Security Services. This includes:

- Cyber Security Management Center (CSMC)
- NEISS transition for legacy NAS systems
- Enterprise Architecture and Interoperability
- Academia and National Science Foundation Technology
- William J. Hughes Technical center (WJHTC) Prototyping Laboratory
- Advanced Concept Technology Demonstrations
- Wireless Intrusion Detection System (WIDS)
- Vulnerability Code Scanning
- Data Loss Prevention (DLP)
- NAS/NextGen information system security capability

These projects and services allow FAA to meet the following outcomes:

- Achieve zero cyber security events that disable or significantly degrade FAA mission critical systems
- Protect NextGen and NAS systems and networks from attempted attacks; with improved and predictable, reliable, available systems
- Protect the Enterprise by expanding capability through Advanced Persistent Threat (APT) efforts
- Complete Enterprise Mapping
- Achieve Full Packet Capture through FAS
- Comply with OMB Memorandums and mandates, remain green
- Improve the efficiency for access mechanisms that meet current federal security guidelines
- Ensure confidentiality, availability and integrity of FAA assets, particularly critical information systems, networks, and administrative systems, through the purchase and customization of commercial-off-the-shelf (COTS) products
- Develop information architecture that can seamlessly share information between agencies participating in the NextGen architecture
- Privacy and sensitive information scanning software installed and monitored for all FAA egress points
- Applied Technology Transition to meet operational requirements
- Implement Information System Security requirements in the IPv6 transition

- Conduct annual transitions within an actionable Enterprise Architecture
- Increase capability to detect rogue access connections into FAA networks
- Increase number of software scanning services to meet ongoing testing and evaluation of information security software controls effectiveness
- Improve cyber incident detection, analysis and response in NextGen ISS activities
- Improve and enhance boundary protection, internal policy enforcement, and ISS governance

$1,000,000 is requested for NEISS to support prototype development of the Internal Protection Enforcement and Certified Software Management, two of the lynchpin NEISS program capabilities. This addresses the existing shortfalls in the current FAA technical capabilities regarding these two areas. This funding provides the requisite expertise to provide the technical analysis required to address specific technical issues associated with implementation of these security capabilities.

$1,000,000 is requested to fund the FAA Identity and Access Management Program required by HSPD-12 and OMB M-11-11 (among other mandates) using the Federal CIO Council's Identity, Credential and Access Management (ICAM) Roadmap. The Federal Identity Access Management (FIAM) group will perform these functions to make accessing computers and facilities more (1) secure, (2) user-friendly, and (3) efficient.

- The functions enhance security by closing gaps in authentication, authorization, encryption, logging, auditing, on-boarding and off-boarding
- The functions improve accessibility so that personnel can use ubiquitous credentials (e.g., PIV Cards) everywhere after the agency ties together disparate facilities, systems and workflows across the Agency and among its partners
- The functions increase efficiency, reduce costs, and increase service by consolidating redundant functions and streamlining transactions

2. What is the Program?

ISS: The FAA ISS program is a partnership between the FAA Chief Information Officer (CIO) organization and FAA lines of business and staff offices (LOBs/SOs) with a focus on protecting our information technology (IT) infrastructure. The program is comprised of the following areas: Cyber Security Management Center (CSMC); IT and ISS awareness and training; IT development; policy, standards, and requirements; program evaluations; system certification and compliance; and Data Loss Prevention.

The Cyber Security Management Center (CSMC) is the operational branch of the FAA ISS Program. It is comprised of facilities, technologies, as well as FAA and contract personnel working as a unified entity to provide extremely effective, enterprise-focused cyber security services to its clients. The CSMC is a 24x7x365 day operation supporting the entire FAA and the Department of Transportation (DOT). In executing the CSMC mission of cyber security for the FAA, the CSMC is the central reporting point for all cyber incidents occurring within the FAA and DOT. Along these lines, the CSMC also represents the entire DOT as the single source provider of the cyber "big picture" when reporting to the Department of Homeland Security (DHS). At the Federal reporting level, the CSMC holds two seats on the National Cyber Response Coordination Group (NCRCG), a DHS-sponsored emergency action team and advisory council reporting directly to the White House on cyber issues affecting, or potentially affecting, national security. Specific Security Services CSMC provides are described below in Question 5.

NEISS: The NEISS program was established to fund the update of legacy systems individual information security solutions to a common NAS enterprise wide solution. In addition, the NEISS program is a Next Generation Air Transportation System (NextGen) initiative designed to close the current ISS security gaps and to plan and implement the NAS Enterprise level ISS to address emerging risks resultant from both the NextGen modernization efforts and the threats posed to the NAS by state sanctioned and non-state adversaries. This program will ensure that a NAS solution will be consistent with the enterprise level security capabilities identified and agreed upon in the FY 2009 Enterprise Architecture ISS Security Roadmap. The ISS roadmap collected and synthesized ISS safeguard shortfalls pervasive in the NAS which must be provided at the enterprise level to be effective and economical. These identified security shortfalls will be addressed by the five NEISS capabilities:

- External Boundary Protection (EBP) – to prevent malware from entering the NAS
- Internal Policy Enforcement (IPE) – to contain the spread of malware within the NAS
- Identity and Key Management (IKM) – to provide identity authentication for all components of the NAS
- Incident Detection and Response (IDR) – to provide detection, analysis, and response to NAS cyber incidents
- Certified Software Management (CSM) – to prevent malware from entering the NAS via the software supply chain

Other security capabilities, e.g. hardening of user systems, will remain the responsibility of individual NAS programs. However, the investment requirements for the enterprise ISS capabilities will fall under the purview of NEISS program and will allow individual NAS programs to focus on the implementation of their specific non-enterprise level safeguards. The NEISS program will still require input from the program offices.

FIAM: The Federal Aviation Administration (FAA) needs to perform three tasks to enhance security, improve accessibility, and increase efficiency.

- **Platform.** Operate the Agency's ICAM Platform. Set up, operate, and connect other systems to the Platform to authenticate users. Consolidate the Agency's workflows and enterprise systems that identify personnel, manage credentials, and control access
- **Support.** Support users, system owners and partners who need to use PIV Cards and other ubiquitous credentials for access. Maintain a help desk and train other help desks on access controls. Issue guidance and resolve access problems. Enable non-agency credentials to use agency resources and vice versa
- **SMEs.** Maintain subject-matter experts who collect metrics, track progress, write policy, answer questions, and represent logical access functions on initiatives that affect access

DOT Strategic Goal – Organizational Excellence
- Enhance cyber security and privacy and improve governance of IT resources.

3. Why is this particular program necessary?

ISS: This program funds Information Security Services including the Cyber Security Management Center (CSMC) with responsibility for cyber security incident management for the Department of Transportation (DOT) in compliance with the Federal Information Security Management Act (FISMA) of 2002 and National Institute of Standards and Technology (NIST) Special Publication (SP) 800-61, Revision 1.

The 2002 FISMA states that each Federal department and agency must maintain an information security program that is consistent with policies, standards, requirements, and guidance issued by the Office of Management and Budget (OMB), NIST, US-CERT, and other designated Federal agencies.

The OMB Circular A-130, Management of Federal Information Resources, states that Federal departments and agencies must implement policies, standards, requirements, and procedures that are consistent with standards and guidance issued by the NIST.

As part of the National Response Framework (NRF), the DOT has been designated as a Cooperating Agency in the Cyber Incident Annex of the NRF. The CSMC fulfills its responsibilities listed in the Cyber Incident Annex if requested by the DHS and/or other coordinating agencies as designated by the NRF.

NEISS: The NextGen technologies (e.g. IP and SOA) cannot be implemented without adopting a concomitant set of enterprise NEISS capabilities. As NextGen evolves, and throughout this transition, there are significant challenges to adequately protect the NAS. A major security challenge for NextGen is the increased level of network connectivity required to share information among internal and external users which encompass aviation partners' networks. The benefits of this increased network connectivity are numerous. These benefits will allow real-time information access from multiple and disparate sources and systems to accelerate decision making and air traffic control processes. To satisfy NextGen's requirements for increased connectivity, the NAS network connections or "backbone" will mirror the Internet. The future NAS will be transformed to a large network using common technologies and communication protocols.

The NAS is presently composed of multiple systems (close to 100) that support air traffic control operations. Consequently, security capabilities to protect the NAS have been created and evolved around individual systems. This has resulted in a non-uniform, non-cohesive security protection for the NAS. This stovepipe protection approach will cause increased security vulnerabilities to the NAS as NextGen is rolled-out. The enterprise capabilities defined by NEISS are not only requisite for all NextGen capabilities but underpin the success of the information exchange dependent on most operational improvements. Without an enterprise based solution set NextGen would be untenable and cost prohibitive.

FIAM: Users access computers (e.g., desktops, agency websites, other federal websites, applications, etc.) using different credentials (i.e., usernames, passwords and smartcards). FIAM consolidates access to the agency's networks and information systems and responds to over 70,000 personnel who have questions and report problems related to access. Identities, credentials, and access controls are growing in number and complexity. Access workflows touch every employee and contractor every day. Under HSPD-12, the Agency issues a PIV Card to someone every three-to-five years. Under ICAM, the Agency validates a PIV card of someone at least every three to five hours—every time someone accesses a computer or application on it. ICAM workflows are highly interconnected. Partners will continue to evolve, and eventually the Agency will need to accept their PIV Cards and allow its partners to accept the Agency's PIV Cards. Their evolution demands one enterprise approach.

FIAM reduces access breaches that result in compromised confidentiality, integrity, availability, authenticity, and repudiation. Combating these breaches is increasingly difficult because the Agency uses many different workflows and systems to manage access. These breaches are not theoretical but real. When personnel leave the Agency, much of their access remains active because too many parties must revoke each piece. Without adopting minimum federal standards, many LACS are accessible when they should not be (and vice versa). Several audit findings already cite security incidents such as a password reset of tens of thousands of webmail accounts and other events that reveal an increased need for oversight and central management of access controls to Agency resources.

The overall security program also ensures compliance with the following additional mandates:

Federal ICAM Mandates:

- Continued Implementation of Homeland Security Presidential Directive (HSPD) 12—Policy for a Common Identification Standard for Federal Employees and Contractors, OMB M-11-11 (Feb. 3, 2011)
- Homeland Security Presidential Directive/HSPD-7
- Homeland Security Presidential Directive/HSPD-12
- Executive Order 13231, Critical Infrastructure Protection in the Information Age
- National Institute of Standards and Technology (NIST) SP 800-37
- Federal Information Security Management Act, OMB M-03-19
- OMB Circular A-130
- Management of Federal Information Resources, OMB Circular A-130
- Preparation, Submission and Execution of the Budget OMB Circular A-11
- Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, OMB Circular A-94
- Transition Planning for Internet Protocol Version 6 (IPv6) OMB M-5-22

In 2010 the CSMC detected over 1.4 billion alerts/attacks generated against DOT infrastructure. From these alerts the CSMC generated over 1,800 incidents for DOT infrastructure including the FAA. To date, the FAA alone has had 160 special threat events. The facilities and equipment required to maintain this level of vigilance is critical to the overall success of the CSMC's cyber security mission.

4. How do you know the program works?

ISS: Information Security has allowed the discovery and remediation of multiple critical system compromises:

- The immediate discovery of the exfiltration of FAA employee data in 2009 allowed the FAA to mitigate the severity by providing Identity Theft Protection to those affected in a timely manner
- By the detection of hacker activity, we were able to remediate systems and prevent valuable information from being stolen

Information Security has been responsible for FAA system vulnerability scanning and assessment to provide a proactive approach to protecting the FAA network:
- Vulnerabilities on FAA websites have been found that could have been used in compromising FAA servers
- Vulnerability Audits are provided to the FAA to enable an awareness of the risks on their network

Expert opinions and information has been provided to the FAA community as needed:
- Information Security whitepapers have been written
- Guidance was given to field technicians concerning technical security issues
- Security Alerts and Bulletins are distributed to the community concerning pertinent vulnerabilities, exploits, and awareness issues

NEISS: In-house and independent studies, a prototype, and a trial implementation provide ample assurance that the NEISS program will protect the NAS from cyber security risks in the NextGen era in an effective and efficient manner. Sample assurance material follows below.

- The FAA System Engineering and Safety Office, Information Security Team, AJP-174, conducted a risk assessment of the NextGen cyber security using an enterprise framework analysis that consisted of six layers. Their 2010 assessment report provides recommendations to mitigate the risks of each enterprise layer. In the Management and Organization layer, the team recommended that FAA provide a holistic and comprehensive cyber security protection mechanism for the enterprise. For the security risks in the other five layers, the team recommended using specific combinations of the five NEISS defined enterprise capabilities
- The National Security Agency (NSA) was tasked to review the NEISS approach to securing the NAS as it is described in the NEISS Concept of Use document, and they concluded that the NEISS capabilities are based on solid concepts and solid information technology principles and they may further benefit from Security Technical Implementation Guidance documents (STIGs) developed by the Defense Information Systems Agency (DISA). These NSA conclusions are documented in their September 2010 deliverable product: FAA/NAS Enterprise Information System Security (NEISS) Concept of Use Documentation Review and Guidance
- The FAA AIO organization has operated the Cyber Security Management Center (CSMC) for over 10 years providing Incident Detection and Response to non-NAS systems (DOT and other agencies), and it is providing incident detection services to the NAS Common ARTS (CARTS IIIE) program. The CSMC-CARTS IIIE arrangement can be considered a trial implementation of the NEISS IDR capability thereby showing its viability

FIAM: The Agency is consolidating access controls across the agency for three pilot applications. The funds this document requests will support expanding consolidation to dozens more applications. The Agency's experience predicts the most successful solutions to install. FIAM uses mature, commercial off-the-shelf (COTS) capabilities that have been repeatedly proved throughout multiple agencies. FIAM performed an industry-day and vendor-day review to verify requirements and eliminate any requests outside of existing COTS capabilities. FIAM performed a request for information (RPI) and developed a use case and test case document proven to be valid by existing standards. One of the critical components of the system is user authentication based on pre-authorized roles and attribute-based privileges. FIAM ensures the Agency provides an automated work flow provisioning capability to manage account setup, modifications, and de-activations in order to improve the efficiency and effectiveness of security and access controls. With the implementation of access control and identity management capabilities, the FAA operations create a secure environment for the agency while protecting internal and external entity intellectual property and privacy.

5. Why do we want/need to fund the program at the requested level?

ISS: The FAA must ensure the integrity and availability of all critical information systems, networks, and administrative systems due to ever increasing cyber terrorism and malicious activities by hackers and other unauthorized personnel. In the Homeland Security Presidential Directive/HSPD 7, FAA was directed to protect and ensure the integrity, confidentiality, and availability of all National Airspace Information Systems as well as federal information. Under the Federal Information Security Management Act (FISMA) of 2002, FAA must ensure all information systems identify and provide information security protection equal to the risk and magnitude of the harm resulting from unauthorized access, use, disclosure, disruption, modification, or destruction of information that support the agency, aviation safety and security, and the NAS.

State Sponsored Threat events are targeted attacks on federal government systems, which pose a serious and imminent threat to those systems. These are events specific in nature, objective and patterned. They, by design, reflect hostile intent. Understanding all aspects of these events dictates that they be detected and prevented to the maximum extent to which the FAA is capable. The development of the term "State Sponsored Threat" was initiated as an indirect route to allow the communication of these events and the identification and mitigation of systems that have been compromised or affected by these sophisticated attacks.

The Office of the Chief Information Officer (AIO's) work continues with a strategy, which is a comprehensive, proactive approach to preventing and isolating intrusions in the agency's computer networks. This cyber defense strategy involves hardening of the individual system and network elements, isolating those elements and backing up those elements to avoid services disruptions.

Information systems security will enhance the National Airspace System (NAS) architecture to include cyber security; harden individual NAS systems and network elements by completing remediation for the discovered vulnerabilities in each of the Nation Airspace Systems; enhance boundary protection to NAS facilities; improve recovery rate during times of cyber attacks through information sharing from the FAA Cyber Security Management Center (CSMC); conduct systemic monitoring at the CSMC, and address the challenge of providing cyber protection while maintaining reliability, availability and high system integrity through applied research and development initiatives. The safety-critical aspect of NAS operations leads to stringent requirements for reliability and availability, resulting in extensive use of system and equipment redundancy, path diversity, and software diversity. Mandates for high integrity increases the time and cost to design, develop, and verify NAS components during initial deployment, routine upgrades, and emergency patches. At the same time, the FAA is under pressure to deploy cost efficient new systems that meet stringent safety and security targets. This creates a challenge to reduce the time and cost to deploy high integrity systems to the U.S. national airspace, while at the same time enhancing confidence in the safety, security, and reliability of these systems.

NAS Information Systems Security Transformation: FAA will complete concept of operation and implement strategy for automated recovery, which involves isolating those systems that have been affected by a virus, instituting the fix, and making sure that affected systems get back online as soon as possible. Architecture and engineering efforts for alternative solutions to secure new NAS systems will be developed (NSure concept). The NAS information technology systems will be monitored and all necessary actions will be taken to ensure the systems are not interrupted and are available at all times. AIO will acquire and implement enhanced tools to be used by the Computer Security Incident Response Center to address complex and rapidly changing cyber threats and vulnerabilities. These include analysis of NAS Netflow data, modeling and simulation of attack vectors into the NAS, data clustering and early indications and warning; as a result FAA will gain the capability to do predictive analysis of events that could cause a service outage to the NAS. Funds are also required to begin to examine the ISS requirements of a space based NAS.

Enterprise Architecture (EA) and Interoperability: OMB Circular A-130 and OMB Circular A-11 mandate an annual baseline of the EA by the Investment Decision Authorities. The FAA Acquisition Management System (AMS) enforces compliance with these federal mandates. The FAA EA has been approved by the Joint Resource Council and the Architecture Review Board for the last several years. OMB recommends the FAA EA as a model to other federal agencies in IT investment management practices.

F&E funding supports the current state "as is", transition, and target "to be" architecture compliance, governance, and planning. In FY 2013, FAA will continue to enhance its enterprise architecture including the target architecture to ensure that Administrative, NAS-Support and the NAS architecture, defined by the Next Generation Transportation System (NextGen)) program, target architecture states are compatible and meet the agency's future requirements. FAA will pursue opportunities to leverage architectural products to reduce costs and improve efficiencies, including the development and enhancement of investment roadmaps.

Data and Information Architecture: Continue to develop and maintain the necessary information architecture to seamlessly share information between the agencies participating in the NextGen architecture, formalize agreements and develop policies to foster the transfer of necessary information between Government agencies and commercial entities. Continue to support the System Wide Information Management (SWIM) program and other NAS program's data architecture efforts.

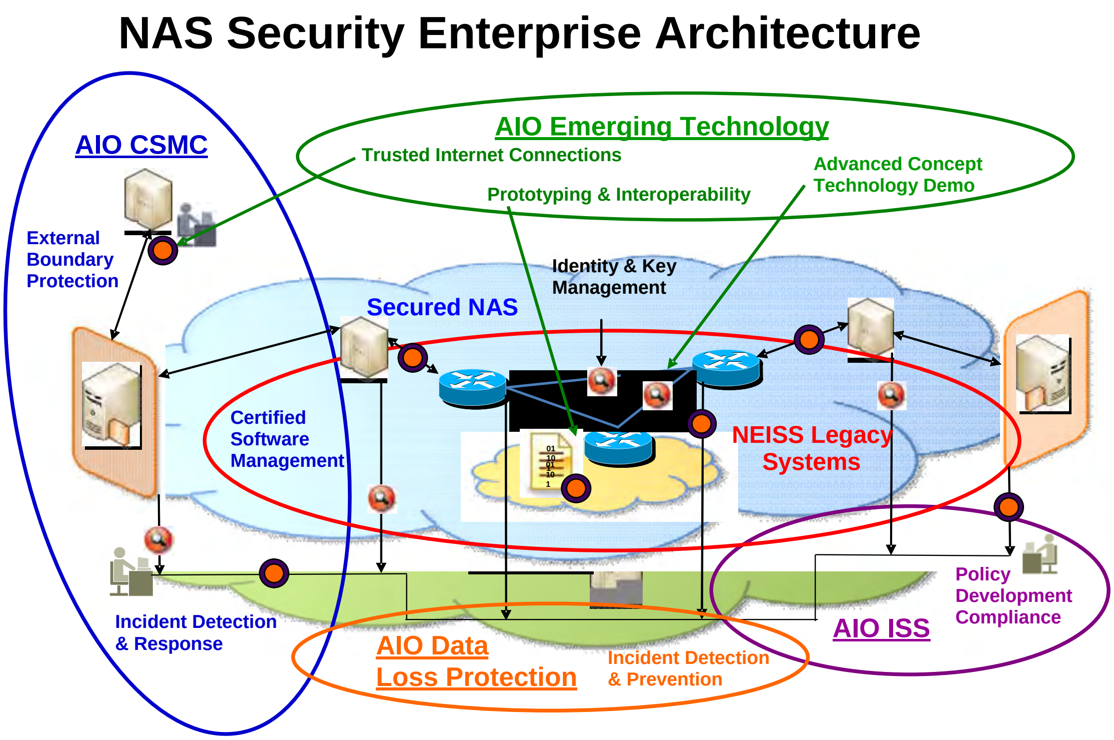
Applied Technology Transition provides a means to explore and execute implementation plans and demonstrate strategies to leverage existing technology applicability to meet ongoing operational requirements. Artifacts from the demonstrations will be transitioned into FAA networks and facilities.

FIAM: This level of funding will support integrating 400 applications across the enterprise over three years, fully redundant infrastructure for access controls, the capacity to avoid and quickly resolve work outages, and sufficient training to leverage ubiquitous access and achieve results.

Without this level of funding, the Agency cannot consolidate access controls for its applications, and it will not comply with OMB M-11-11 and related federal mandates. Without the requested level, the Agency's PACS and LACS will continue to be insecure, inaccessible and inefficient. Without meeting the federal mandates, the Agency risks (1) escalating breaches in security, (2) reduced accessibility (i.e., by personnel and partners), and (3) waste (e.g., unnecessary redundancy and complexity).

The NextGen system and the flying public demand safety and security and this capability can help ensure that need. The FIAM group and the ICAM LACS functions it performs have the capability to provide many security solutions where risks exist today. FIAM aligns the Agency so that security will be a strategic enabler working in the background, providing a seamless security capability for the FAA as an agency. The flying public will continue to see the FAA is the premier flying capability in the world because of its safe and secure flying record.

The following graphic shows the interrelationships between all FAA information security components.



Detailed Justification for - - 3A07 System Approach for Safety Oversight (SASO)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – System Approach for Safety Oversight (SASO)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
System Approach for Safety Oversight (SASO)	$23,353	$23,600	$23,000	-$600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Software Development	---	$10,900.0
2. IOC Implementation/Training	---	7,400.0
3. Program Management	---	2,700.0
4. Contract Award	---	2,000.0
Total	Various	$23,000.0

For FY 2013, $23,000,000 is requested for SASO. SASO implementation is composed into two segments: 2a and 2b as follows:

Following the successful completion of business process reengineering in FY 2012, $21,000,000 (SASO-2a) is requested to develop automation and business processes known as the Safety Assurance System (SAS), implementation initiatives including training, and the overall program management effort. SAS development is expected to be completed, and testing will be nearly completed during FY 2013.

$2,000,000 (SASO-2b) is requested to begin awarding contracts for Business Process Re-engineering and Change Management Implementation for the second implementation phase.

2. What Is This Program?

The SASO program is one of several the FAA initiatives to increase safety and control cost by adopting the International Civil Aviation Organization (ICAO) mandate to revise State Safety Programs to incorporate Safety Management System (SMS) principles. To accomplish the above, the SASO Program is reengineering Flight Standards Service (AFS) business processes and developing an AFS oversight system based upon SMS principles. The difference between the current "regulatory compliance-based" approach and the reengineered SMS-based approach is the performance gap SASO is closing.

The SASO program will transform the FAA Flight Standards Service to a national standard of system safety based upon safety management system principles. The primary beneficiaries are to the flying public.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

As the regulator of a major segment of the U.S. aviation industry, AFS must continually strive to improve aviation safety. AFS is responsible for oversight of nearly the entire civil aviation industry that uses America's National Airspace System. Today's safety oversight system is stove piped, reactive in nature, and "regulatory compliance-based". While many technical and human factors problems contributing to accident rates have been resolved, remaining are more complex organizational factors requiring additional systems-based, data-supported analysis and assessment for their resolution. Increases in technical and operational complexity of aviation operations and introduction of new technologies further stress today's oversight system. SASO will make the system safer and anticipate future needs and challenges. It will implement a more structured, data-supported risk-based oversight system that will use hazard identification and risk assessment strategies to formulate surveillance plans and target FAA resources. The scope of the investment includes reengineering AFS business processes and consolidating 56 AFS applications into the appropriate number of enterprise systems that serve 4,800 FAA Aviation Safety employees, in 8 regions, at headquarters and approximately 120 field offices, and more than 25,000 aviation industry professionals managing aviation safety throughout the United States. It leverages technology instead of increasing oversight personnel as budgetary pressures constrain personnel growth. By implementing SASO via the SAS, AFS expects to contribute to reducing the commercial air carrier fatalities per 100 million persons on board by 24 percent over nine-year period (2010-2018), no more than 6.2 in 2018 and to reduce the general aviation fatality rate to less than one fatality per 100,000 flight hours by 2018.

4. How Do You Know The Program Works?

The SASO program sponsored five years of research and development from 2003 through 2007 inclusively. The research resulted in capabilities adopted by the SASO Program that are currently being implemented to create a Safety Management System (SMS). Segment 2a implements the SAS which completes the first of four pillars of the SMS, and segment 2b implements the remaining three pillars. These capabilities are also recommended as best practice by the International Civil Aviation Organization (ICAO) and are being adopted by all member aviation authorities.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The success of the SASO program depends upon continued development funding through FY 2018 to achieve and sustain full benefits. Failure to continue funding at the requested level will limit the automation of oversight capabilities achieved through business process reengineering and require additional manpower (aviation safety inspectors) not currently budgeted to achieve aviation safety goals. Less than full funding will delay system implementation and threaten the FAA strategies and metrics achievement. A complete loss of funding will put the FAA at risk for achieving aviation safety goals.

Detailed Justification for - **3A08 Aviation Safety Knowledge Management Environment (ASKME) – Phase 2**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aviation Safety Knowledge Management Environment (ASKME)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aviation Safety Knowledge Management Environment (ASKME)	$13,473	$17,200	$12,800	-$4,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$2,935.0
2. Application/Solution Requirements	---	2,652.0
3. Application/Solution Design and Development	---	3,781.0
4. Application/Solution testing	---	432.0
5. Electronic File Service	---	3,000.0
Total	Various	$12,800.0

For FY 2013, $12,800,000 is requested to fund the following ASKME requirements:

- Technical Evaluations (DTE/DDS) – Complete Design, Development, Test, and Deployment phases. Deployed to production for use by AIR
- Work Tracking Software-Work Activity Tracking (WTS-WAT) – Complete Design, Development, Test, and Deployment phases. Deployed to production for use by AIR
- Engineering Design Approval (EDA) – Complete Design, Development, Test, and Deployment phases. Deployed to production for use by AIR
- The milestones above complete ASKME Segment 1
- Electronic Filing Service (EFS) – Historical scanning activities - fourth year
- Work Tracking Software Budget Management (WTS-BMgmt) – Finalize Documented detailed System Specification Requirements phase
- Airworthiness Directives Development (ADD) – Finalize Documented detailed System Specification Requirements phase
- Work Tracking Software Budget Management (WTS-BMgmt) – Design, Development, Test, and Deployment phases (follows System Specification Requirements phase)
- Airworthiness Directives Development (ADD) – Design Development, Test, and Deployment phases (follows System Specification Requirements phase)

2. What Is This Program?

The ASKME is a suite of IT tools designed to support and enable the FAA AIR to more efficiently certify new aircraft and modifications to existing aircraft.

The program was established to provide a comprehensive automation environment for critical safety business processes for AVS through deployment of 18 integrated business solutions/projects between FY 2008 and FY 2016. Phase 1 covers FY 2008 - FY 2012, and Phase 2 covers FY 2013 to FY 2017. ASKME, Phase 1, obtained its baseline decision (FY 2008-FY 2012) on June 20, 2007 from the FAA Joint Resources Council.

The environment created by integration of ASKME deliverables will provide for the electronic storage and retrieval of FAA technical documentation and lessons learned from previous certifications that involve aircraft design and manufacturing safety issues so that they can be accessed and shared more easily. This technical data includes the rationale for design and production certification decisions, interpretations of rules and policies, and audits of aircraft industry manufacturers. ASKME will provide tools to improve the ability to identify potential unsafe conditions by analyzing this documentation along with safety information such as Service Difficulty Reports, National Transportation Safety Board safety recommendations and reports, accident reports, and Maintenance Difficulty Reports. ASKME will also provide electronic tools for capturing key safety related data resulting from its standard business activities for rulemaking and policy development, airworthiness directives, design certification, production/ manufacturing certification, airworthiness certification, designee management, evaluation and audit, external inquiries, enforcement, continued operational safety management, and international coordination.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

The ASKME program will leverage an Earned Value Management (EVM) System as the primary mechanism for planning, controlling, and integrating of project scope, schedule, and resources. The ASKME EVM system will deliver schedule and cost performance metrics enabling the program to anticipate, forecast, and communicate performance while ensuring the program performs on schedule and within cost. The EVM system will also measure progress towards milestones in an independently-verifiable basis.

The current and projected/future AIR workload exceeds workforce capability. ASKME business process tools will help AIR to streamline work activity and oversight practices, enabling AIR technical staff to transfer non-safety critical work activities to its pool of designees, resulting in future cost savings by allowing staff growth to be maintained at minimal levels. Further, the work transfer will enable AIR technical staff to focus more on safety identification, risk management, resolution, and improvement activities.

The analytical tools produced by ASKME provide the basis for AVS technical staff to identify and pre-empt potential hazards and events through predictive analysis and subsequent decision-making and corrective action. Corrective actions will then be monitored to assess impacts safety for further refinement of the risk management model.

3. Why Is This Particular Program Necessary?

Within the FAA AVS organization, AIR is responsible for ensuring that civil aircraft are designed and built to operate safely within the NAS.

In carrying out their responsibilities, FAA personnel perform numerous business activities that generate massive amounts of data and information used in making strategic aviation safety decisions. The data is also used throughout AIR to ensure standardized regulatory compliance, workforce education, trend analysis, and program reporting. As the aviation industry has grown in size and complexity, so has the requirement for additional resources to perform AIR services. Additionally, within AIR, new security requirements related to terrorist countermeasures have surfaced as a result of the September 11, 2001, terrorist events.

The ability of AIR to remain responsive to industry growth will be impaired without maximizing the use of automation.

ASKME will provide current and accessible information, designee program effectiveness will be improved, designees better utilized, and AIR designee oversight and evaluation will be enhanced.

ASKME will provide a history of past decisions and reliable substantiation of previous decisions. ASKME will provide a system for electronically storing FAA technical documentation and lessons learned identifying aircraft design and manufacturing safety issues so that they can be found, accessed, and shared more easily. This technical data includes the rationale for design and production certification decisions, interpretations of rules and policies, and audits of aircraft industry manufacturers. ASKME will provide tools to improve the ability to identify potential unsafe conditions by analyzing this documentation along with safety information such as Service Difficulty Reports, NTSB safety recommendations and reports, accident reports, and Maintenance Difficulty Reports. ASKME will also provide electronic tools for capturing key safety related data resulting from its standard business activities for rulemaking and policy development, airworthiness directives, design certification, production/manufacturing certification, airworthiness certification, designee management, evaluation and audit, external inquiries, enforcement, continued operational safety management, and international coordination.

ASKME is a suite of IT tools designed to support and enable the AIR to meet specific FAA goals of Safety, Organizational Excellence, and International Leadership.

ASKME activities are as follows:

- Implement a proactive safety management system. This system is designed to identify and address safety risks and accident precursors throughout the product lifecycle of design, manufacturing, build, operations, and maintenance into the 'safety management process/automated lessons learned feedback' mechanisms. The risk assessment performed on the safety data may be used for risk management analysis, root cause analysis, corrective action, and follow-on work in the areas of standards, certification, maintenance, and operations
- Provide comprehensive, real-time, organization-wide access to current and historic digital and paper-based documentation aimed at supporting effective and timely decision making in standards, certification, and continued operational safety
- Enable real-time collaboration among AIR technical staff, industry, international aviation agencies, applicants, approval holders, and designees to facilitate effective and timely decision making
- Automate the integration of risk management processes into standards development, certification, and continued operational safety
- Provide tools to assist with designee oversight and delegation in certification through the use of automated risk management tools
- Provide tools to enhance resource utilization and performance management and monitoring

When integrated into our safety management approach and practices, these combined capabilities will enhance aviation safety and promote a culture of system safety.

In order to accomplish the objectives, the ASKME suite of tools will provide the following:

- Web-based knowledge management portal designed to store AIR's valuable knowledge assets, making them accessible, facilitating management and workforce decision making, providing a proactive systems safety approach, and improving overall productivity and customer- and citizen-based satisfaction
- Collaboration tools to facilitate real-time communications, decision making, and management between AIR, FAA Designees, and aviation industry applicants as well as AIR's domestic and international partners. This collaboration capability will enhance identification, analysis, management, and resolution of safety issues; certification and production approvals as well as oversight of designees. The tools will also support real-time collaboration between AIR and international civil aviation agencies to facilitate decision making during accident response and regulatory development, allowing for real-time exchange with other countries of accident/incident information and aviation supplier audit information
- Predictive safety data analysis tools designed to support the full range of continued airworthiness analytical activities, including safety data identification/collection, risk assessment, risk management, prescription of corrective action, monitoring, and feedback. The tools will provide the capability to access and analyze accident/incident data to enable recognition of potential safety problems and development of solutions and intervention strategies. The tools will also provide the capability to integrate and analyze compliance, production, operations, oversight, and regulatory data to aid in identifying potential safety risks, develop new regulatory material, and approve design modifications. The tool will also support the application of risk management tools to elements of the safety continuum, where applicable
- Integrated data management and reporting tools to support a standard and integrated data management architecture that can facilitate agency and aviation industry-wide data collection and information sharing

4. How Do You Know The Program Works?

The measurement criteria for expanding accessibility to current and historical safety documents are the number of safety document types readily available to the AVS safety workforce. Currently, the AIR RGL provides access to 14 safety document types (FARs, SFARs, NPRMs, Final Rules, Make/Model Information, Type Certificate datasheets, Special TCs, Airworthiness Directives, Advisory Circulars, Orders and Notices, TSOs, Special Conditions, Exemptions, and Equivalent Levels of Safety). ASKME will increase the number of safety document types electronically available in the AVS Knowledge Management environment.

The measurement criteria for applying risk-based targeting of the AIR safety workforce are the percentages of AIR work to which Risk Based Resource Targeting (WTS-RBRT) is applied to determine planned work. Currently, 57 percent of WTS-RBRT is applied for planning work. ASKME will provide tools and technologies to enable expansion of WTS-RBRT for all ASI and ASE activities. The current ASKME performance baseline funding runs through FY 2012, so parameters reported below in Table 1. ASKME Performance Baseline reflects targets as Reported in OMB Exhibit 300 only through the end of FY 2013.

Table 1: ASKME Performance Baseline as Reported in OMB Exhibit 300

Performance Baseline	
Performance Parameter	**Values (Units)**
Number of AIR business processes integrated into AVS enterprise architecture and ASKME	8 of 25 processes integrated by 2013
Percentage of AIR work to which risk based resource targeting is applied to determine planned work	Increase to 71 percent by 2013
Percentage of e-learning/blended learning assets using FAA metadata tags	Increase to 50 percent of all AIR learning assets by 2013
Percentage of functionality included into the ASKME environment	Increase to 55 percent by 2013

5. Why Do We Want/Need To Fund The Program At The Requested Level?

AIR is gaining the desired benefits of the ASKME program with the successful deployment of the ASKME sub-functions, Electronic Filing System and Project Monitor Safety Related Data- Monitor Safety Analyze Data and the imminent deployment of the WTS-RBRT sub-functions.

ASKME Sub-functions status for FY 2011 and FY 2012:

- Electronic Filing Service - (EFS) – Historical scanning activities - first and second year
- Technical Evaluations (DTE/DDS) – Starts FY 2012, Ends FY 2013- Complete Design, Development, Test, and Deployment phases (follows System Specification Requirements phase
- Work Tracking Software -Work Activity Tracking) (WTS-WAT) Starts FY 2011, Ends FY 2013- Complete Design, Development, Test, and Deployment phases (follows System Specification Requirements phase
- Engineering Design Approval (EDA) – Starts FY 2012, Ends FY 2013 - Complete Design, Development, Test, and Deployment phases (follows System Specification Requirements phase

A reduction in ASKME would impact completing the ASKME programs that are already in-progress and will impair the ability of AIR to remain responsive to industry growth. AIR would be unable to use IT to modernize its business practices and maximize the productivity of its workforce without a comprehensive system with new processes and automation

Detailed Justification for - 3A09 Data Center Optimization

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Data Center Optimization
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Data Center Optimization	$1,952	$1,000	$1,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Data Center Reductions (Including Server Rooms)	4	$1,000.0

The Data Center Consolidation Initiative (DCCI) program addresses FAA business needs to consolidate data centers, implement virtualization technology, and migrate applications to alternative hosting environments, such as public or private clouds. The program manages enterprise-wide requirements development for all data center activities that support administrative and mission support services.

For FY 2013, $1,000,000 is requested for the DCCI program to achieve the following:

- Establish two Tier III magnet data centers into which the FAA will consolidate 162 data center spaces, which currently comprise approximately 58,000 square feet of aggregate data center space and contain approximately 2,700 physical servers and 2,300 virtual servers.
- Establish centralized data center service management
- Deliver state-of-the-art data center services
  - Flexible and adaptable service
  - Available infrastructure in the required amounts
  - Fully meets DOT, FAA, and applicable federal government privacy and security requirements
- Deliver disaster recovery capabilities

The FAA is aligned with the Federal program called the Federal Data Center Consolidation Initiative (FDCCI), which consolidates data centers across the government. The FAA's data center configuration consists of 162 server rooms which do not offer sufficient data center capabilities, are facing capacity constraints, are labor intensive, and managed in a fragmented manner, which results in numerous inefficiencies. The program will determine enterprise-wide requirements for consolidating within two magnet data centers, transitioning to a highly virtualized environment, and for all associated data center activities that support administrative and mission support services.

For FY 2013, $1,000,000 is requested for the DCCI program to achieve the following:

- Complete the FAA Investment Decision Analysis process, which will determine in what order server rooms will be closed based on application-level assessments (e.g., application mapping), identify efficiencies, determine capacity needed, target various server rooms for closure, verify technical requirements and a target architecture for the consolidation, and outline management and support needs for the future. Specific activities include:

FAA Acquisition Management System Milestones -- DCCI Investment Program	Due Dates
IIA (Initial Investment Decision) (Complete in FY13)	
Prepare Initial Implementation Strategy and Planning Document	Oct-12
Enterprise Architecture	Oct-12
IP&A Milestone 2 Review	Nov-12
Initial Business Case Analysis Report + approval	Nov-12
Develop Final Investment Analysis Plan	Dec-12
V&VIA Documents -- Conduct Independent Evaluation Review	Jan-13
Initial Investment Decision	Jan-13
FIA (Final Investment Decision) (Commence in FY13)	
Final Program Requirements	Apr-13
Enterprise Architecture	May-13
Business Case Analysis	Jun-13
Independent Evaluation Review	Aug-13
F&E and OPS budget impact assessment	Aug-13
Finance Senior VP concurrence	Aug-13
ABA finance review	Aug-13
Strategy for Post-Implementation Review	Jul-13
EVM method	Jul-13
Implementation Strategy and Planning Document	Aug-13
OMB Exhibit 300	Sep-13
Acquisition Program Baseline	Aug-13
Production Decision Authority and In-Service Decision authority	Sep-13
SWIM interoperability check	Sep-13

Data Center Reductions and Related Cost Savings: The FAA requires the investment to accomplish large-scale consolidation, as described above. Until then, the agency can only project potential cost savings that result from the large-scale consolidation. The current modeling demonstrates that these savings will be achieved over time after the shutdown begins, particularly of larger (over 500 square feet) data center spaces. The investment of $1 million in 2013 will continue the agency work towards additional data center consolidation and/or closure. During FY13 and FY14 the agency will realize initial savings from small server room closures – the full decommissioning of the space and the infrastructure of these small spaces (on average less than 200 square feet) will serve as a pilot to understand how quickly the agency can realize savings. During FY13 the agency has identified four spaces that will be decommissioned.

2. What is the program?

The Data Center Consolidation Initiative (DCCI) program addresses FAA business needs to consolidate data center infrastructure, implement virtualization technology, and migrate applications to alternative hosting environments, such as public or private clouds. The program manages enterprise-wide requirements development for all data center activities that support administrative and mission support services. The DCCI program will achieve these objectives:

- Reduce the cost to FAA of maintaining data center infrastructure
- Shift IT investments to more efficient cloud computing platforms and technologies

DOT Strategic Goal – Organizational Excellence

- Enhance cyber security and privacy and improve governance of IT resources.

3. Why is this particular program necessary?

In February 2010, OMB launched the Federal Data Center Consolidation Initiative (FDCCI), which seeks to reduce the number of data centers the government owns, operates, and leases. Data center closures will save taxpayers substantial cost by cutting spending on wasteful, underutilized hardware and software as well as enhancing our cyber security; shrinking our energy and real estate footprints; and taking advantage of transformational technologies like cloud computing to make government work better for the nation. As part of the FDCCI, agencies are required to continually inventory their data center assets, create consolidation plans and integrate these plans into fiscal year budget submissions. AIO/AOT is managing this effort in coordination with the Department of Transportation (DOT).

The FAA has 162 data centers/computer rooms throughout its non-NAS organizational environment. This is considered to be excessive. OMB has mandated that the federal government complete aggressive consolidation and obtain at least 800 closures by the end of 2015; the FAA is using the proposed investment to comply with this mandate (expected investment decision in November 2013).

OMB is also requiring agencies to track utilization and demonstrate plans to optimize in place, while large-scale consolidation is under planning. The FAA is pursuing this at the current time and the current DOT plan emphasizes optimizing in place. The DCCI program is necessary in order to meet the federal objectives for data center consolidation and to assist the agency in meeting its efficiency and cost reduction goals. Reducing FAA data center infrastructure costs contributes to those goals.

Per FY 2013 Passback guidance, in FY 2013 the FAA will expand its data center consolidation efforts to determine the feasibility of integrating the NAS and non-NAS projects. However, the NAS effort to implement its own facilities consolidation investment program for NextGen, and as that infrastructure supports a completely separate function, it is highly unlikely these two efforts will be integrated.

4. How Do You Know The Program Works?

The DCCI program will continue to measure success against the performance objectives cited above. Through this investment funding for FY13, the DCCI program will use engineering contract support to maintain the DCCI inventory of data center infrastructure and manage reporting to OMB on the mandatory data center consolidation. The program will implement a standard model for measuring total cost of ownership of data center infrastructure. The funding so far in FY 2011 has allowed DCCI to complete two mandated requirements and to complete several other key planning activities including:

- Final data center asset inventory baseline and the final data center consolidation plan with reduction schedules completed and delivered.
- Stage 0 and Stage 1 Application Mapping Pilot completed and delivered. (This was a manual application mapping pilot to assess the feasibility of a manual, versus automated, approach.) On March 31, the FAA CIO Council concurred with DCCI doing a second pilot. The second pilot concluded 9/30/2011.
- On March 4, 2011 the DCCI issued a DCCI Decision-making Tool to identify by priority what spaces within each LOB/SO can be consolidated. The data produced by this tool was delivered to all LOBs/SOs and to the FAA Steering Committee for discussions throughout May in order to reach consensus by May 31st.
- During the remainder of FY 2011, the project developed an inventory of major systems in coordination with the LOBs/SOs. The program consulted all available inventory information from other parts of the agency. DCCI delivered a data center consolidation strategy to the agency on 9/30/2011, which requires verification through the investment analysis process.
- Another FAA business plan target that has received support as a result of the DCCI program includes server count reductions on the non-NAS Wide Area Network. To date 253 servers have been consolidated for a savings of $3,300,000, which includes $574,700 of FY 2010 carryover savings. These two programs provide support for each other. The savings continue to grow over time as consolidations are achieved.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

We will need additional funding to complete investment analysis. The analysis requires contract support for engineering services. Engineering services will provide requirements analysis, application mapping activities, server virtualization, decommissioning underutilized hardware and software assets, and consolidating smaller data centers into Enterprise Data Centers (EDCs). This is in preparation for full consolidation within two magnets, as identified by the investment decision.

As stated earlier, the need to fund this program at or above the requested level is substantial if the agency is to meet stated targets for reducing data center infrastructure. The FAA cannot determine full investment requirements or project when, where, and what should be closed without the capital investment of $1M.

The funds will be used for continued engineering, inventory, and consolidation strategy support. A full, long-term investment decision with associated costs is expected in November 2013.

Detailed Justification for - 3A10 Aerospace Medical Equipment Needs (AMEN) Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aerospace Medical Equipment Needs (AMEN)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aerospace Medical Equipment Needs (AMEN)	$0	$10,000	$3,000	-$7,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Hardware	40	$1,000.0

For FY 2013, $3,000,000 is requested to continue the technology refresh to replace Aerospace Medical Research Division's laboratory assets at the Civil Aerospace Medical Institute (CAMI).

The AMEN technology refresh program will replace and/or update 40 equipment items, with Commercial-Off-The-Shelf (COTS) products in FY 2013. The types of equipment are summarized as follows:

- Biochemical Sample Analyses Systems – e.g., chromatographs, spectrometers, molecular biology instruments, and sequencing systems
- Biochemical Sample Preparation and Physiological Monitoring Systems – e.g., centrifuges, plates, tonometers, oxymeters, extraction, and balances
- Storage, Cleaning, Machining, and Laboratory Safety Systems – e.g., refrigerators, freezers, fume hoods, filing cabinets, locker, washer, dryer, and drills
- Scientific and Engineering Research Systems – e.g., data acquisition system for the horizontal accelerator/sled, data mining statistical tool, and aeromedical research results databases
- Mechanical and Monitoring Systems – e.g., environmental monitoring, light system electronic control, anthropometric dummies, calibration systems, and transducers

2. What Is This Program?

CAMI is the medical certification, education, research, and occupational medicine wing of the Office of Aerospace Medicine (AAM) under the auspices of the Federal Aviation Administration's (FAA's) Office of Aviation Safety (AVS).

CAMI's Aerospace Medical Research Division (AAM-600) personnel work in complex research laboratories and testing facilities with scientific, engineering, and medical systems. These assets are used to improve the security, safety, health, and performance of the principal components of the National Airspace System (NAS): the human operator and the flying public which s/he serves. To accomplish their mission, AAM-600 scientists, physicians, and engineers utilize highly technical and specialized equipment. However, much of this equipment is too old and becoming obsolete. The AMEN technology refresh program is designed to replace this aging equipment to avoid potential work stoppage and quality control failures. The equipment requested by the AMEN technology refresh program supports two critical FAA research areas: (1) Bioaeronautical Sciences and (2) Protection and Survival.

- Bioaeronautical Sciences personnel perform research activities regarding pilot certification and performance, aircrew health, atmospheric and radiation risk data, and other factors important to aerospace safety. For example, the forensic toxicology laboratory serves as the primary national site for toxicology-testing for federal agencies, including the FAA and the National Transportation Safety Board (NTSB). Accident and fatality research and testing are routinely conducted on a wide variety of biological specimens. This laboratory also performs toxicological testing and research on biological materials obtained from living subjects involved in significant transportation related accidents, such as major railway, maritime, pipeline, or highway events. In support of this research, databases of medical and accident data are maintained. There are five laboratories that perform bioaeronautical sciences research in support of the CAMI mission: forensic toxicology, biochemistry, functional genomics, radiobiology, and bioinformatics.

- Protection and Survival research personnel provide state-of-the-art information, procedures, and equipment evaluations relative to aircraft accident investigation, survivability, health, and security of passengers and crewmembers during normal operations and emergency events such as in-flight fires, decompression, emergency evacuations, and crash landings on land or water. There are five laboratories that support these efforts: cabin safety, biodynamics, environmental physiology, medical, and vision. Additionally, Protection and Survival personnel, in the form of the Autopsy Program Team, acquire autopsies for all fatal aviation accidents in the U.S. and maintain a database of this information. Specialized facilities within the AAM-630 laboratories include a hypobaric test chamber, protective breathing equipment and water survival test facilities, a dynamic impact test facility, and aircraft evacuation/cabin environment test facilities.

The beneficiaries of the research resulting from the use of the equipment sought by AMEN include: the General Public, Aeromedical Scientific and Engineering Communities, Aeromedical Education/Training Communities, Aeromedical Certification, including FAA AAM Regional Flight Surgeons and Aviation Medical Examiners (AMEs), Aircraft Accident Prevention and Investigation, Aircraft Certification, Flight Standards, Legal Counsel, Space Transportation, Quality Management, Aviation Operations Personnel and their organizations, Aircraft manufacturers, and Industry/Government Accreditation/Standards development organizations.

The AMEN program also supports the President's commitment to driving towards sustainable growth and quality jobs through his "Strategy for American Innovation" Specifically, the conduct of critical research across all modes of transportation, support of data-driven decision making; building a leading physical infrastructure; support of advanced vehicle technologies; and educating the next generation with 21st century knowledge and skills to foster a world-class workforce for the transportation sector (http://www.whitehouse.gov/sites/default/files/uploads/InnovationStrategy.pdf).

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

The current aeromedical laboratory equipment does not reflect the capabilities offered by advanced technology and procedures currently available in the market. Modern laboratory analysis and associated methodologies cannot be implemented using outdated equipment. CAMI's Aerospace Medical Research Division has numerous relationships with government agencies, military, academia, industry, and professional organizations in the U.S and abroad. AAM-600 counts with 52 personnel who are members of approximately 90 professional organizations and 55 committees. Thus, CAMI's organizational excellence and international leadership is dependent on its ability to remain at the forefront of advance technology. While the use of outdated equipment does not currently impede routine or safety of flight research, the "lack of access" to modern technological developments in the field impacts CAMI's credibility and its ability to advance aerospace medicine concepts in civil aviation operations to remain the world's leader in addressing human protection in-flight and therefore aviation safety.

The aging and obsolete laboratory research equipment is no longer supportable and jeopardizes mission accomplishment. Not only is this equipment outdated from a technology standpoint, but is also becoming more difficult to maintain at a level that is sufficient to serve CAMI's needs. The majority of the equipment sought is highly sophisticated and protected by proprietary data; third party vendor options are usually not available or their service may nullify warranty agreements. Vendors for some of the current laboratory equipment have notified CAMI that further support of critical systems cannot be guaranteed and in some cases both hardware support and the associated software is no longer available. Because of the equipment age in many of the laboratories, CAMI is only one failure away from work stoppage or not being able to perform its mission at an optimum level. In addition, parts' obsolescence will increasingly cause higher costs for replacement parts when they can be found or fabricated. Failure to replace the subject equipment places numerous laboratory accreditations, certifications, standards, programs, and procedures at risk. Suitable state-of-the-art replacement laboratory equipment will provide a significant and urgently required benefit in support of the DOT/FAA strategic goals. State-of-the-art laboratory equipment is essential to CAMI's responsibilities to the FAA and the public at large. This equipment is used in support of aeromedical certification decision making processes, education program development, accident investigation and prevention, and enhancement of occupational medicine standards.

CAMI's unique and critical human resources, their research capabilities, and their professional competencies are being negatively impacted by the use of outdated equipment and associated procedures. Further, FAA and NTSB responsibilities in transportation accident investigations supported by the CAMI laboratories demand high quality control and assurance programs – these programs would be facilitated by modern equipment. The personnel who support the CAMI aeromedical research laboratories encompass over 400 years of knowledge, skills, and experience. These personnel include scientists, physicians, engineers, technical, and administrative staff. They are the face of the FAA at numerous professional organizations, and present their results at scientific and engineering forums – the nature of their expertise and the ultimate result of their efforts (human safety), demand modern technology to support their research activities. A technology refresh would ensure CAMI products and services remain at the forefront of scientific and engineering practices and facilitate the recruitment of top professionals.

4. How Do You Know The Program Works?

AMEN Program Metrics: In terms of the performance of the AMEN program itself; the replacement of aeromedical laboratory equipment, the projected acquisition schedule and equipment cost will be monitored on a continuous basis so as to ensure it remains within the planned budget and schedule through the completion of the effort and in accordance to the AMEN Acquisition Program Baseline (APB).

Products and Services Metrics: The performance of research activities leading to the aerospace medical research products and services that the AMEN equipment will support will be monitored in accordance with established AVS Quality Management System (QMS) procedures as follows: AAM-600 performs a variety of research studies. As requests for aerospace medical research are received, defined, approved, and scheduled, they are allocated to either the Bioaeronautical Sciences or the Protection and Survival research laboratories. All aeromedical research projects are subject to AVS approved procedures and are described in AAM QMS documents No. AAM-600-001 (Research Knowledge Process) and No. AAM-600-002 (Involvement in Scientific Workgroups). There are numerous other QMS procedures with which AAM-600 complies, including those addressing training, publication of research findings, protection of research volunteer subjects as monitored by the FAA's Institutional Review Board (IRB), and maintenance/calibration of laboratory equipment. These procedures are available at https://intranet.faa.gov/faaemployees/org/linebusiness/avs/qms/qms_homepages/aam/qms_divisions and are audited at least once a year by each, internal AVS auditors and auditors external to the DOT. These auditors assess AAM-600's compliance with the International Organization for Standardization (ISO) standard No. ISO 9001:2008. These assessments include the evaluation of the research process performance, the resulting products and services, and the stakeholders' satisfaction with the same. Nine metrics summarizing this assessment are tracked and reported to AVS and AAM management on a quarterly basis.

Research Study Metrics: All of the AAM-600 research is conducted in accordance with the functional flow block diagram presented in AAM-600-001. This functional flow diagram represents the activities that AAM-600 personnel must perform to accomplish CAMI's mission. The equipment sought by the AMEN program would support step 5.5.2 of the diagram: the collection of research data and its subsequent analysis. The approach to the collection and analysis of research data, i.e., the decomposition of step 5.5.2 in into subroutine steps is driven by scientific research protocols unique to each study's experimental design and in accordance with:

- the standard practices of the disciplines involved in the study (e.g., chemistry vs. mathematics vs. mechanical engineering)
- the environment and operations being addressed (e.g., general aviation/commercial operations, acrobatics, and/or altitude exposure)
- the population under study (e.g., pilots, human volunteer research subjects from the general public, or flight attendants)
- the nature of the samples being collected (e.g., biological samples, chemical volumes, and/or physiologic parameters)
- the measures of interest, the laboratory procedures used to measure or derive such data, the methods to analyze it, etc

Thus, this information and associated performance metrics vary with each study, prepared by the scientist or engineer assigned to that study, and presented in detail in a Research Protocol/Test Plan for approval by various authorities prior to its execution.

Equipment Performance Metrics. In terms of monitoring the performance of the equipment itself, this approach will vary with the nature of the research study. Based on an approved research protocol/test plan, the equipment sought by the AMEN program would serve a variety of functions to meet the goals of the study. For example, a refrigerator may be used to store reagents used in chemical analyses; another refrigerator may be used to store biological samples from aircraft fatalities, a centrifuge may be used to prepare blood samples, a sled may be used to develop an aircraft seat certification's parameters, a statistical software program may be used to compute the incidence of accidents involving a particular medical condition, a fume hood may be used to safely prepare chemical mixtures, or the evacuation test bed may be used to assess the time it takes for a human to exit and aircraft during emergency situations or to train flight attendants on the best way to communicate and demonstrate safety procedures. Numerous procedures, including compliance with calibration standards are routine measures to assess the performance of AAM-600 laboratory assets.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The age of the current equipment continues to advance; it jeopardizes mission accomplishment, places several accreditations at risk, and does not allow the FAA to keep up with science and technology advances currently available in the market.

The AMEN investment will allow for the continued performance of aerospace medical research. This research serves as the knowledge base for Physicians, Physiologists, Human Factors Experts, Engineers, Psychologists, Educators, Flight Attendants, Aircrew, and numerous other academia, industry, and government personnel in the U.S. and abroad who are concerned with the safety of humans in aerospace operations.

Primary consideration was given to the cost of replacement, age of the current equipment, and its criticality in terms of CAMI's mission and certification standards. Other variables considered were the functionality/type of equipment, status of the corresponding technology today, expected technology advances, vendor information regarding the support of the equipment, and the field of study addressed by the equipment. A minimum of $12,000,000 in FY 2012 was necessary to address the most critical items to be replaced. A total of $3,000,000 is required for FY 2013 to continue this technology refresh effort.

A reduction in FY 2013 would result in the re-prioritization of the AMEN acquisition plan in terms of the variables presented above. For example, the acquisition of selected equipment would be deferred to the subsequent year of the baseline period of the AMEN program (FY 2014) or future technology refresh efforts.

Detailed Justification for the – 3A11 Aviation Safety Information Analysis and Sharing (ASIAS)

What Do I Need To Know Before Reading This Justification?

For FY 2009 through FY 2012, ASIAS was part of and received funding from the Systems Safety Management Transformation (SSMT) program (1A08G). For both FY 2011 and FY 2012, $7.85 million was included in SSMT for ASIAS. There are no funds included in SSMT for FY 2013.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aviation Safety Information Analysis and Sharing (ASIAS)

($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aviation Safety Information Analysis and Sharing (ASIAS)	$0	$0	$15,000	+$15,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$750.0
2. Integration of GA Digital Flight Data into ASIAS	---	500.0
3. Acquisition/Mgmt of Data/ASIAS Architecture Enhancement	---	7,800.0
4. Advancement of ASIAS Analytical Capabilities	---	5,200.0
5. Visualization Capabilities for ASIAS Analytical Methods	---	750.0
Total	Various	$15,000.0

For FY 2013, $15,000,000 is requested for the following:

- Developing ASIAS capabilities to include enhancements that build upon and extend existing capabilities for managing and processing aviation performance data. As new data sources become available, technical requirements will be developed and added to the existing ASIAS Data Management Plan and they will be integrated into ASIAS and fused with others. For FY 2013, the activities include:
  - Expanding ASIAS to include National Airspace System Facility Performance Data as part of the query system, allowing ATO users to merge their operational data with the rest of data available through the ASIAS portal
  - Expanding ASIAS to include General Aviation (GA) digital flight data
- Developing tools that convert both textural and numeric data into information, and creating visualization capabilities that aid causal/contributing factor analyses and risk assessment. For FY 2013, the activities include:
  - Initiating the capability to query multiple operational and safety databases from a single entry point and using a single query

2. What Is This Program?

The ASIAS program is an information safety analysis and data sharing collaboration involving industry and government to proactively analyze broad and extensive data to advance aviation safety. The primary objective of ASIAS is to provide a national resource for use in discovering common, systemic safety problems that span multiple airlines, fleets and regions of the global air transportation system. ASIAS leverages internal FAA datasets, airline proprietary safety data, publicly available data, manufacturers' data and other data. ASIAS fuses these data sources in order to identify safety trends in the National Airspace System (NAS), leading to a comprehensive and proactive approach to aviation safety in conjunction with implementation of NextGen capacity and efficiency capabilities. This program enables NextGen by reducing the fatalities rate commensurate with the increases in capacity. By FY 2015, this program element will provide system knowledge to enable early identification of event precursors allowing intervention strategies to avoid accidents and incidents and to mitigate potential operational safety impacts of NextGen system alternatives.

The ASIAS program directly supports the Safety Strategic Goal of the DOT Strategic Plan FY 2010 – FY 2015, in particular:

- Outcome 1 - Reduction in transportation-related fatalities
- Outcome 2 - Reduction in transportation-related injuries

ASIAS focuses on the DOT's aviation safety strategy of working with domestic stakeholders, including carriers, to stimulate cooperation for the open reporting of safety concerns.

DOT Strategic Goal - Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

This research includes expanding information sharing and data analysis to identify and mitigate risks before they lead to accidents. New automated processes are required to facilitate advanced analysis of comprehensive data which will unlock new insight about potential safety risks in both the current NAS and as the NAS evolves to NextGen. ASIAS is developing the only industry-wide integrated analytical, forecasting, and decision support capabilities to address NextGen evolutionary procedures. Analyses, using these advanced safety analytical capabilities, can be performed that would not be available to individual stakeholders performing similar analysis. Safety information discovered through ASIAS analytic activities will be used across the FAA and industry to drive improvements and support Safety Management Systems (SMS). ASIAS supports both the safety risk management and safety assurance functions of SMS by providing the data, technology and actionable results to enable the FAA and ASIAS users to optimize SMS safety risk management performance. Safety insights from ASIAS analysis will be communicated to the ASIAS users. Stakeholders will leverage insight to identify risk-reducing alternatives or changes to operations or processes. Implemented changes will prevent would-be accidents.

The ASIAS approaches will be instrumental in detecting the impacts of system performance anomalies around the NAS. Without the ASIAS program, manual processes would be required for detection of safety-significant events. Many of these events would grow in severity before they are detected, since some of the data that ASIAS collects cannot be manually processed, such as Flight Operational Quality Data (FOQA) and surveillance data from radars, and therefore precursors would go undetected. Integration of the impacts of NextGen changes on safety likewise would not be facilitated using current methodology within FAA.

4. How Do You Know The Program Works?

During the early development, ASIAS has discovered potential safety issues in the NAS that should be addressed in the near-term through procedural and airspace design. These issues have been provided to the NextGen program office to assist in prioritization of NextGen systems to mitigate risk. Coordination efforts have ensured that throughout the NextGen evolution planning process ASIAS results can be integrated into the airspace and design process and inform design tools. Below are examples of such successes that have and will continue to improve the overall operations within the NAS.

- Results of analyses of TCAS and TAWS events were transmitted to the Commercial Aviation Safety Team (CAST) for the development of safety mitigations
- CAST developed and approved two safety enhancements for TCAS and four safety enhancements for TAWS, designed to mitigate safety issues identified

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$15,000,000 is required to continue work in ASIAS in FY 2013. As ASIAS expands in terms of participants, data sources, and analytical capabilities, the ability to conduct meaningful and complex analyses must advance. The supporting elements for achieving the ASIAS vision of identifying and mitigating safety risks include:

- Integration of new analysis capabilities developed under the R,E&D program, such as data fusion, data mining, and vulnerability discovery methodologies, into the next generation of ASIAS architecture and demonstrating the capabilities offered from the new architecture. The development of analytical capabilities supporting ASIAS analyses will require close coordination with existing vendors for eventual technology transfer to those vendors, and to the extent needed, integration of vendor capabilities into the ASIAS prototype.
- Development of data standardization and integration capabilities for new aviation communities, such as helicopter, general aviation, corporate aviation and military to enable the support of national-level analysis. Anomaly and risk detection approaches that work well for commercial jet aircraft may not apply for the other types of aircraft in these communities.
- Development of in-depth and comprehensive perspectives of operational risks that exist and that could be introduced through changes in air traffic management procedures, airspace design changes (i.e., sectors and routes), area navigation (RNAV) procedures, airport use, avionics, and fleet mixes.

Analyses, using advanced safety analytical capabilities, can be performed that would not be available to individual stakeholders performing similar analysis. These advanced safety capabilities will support analysis of comprehensive data which will provide new insights about potential safety risks in both the current NAS and as the NAS evolves to NextGen. With a reduction in funding, achievement of these targets and solving these issues by 2025 will be delayed.

Detailed Justification for - 3A12 National Test Equipment Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – National Test Equipment Program (NTEP)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 Present's Request	Difference from FY 2012 Enacted
National Test Equipment Program	$0	$0	$2,000	+$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Hardware and Software Engineering Program Support	---	$100.0
2. Corrective Maintenance	---	1,200.0
3. Program Planning and Control	---	500.0
4. Investment Analysis	---	200.0
Total	Various	$2,000.0

For FY 2013, $2,000,000 is requested to replacement of obsolete test equipment. The funding provided will be used for engineering support required to evaluate new products, to procure replacement test equipment used to accomplish corrective maintenance/installation, contractor support to administer the program, and disposing of old test equipment.

2. What Is This Program?

The National Test Equipment Program (NTEP) supports the replacement of obsolete and non-functional test equipment used in maintaining NAS systems. NTEP ensures that the FAA National Airspace System (NAS) is operating properly by providing functioning test equipment used to troubleshoot, repair, and certifying new and legacy systems. These systems include: Communication, Automation, Surveillance, Power, Navigational, and Weather systems. The NTEP supports approximately 65,000 test equipment items used at over 41,000 sites.

DOT Strategic Goals – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

This program is necessary to ensure NAS Systems have the required support test equipment used by Airway Transportation Systems Specialists. Test Equipment is used to validate manufacturers operating parameters are within tolerance. The FAA, through this program, is responsible for the calibration, maintenance, and management of test equipment under its authority as stated within FAA Order 6200.4G, National Test Equipment Program Management.

4. How Do You Know The Program Works?

Over the past three years, we have been replacing test equipment on a smaller scale as critical needs have been identified. We have the expertise to procure necessary test equipment, when adequate funds are available. However, there is a varying demand for the levels of test equipment, due to the fact that the program works from feedback received by our customer, Airway Transportation Systems Specialists. On a National scale, based upon data received from our repair shops in Oklahoma City, 50 percent of test equipment that failed calibration could not be repaired or cannibalized, thus requiring full replacement of item.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The level of required funding will allow the FAA to replace obsolete test equipment and continue to meet our primary mission of providing reliable and certified systems for Air Traffic operations. This will ensure NAS systems are maintained while FAA continues to modernize; which will allow for greater efficiency and improved safety. The required funding levels will allow NTEP to maintain a viable inventory of test equipment to support Air Traffic operations and offset the number of unrepairable test equipment items.

Detailed Justification for the – 3A13 Mobile Assets Management Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Mobile Asset Management Program
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Mobile Assets Management Program	$0	$0	$1,700	+$1,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Planning, Authprization, Management and Control of Existing Assets	---	$1,600.0
2. Decommissioning	---	100.0
Total	Various	$1700.0

For FY 2013, $1,700,000 is requested to ensure that a sufficient number for the FAA's mobile assets are available to maintain/restore continuity of aviation operations, such as:

- Meet emergency or special event requirements
- Temporarily replace facilities destroyed by natural or manmade disasters
- Support scheduled maintenance and modernization programs

2. What Is This Program?

The Mobile Asset Management Program (MAMP) was established in response to a visible inability to support the continuity of NAS operations in the event of natural or manmade disasters. The MAMP provides NAS operations continuality/restoral and risk mitigation at FAA operational facilities, such as air traffic control towers (ATCT), terminal radar control facilities (TRACON), remote transmitter/receiver (RTR) sites, remote communications air/ground (RCAG) sites, and other sites that experience unexpected or planned system outages. The program fills a current void in the lifecycle support of mobile systems that are/have been developed or acquired to provide emergency support to ensure continuity of NAS operations at operational facilities. The lifecycle support will consist of equipment repairs and needed upgrades to ensure conformance to FAA operational standards. Additionally, mobile assets provide temporary facilities to support air traffic operations when a fixed facility must be taken down during modernization projects and major equipment outages.

DOT Strategic Goals – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The FAA has established the Mobile Asset Management Program (MAMP) because there is no centralized national program to manage critical mobile assets. As a result, the FAA's mobile assets, specifically the Mobile Air Traffic Control Towers have deteriorated to the point where many are not operational due to lack of consistent preventative, pre-deployment, or post deployment maintenance resulting from a lack of funding and management oversight. The procedures that are currently followed for lifecycle support and management are not standardized across the NAS, leading to varying degrees of readiness and availability between the three Service Areas. Resources for a national program office need to be identified and conscientiously put into place. This funding will help to ensure that mobile assets will be available and ready to meet emergency or special events requirements when they occur.

4. How Do You Know The Program Works?

The Mobile Asset Management Program (MAMP) will be determined to work when the FAA is able to respond to NAS outages on short notice and is able to restore continuity of operations within hours of arriving on-site. The program will be working when it is able to ensure the availability of mobile assets to maintain or re-establish continuity of air traffic operations in response to emergencies and natural disasters. The FAA's mobile assets have been deployed to support relief efforts during natural disasters like the recent earthquake in Haiti or the hurricanes that hit the Gulf coast each year. These assets have played a significant role during disasters such as the recovery efforts following the space shuttle Columbia tragedy and forest fires on the west coast.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

For FY 2013, $1,700,000 is required to ensure that a sufficient number for the FAA's mobile assets are available to maintain/restore continuity of aviation operations, such as:

- Under FAA Order 6000.15, the agency is required to procure and maintain mobile assets that are capable of providing and supporting tactical ATC services that include communication, navigation, surveillance, infrastructure support (e.g., Engine Generators), and mission support (e.g., Command Centers)
- Meet emergency or special event requirements
- Temporarily replace facilities destroyed by natural or manmade disasters

Detailed Justification for - 3A14 Aerospace Medicine Safety Information System (AMSIS) Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aerospace Medicine Safety Information System (AMSIS) Program
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aerospace Medicine Safety Information System (AMSIS)	$0	$0	$3,000	+$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aerospace Medicine Safety Information System	---	$3,000.0

For Fy 2013, $3,000,000 is requersted to begin Phase I Technical Upgrade of the AAM databases. Requirements will be established, technology researched and alternatives developed to establish the most effective and expeditious methods to procure and install current technology into, in some cases, antiquated database systems currently being used by AAM. Innovative ideas will be researched, cloud technology will be investigated, and shared resources with other government agencies will be explored, and, if possible implemented as tools to support AAM Safety Management System implementation.

2. What Is This Program?

The Office of Aerospace Medicine (AAM) is responsible for: the medical certification of airmen; the medical clearance of air traffic control specialists; oversight of aviation industry drug and alcohol testing programs; designation, training and oversight of aviation medical examiners; FAA employee substance abuse testing; airmen aviation physiology and survival training and education; the FAA Employee Health Awareness Program; and aerospace medicine and human factors research. These programs are carried out by AAM at FAA Headquarters, the Civil Aerospace Medical Institute, in the regional Aerospace Medicine divisions and at the three Industry Drug Abatement Compliance and Enforcement Centers. All of these regulatory programs that support aviation safety, employee health programs, and research programs are information driven.

AAM has designed, developed and implemented information systems to efficiently process and manage safety, health and research information. However, to ensure that these systems are maintained and kept up-to-date and/or replaced as necessary, lifecycle funding (F&E and OPS) is needed. Over the past 20 years AAM received F&E funding to support information systems development and procurement through the Aviation Safety Analysis System (ASAS) Capital Improvement Plan (CIP) line item. The last year of F&E funding received from ASAS was 2008. The information systems developed under ASAS are effective, mature systems, but the technology and architecture of these systems will, over time, no longer be supportable and will become obsolete.

AAM requires future systems life-cycle funding to re-engineer AAM safety program business processes; design and develop new information systems architecture; and to design, procure and deploy next generation information systems. To support existing systems, technology, and develop replacement systems in the future, AAM proposes to establish the Aerospace Medicine Safety Information System (AMSIS) Program.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

Due to the following identified performance gaps and mission shortfalls, this technical refresh of the medical systems has become necessary for the continued support of the regulatory programs that support aviation safety, employee health programs, and research programs:

- Data and Information Accessibility/Knowledge Management: Lack of ability to easily access all information sources for current and historical safety-related data and workforce knowledge
- Collaboration between AVS, Designees, and Applicants: Geographically dispersed personnel, designees, and applicants unable to work effectively together based on standard business processes
- Collaboration with International Aviation Community: No capability to interact with peers in the international community in real-time
- Data Analysis: Lack of automated analysis tools to manipulate data; identify trends, and problem areas
- Information Quality and Standards: Lack of record/audit tracking as required by medical or security record keeping demands
- Strategic Resource Optimization: Limited, inconsistent, cumbersome, and time consuming methods to track and allocate resources
- Technical Knowledge Transfer: Vast amount of information only available on paper or in local computer systems

The AMSIS program will address the following Mission Shortfalls within the current AAM subsystems:

- <u>Electronic Medical Records:</u> The Federal Government and private medical entities are moving towards electronic medical records. The AAM Subsystems are not architecturally equipped to be part of this network.
- <u>Technical Refresh:</u> The majority of the AAM Medical Subsystems are mature systems that are not in complete concurrence with FAA, Department of Transportation (DOT), and the Federal Government architecture standards.
- <u>Business Process Re-engineering</u>: The processes used within AAM are mature. An independent assessment of AAMs Business Processes is needed to redesign the way things are done to better support the organization's mission and reduce costs. This will include:
  - Discovering methods that simplify current processes and eliminate wasted efforts;
  - Incorporating both technical and medical industry standards;
  - Cutting operation costs;
  - Improving customer service.
- <u>Outdated Pathology Coding Methodology:</u> AAM is using a non-standard pathology coding methodology. To be consistent with the rest of the international medical community, AAM needs to update its current pathology coding method to match the International Statistical Classification of Diseases and Related Health Problems (ICD) standard.

4. How Do You Know The Program Works?

This is a technical refresh to a system that is already in place and providing a valuable service through the Office of Aerospace Medicine (AAM). This organization is responsible for the medical certification of airmen and the medical clearance of Air Traffic Control Specialists (ATCS). AAM maintains records on over 400,000 current medical certifications and millions of past medical examinations as part of AAM's role in the oversight of three quarters of a million airmen and nearly 50,000 ATCS. In order to maintain the automated systems to support these operations, funding beginning in FY 2013 funding is essential. We must meet federal requirements of the Department of Health and Human Services to establish a capability to match airman medical records with the electronic health records of other government departments. We must also interface with more than 5,000 Aviation Medical Examiners who perform pilot and air traffic controller medical examinations. AAM subsystems are not architecturally equipped to be part of this network and would be unable to interface with the national Electronic Medical Records System. AAM currently has a client server relational database, which is an obsolete way to conduct business. We plan to convert to the Aerospace Medical Certification Subsystem (AMCS), which collects and transmits medical data for the medical certification process, to a web-based system. This is essential in order to comply with industry standards and to meet OMB standards for security and reliability.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The Technical Refresh of a number of AAM databases will be completed in a modular fashion. Only a select number of modifications will be considered, approved, installed, and tested in FY 2013 as Phase I. Future phases will be planned for FY 2014 and beyond.

The technology will be chosen from the best available sources that provide the most appropriate current solutions to the technical upgrade requirements.

Detailed Justification for: 3B01 Aeronautical Center Infrastructure Modernization

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aeronautical Center Infrastructure Modernization
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aeronautical Center Infrastructure Modernization	$14,970	$16,500	$12,500	-$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. System Training Bldg Renovation Construction	1	$7,300.0
2. Replacement of ajor Building Systems	---	2,000.0
3. Telecommunications Upgrades	---	3,200.0
Total	Various	$12,500.0

For FY 2013, $12,500,000 is requested for the following:

- $7,300,000 for the final phase of Systems Training Building renovation construction. Funding will provide for relocating NAS training systems, replacing building walls, ceilings, lighting and electrical systems, boilers/chillers, plumbing and insulation, installing fire systems and proper egress.
- $2,000,000 to replace major building systems within leased and owned buildings that includes heating, ventilation, air conditioning, electrical, plumbing, replacement of finishes due to installations, asbestos abatement/removal, utilities infrastructure (water, gas, sewer, high voltage, storm water), roofing, stairs, fire protection, elevators, roadways, parking lots, sidewalks, and paved surfaces to address a backlog of deferred requirements.
- $3,200,000 to upgrade the telecommunications infrastructure. Funding will support technical refresh of the Cisco network for redundancy, reliability, security and availability in Buildings 13, 15, 9, 189, 190, 191, 192, 193, 226, 230, 232, 256, 257, 264 (24 of 61 buildings). Router backplanes will be replaced to support increased bandwidth required by FAA data centers and personnel, single mode fiber for increased redundancy of core routers on the network, and hardware/software upgrades to support newer model telephones. The old telephone system has reached the end of service life and is no longer supported by the manufacturer.

2. What Is This Program?

The Aeronautical Center is the FAA's centralized location that supports FAA National Airspace Systems (NAS) Air Operations/flight checks, engineering, system testing, training (Radar/Navaids), NAS logistics, aeromedical and transportation safety research, and Business Services. The Center is comprised of 1,100 acres of leased land and has approximately three million square feet of space under roof, that supports the work of 7,300 FAA employees, students, and contractors on a daily basis; and approximately 11,000 visitors annually; the largest concentration of FAA personnel outside of Washington D.C.

The Aeronautical Center Infrastructure Modernization program funds renovation and replacement of major building systems for leased and FAA-owned buildings at the Center that are not provided for by other funding sources or lease agreement; to assure they remain usable for NextGen and the next generation of

FAA personnel. Many buildings are approximately 50 years old and in need of renovation and building system replacement.

DOT Strategic Goal - Organization Excellence

- Diverse and Collaborative DOT workforce.

Anticipated FY 2013 Accomplishments:

- Replace exterior metal panels on the Thos. Stafford Building, a 222,000 sq ft, 20 year old building whose panels are separating from the building and fail to provide a weather-tight seal to the building. Water is leaking into basement Air Traffic Control training laboratories and some classes have been cancelled due to water on console scopes
- Renovation construction of the Systems Training Building, where ATO Technical Operations training is conducted, will be in progress an 117,000 square feet, 43 year old building renovation that requires replacing building systems that have exceeded their service life. The project will include installation of new boilers, chillers, air handlers, electrical, plumbing, fire alarms, and other building systems
- Transition the 22 year old telephone system to the FAA Administrative Voice Enterprise Services (FAVES) telephone system. The current system hardware/software is at the end of its service life and the manufacturer has discontinued supporting the product
- Upgrade telecommunication network, phase 2 of 5, to design, test, and reconfigure the network for redundancy, reliability, and security in 14 buildings that includes security assessment/upgrade, and disaster recovery testing. Fiber also to be installed on the east campus for redundancy on network routers

3. Why Is This Particular Program Necessary?

This program extends the service life of Aeronautical Center buildings through renovation and major building system replacement where FAA missions are performed: Eighty percent of the space at the Center directly supports the ATO. Thirteen percent of Center space supports DOT and FAA Business Services and includes DELPHI/Prism, Castle Data Center Operations, Accounting Operations, Acquisition, the ATO Data Center, and Aviation Safety/Research.

Some NAS support functions are conducted in outdated structures and in buildings that do not meet current building codes. Delays to renovation and replacement of building systems have consequences that include leaking roofs, deteriorating plumbing, malfunctioning heating, ventilation, air conditioning, and non-compliance with life safety codes that can disrupt work, cause NAS automation and technology failures, risk occupant health and safety, require emergency repairs, and loss of productivity.

The aging infrastructure, in combination with growth and improvements to the NAS and business services, affects Aeronautical Center personnel and facility requirements in which they work. This program extends the useful life of facilities at the Center for current and future generations.

4. How Do You Know The Program Works?

Renovating aging facilities at the Aeronautical Center allows space efficiencies for additional functionality, personnel, and systems. Center facilities are cost effective and lower in cost than comparable GSA metropolitan Oklahoma City leased facilities, FAA Headquarters, and other FAA facility locations.

The program works because in FY 2011, the program successfully completes these projects:

- Fire detection/suppression systems in Hangars 8 and 9 completed to protect approximately $660,000,000 in flight inspection aircraft/equipment w/unique instrumentation; that would be very difficult to replace
- Building 13 (CAMI) renovation construction completed in a 43 year old building to remove asbestos, install fire detection/suppression, seismic mitigation, Americans with Disabilities Act improvements.

This initiative reconfigured inefficient space, replaced electrical, telecom, mechanical, lighting, ceiling/floors.

- Building 12 (Air Navigational Facility #2) renovation construction completed in a 47 year old building to replace/add fire suppression; correct foundation settling; remediate radon; replace boilers/chillers; upgrade electrical, plumbing, insulation/windows on the first floor
- Incremental telecommunication upgrades of network equipment included:
  - Replacement of approx 35 network switches/UPS units at end of service life for increased security
  - Upgrade IPE controller/hardware/software to support campus growth
  - Installed hybrid fiber cable/copper cable between core buildings
  - Upgraded network for improved security, redundancy, reliability
  - Completed Continuous Monitoring Assessment of Center voice/certification of backbone network
  - Implemented wireless solution to support Homeland Security Presidential Directive - 12 requirements

This program benefits the FAA and avoided $66 million in costs from FY 2008-2010 by:

- Lowering lease costs/energy/labor/renovation construction costs than comparable local alternate locations: $19.22 per square foot as compared with OKC GSA Metropolitan lease prices at $25.22 per square foot at FY 2009 GSA lease national average
- Allowing flexibility and growth to support NextGen airspace system requirements
- Supporting NAS operations/maintenance, current and future ATO initiatives
- Decreasing energy and repair operations costs
- Enabling ATO initiatives by providing infrastructure that supports new NAS facilities funded by other capital programs and includes Precision Runway Monitor (PRM), Instrument Landing System (ILS), and Terminal Automation Modernization Replacement (TAMR)

5. Why Do We Want/Need To Fund The Program At The Requested Level?

There is a significant backlog of facility improvements that need to be addressed to prevent further deterioration of buildings. The backlog can be addressed with incremental funding increases to improve facility conditions and assure the aging infrastructure remains viable in future years.

Detailed Justification for - 3B02 Distance Learning

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Distance Learning ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Distance Learning	$1,996	$1,500	$1,500	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. CBI Hardware Replacement	1	$980.0
2. CBI Support Contract	---	520.0
Total	Various	$1,500.0

For FY 2013, $1,500,000 is requested hardware replacement and contract support.

2. What is this Program?

Distance learning provides FAA with state-of-the-art quality course delivery to geographically dispersed students with a reduced dependency on travel to centralized facilities.

Anticipated FY 2013 Accomplishments:

- Procure 700 CBI Platforms for LCM replacement of obsolete, out of warrantee systems
- Accomplish engineering support for development of software image and to maintain configuration control for highly reliable field site performance

DOT Strategic Goal - Organizational Excellence
- Diverse and Collaborative DOT Workforce.

Distance Learning supports the DOT Strategic Plan Organizational Excellence Goal of increasing education and the training level of our workforce. Within this overall effort, this program focuses primarily on computer based instruction (CBI), aviation training network (ATN), and web delivery as critical distance learning solutions. The CBI distance learning sub-system provides a complete independent or networked training platform. The CBI Program Office partners with ATO and AVS to implement upgrades and new technologies to enable delivery of distance learning training to FAA employees making the organization more effective with stronger leadership, increased commitment of individual workers to fulfill organization-wide goals, and a better prepared, better trained, diverse workforce.

3. Why is this particular program necessary?

The major benefit of distance learning is the substantial reduction in student travel and per diem costs associated with resident-based training. In addition, distance learning delivery methods increase training effectiveness as well as training opportunities for all FAA employees, provide flexibility in training schedules through local management control, and decrease the time employees spend away from their work site. The CBI, ATN, and web delivery systems are required to deliver initial operator, transition, and maintenance training for many NAS programs. The FAA requires cost-effective distance learning alternatives to reduce the current resident-based training load, accommodate increases in training due to the introduction of new national airspace systems, continue personnel transition/refresher training, support succession training, and provide performance support. The requested funding will replace obsolete/unsupportable CBI platforms that have reached the end of their useful life.

4. How do you know the program works?

The distance learning program is effective by providing training opportunities at field locations that have recorded approximately 300,000 course completions over the last fiscal year. This has resulted in the cost avoidance in travel and per diem of over $16,800,000.

5. Why do we want/need to fund the program at the requested level?

The required funding is needed to replace obsolete and/or unsupportable equipment used in the CBI and ATN sub-systems. The Distance Learning Resource Center data shows hardware-related calls increase significantly in the last few months of a system's warranty period, which would likely continue past warranty expiration. If the program were to be funded at a lower level, the CBI platforms would not be upgraded and system degradation would occur, resulting in a lack of available field training to employees and an increase in travel and per diem cost in order for training to be accomplished.

CBI platforms must be replaced when warranties expire for the following reasons:

- Increased processing and courseware power demands
- Short production life-span of specific computer components
- Decrease risk of extended training platform downtime at field sites (75 percent of field sites are single CBI Platform sites)
- Less overall maintenance support cost vs. maintaining a stock of spare parts

Executive Summary – Facilities and Equipment, Activity 4.

1. What Is The Request And What Will We Get For The Funds?

The Facilities and Equipment (F&E) Activity 4 program is requesting $217,900,000 for FY 2013, a decrease of $22,400,000 (9 percent) below our FY 2012 enacted level. Of this funding, $2,000,000 is requested to continue to transform current digital aeronautical information in conformance with international standards and NextGen objectives. This transformation will enable the near real-time processing of such data to improve mapping and flight planning, as well as the accuracy and timeliness of ATC instructions.

Key outputs and outcomes expected to be achieved in budget year with the requested resources:

- Program Leases – Funds over 3,100 facility and land leases in support of critical NAS requirements.
- Mike Monoroney Aeronautical Center Leases – Funds warehouse, administrative office space, and training facilities that support the mission of 7,100 employees, contractors, and students training of 90,000 students annually.

Activity 4 funding provides mission support services for the modernization of air traffic control, and safety, regulation, and security, and information security requirements. The funding for Activity 4 programs support:

- Major support contracts that cross programmatic, functional, and organizational lines
- System-engineering, logistics, requirements analysis, and systems management for the overall NAS, and safety, security functions throughout the FAA.

2. What Is This Program?

This Activity provides mission support services that cross FAA organization and functional lines. Over 90 percent of the funding supports ATO programs and initiatives. Funding for MITRE's Center for Advanced Aviation System Development (CAASD), one of FAA's Federally Funded Research and Development Center (FFRDC), is provided under Activity 4.

We request Activity 4 funding for leasing ATC facilities and related research and laboratory facilities (including those located at the Mike Monroney Center in Oklahoma City, Oklahoma and the William J. Hughes Technical Center in Atlantic City, New Jersey).

Activity 4 efforts contribute to the following DOT Strategic Goals:

- Safety: Reduction in transportation-related injuries and fatalities
- Economic Competitiveness: Maximum economic returns on transportation policies and investments
- Organizational Excellence: Diverse and collaborative DOT workforce

3. Why Is This Particular Program Necessary?

Activity 4 funds many of the mission support activities that we must perform to effectively operate and maintain our ATC operation. We use the funding to procure the additional systems engineering skills and lease facilities and equipment required to complete mission. Many years ago, Congress directed us to budget for the support activities separately from our other Activity 2 and 3 acquisition programs. Activity 4 can be viewed as an overhead account for the overall F&E budget.

4. How Do You Know The Program Works?

This program has been successfully implemented for over 15 years. We have demonstrated that this is an effective way to allocate program costs across functional and organizational lines. Under this approach, we have achieved management efficiencies while obtaining the expertise needed to augment in-house resources.

For example, FAA revalidates MITRE/CAASD requirements annually. Funding on various initiatives will change based on FAA priorities and requirements. MITRE has demonstrated a unique ability to quickly reallocate resources to support FAA needs based on its extensive knowledge and understanding of the overall mission and, in particular, the ATC operation.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

We request funds for a variety of activities under Activity 4 including equipment installation; research, development and demonstration of new technologies; facility leases; systems engineering support; and program management services. In many cases, it is more efficient for FAA to contract for a portion of support services and lease facilities to obtain the personnel and infrastructure needed to meet current requirements than to hire additional permanent staff and procure land and buildings. Activity 4 funding enables the agency to flexibly procure the additional resources needed to meet current demand while not substantially increasing fixed operating costs. As in the case of Activity 3 funding, FAA would prioritize reductions in Activity 4 programs with respect to the ATC operational requirements identified in Activity 1 and 2 programs. Activity 4 level-of-investment programs would be reduced in a manner that would enable FAA to sustain ATC safety and services at levels expected by the public, the military, and our other stakeholders. Further reductions would require larger funding cuts in mission support activities.

Detailed Justification for - 4A01 System Engineering (SE2020) and Development Support

What Do I Need to Know Before Reading This Justification?

- System Engineering (SE2020) and Development Support continues to provide an innovative, cost-effective, diverse workforce which supports FAA's agency-wide goal to enhance the National Airspace System (NAS) and improve the overall efficiency of the air traffic control system increasing capacity of the NAS by 2015.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – System Engineering (SE2020) and Development Support
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
System Engineering and Development Support	$32,235	$32,900	$35,000	+$2,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. System Engineering (SE2020) Contract	---	$27,700.0
2. System Architecture/Other 8A Support	---	1,900.0
3. Program Evaluation	---	500.0
4. Computer Services	---	1,900.0
5. ATC/ANF Systems Support	---	3,000.0
Total	Various	$35,000.0

For FY 2013, $35,000,000 is requested to provide technical contract support services which will ensure sound systems engineering practices and business case development processes instrumental to the safety, efficiency, and securing the NAS. Also, the contract provides support to FAA's planning and budgetary processes ensuring consistent application of the Acquisition Management System (AMS).

2. What Is This Program?

The Systems Engineering 2020 will complement Next Generation Air Transportation System (NextGen) programs. Contractors will research emerging procedures and technologies, and perform systems engineering to determine the best way to deploy the NextGen initiatives on a wide scale or, said another way, to "demonstrate" that NextGen procedures will work on a large scale within the current and evolving air traffic system.

The FAA will issue tasks to SE2020 contractors covering a variety of research and engineering activities. These tasks will be carefully designed to advance multiple facets of aviation modernization efforts for the NextGen and other FAA missions.

The engineering support required will consist of disciplines ranging from systems requirements and system modeling to transition and human resource planning. In addition, automated data processing and information resource support will be required to provide for the development and/or enhancement of computer simulation models, miscellaneous software upgrades, databases, and program management tools. Program management, financial management and investment analysis support will be provided to assist with planning, decision-making, and budgetary oversight of the activities involved in implementing newly acquired systems, components, and equipment in existing operational NAS facilities.

DOT Strategic Goal - Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The System Engineering 2020 contract will procure the necessary technical expertise in order to provide Research, Systems Engineering, and Program management support critical to the enhancement of the NAS in today's rapidly changing technology environment. The request will support air traffic control specialists, system engineers, acquisition specialists, computer operation/simulation operators, configuration management specialists, engineers, financial analysts, program analysts, human factors specialists, technical editor/writers, web designers, and information specialists. This unique knowledge and expertise will assist FAA in improving aviation safety, security, and efficiency of the air traffic control system while increasing the capacity and reliability of the National Airspace System.

4. How Do You Know The Program Works?

The System Engineering 2020 provides continuity, innovation, and cost-effective workforce necessary to support the agency's goals of improving aviation safety, security, and efficiency while increasing capacity and productivity reducing overall operating costs resulting in a cost savings. The System Engineering 2020 creative and innovation workforce will develop and enhance software tools to help improve the efficiency of the agency's NAS.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The System Engineering 2020 contract support provides future enhancement of the Air Traffic System by establishing and documenting the FAA's Enterprise Architecture (EA) requirements. The National Airspace System EA is the blue print for the future air transportation system and for complete, accurate, clear and concise roadmaps and views that must be identified and documented in the architecture. System Engineering 2020 assists in developing, delivering, and implementing guidance to move forward the engineering and prototyping effort for NextGen; establishing a NextGen Service Level Agreement Planning Group to assist in the identification of RE&D requirements necessary for the transition to NextGen; and provides support for the System Wide Information Management (SWIM) Evolution Strategy.

In addition, contract support services have ensured sound systems engineering practices and business case development processes. Also, the contract provides support to FAA's planning and budgetary processes ensuring consistent application of the AMS process.

Detailed Justification for - 4A02 Program Support Leases

What Do I Need To Know Before Reading This Justification?

- Real estate rights are required for FAA facilities
- The acquisition of real estate rights (leases and purchases) are negotiated to ensure the lowest overall cost to the FAA
- There is active oversight on the expenditure of these funds throughout the FAA

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Program Support Leases
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Program Support Leases	$38,523	$40,000	$40,900	+$900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Operational Leases	---	$40,900.0

For FY 2013, $40,900,000 is requested to pay the annual rent on leases for real estate (both land and space) to house facilities required to operate the National Airspace System (NAS). This program funds more than 3,100 leases along with other real estate requirements and will include:

- Payment of rents for land and space leases that directly support navigation, communication, weather observation and reporting, air traffic control, and other functions that support the NAS
- Costs associated with the rental and management of land and space for service/maintenance centers, deployment/development centers, laboratories, test beds, and other types of facilities that support the deployment and operation of technical facilities
- Funds for conversion of existing leases to fee ownership or perpetual easements
- Payments for condemnation (leasehold or fee) of real property interests
- Costs for real estate appraisals, market surveys, title reports, and other costs associated with the acquisition and management of real property assets
- Funds for costs to relocate offices, facilities, personnel, and equipment
- Fund the consolidation or combination of multiple offices when technically feasible and economically advantageous
- Fund the development of business tools to enhance real estate acquisition and management activities and for implementing program efficiency practices
- Funding for costs associated with real property lease terminations and equipment disposals
- Funding for testing and studies (environmental, suitability, sustainability, cost-effectiveness, etc.) in connection with the leasing, purchasing, usage, management, and disposal of real property
- Funding for real property costs associated with the transition to Next Generation (NextGen) facilities

2. What Is This Program?

This program secures the funding for the payment of the required real property rights by providing the payments for more than 3,100 leases covering both land and space for operational facilities. It also funds the purchase of land when economically advantageous to FAA.

This program improves management of the FAA's real property assets and supports:

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and nvestments.

3. Why Is This Particular Program Necessary?

To operate the NAS, FAA requires real property rights for more than 3,100 rentable real estate leases. Without property rights, FAA could not operate the NAS since the majority of its facilities reside either on leased land or in leased building space. Leases for building space include those for planned, constructed, and newly finished Air Traffic Control Towers with high rent. The FAA must also obtain clear zones to prevent interference with electronic signals at certain facilities, such as very high frequency omni-directional ranges, airport surveillance radars, and air route surveillance radars.

The real property leases are legally binding contracts that usually require rents to be paid each year. The total rent amount for the leases portfolio increases each year due to the addition of leases for new facilities and the renegotiation of expired leases.

4. How Do You Know The Program Works?

Sufficient funding is available to make rent payments for all the real estate leases for NAS operational facilities. The significant savings have been achieved through the implementation of the co-location, consolidation, and oversight measures which are an integral part of this program.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$40,900,000 is required in order to cover the rent payments for the projected total real estate lease portfolio, pending judgments for fee condemnation court awards, and newly commissioned Air Traffic Control Towers.

Detailed Justification for - 4A03 Logistics Support Services (LSS)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Logistics Support Services (LSS)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Logistics Support Services (LSS)	$10,978	$11,700	$11,500	-$200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Real Estate Acquistion, Materiel Management Contract	Various	$11,500.0

For FY 2013, $11,500,000 is requested to fund contractor-supplied logistics services.

2. What Is This Program?

Through the LSS program, the agency utilizes contractor-supplied services to perform real property acquisition, materiel management, contracting activities in support of FAA Capital Investment Plan (CIP) projects, and conduct capitalization and property control-related activities. These services currently provide a significant portion of the workforce for acquisition, real estate, and materiel management at regions and centers. The LSS program is instrumental in establishing new or upgraded facilities, including air traffic control towers and TRACONs, throughout NAS. The logistics personnel services will support the FAA Facility Security Risk Management (FSRM) program. The LSS resources will continue to be used for asset tracking and documentation efforts to obtain and maintain a clean audit opinion.

The LSSC program directly supports the FAA Flight Plan Goal of Organizational Excellence, Objective 3, Improve financial management while delivering quality customer service. Specifically, the program provides key support functions which enable the FAA to manage real property assets, maintain a clean audit opinion, and plan the execution of critical acquisition activities supporting the NAS. These functions are performed throughout the three Logistics Service Areas, FAA Technical Center, and FAA Aeronautical Center.

Related project management goals include:

- Complete of 80 percent of the annual real property inventory validation effort
- Designate 75 percent of the disposed real property assets as "retired" within 30 days of the date the disposal forms are received from ATO
- Capitalize 85 percent of all personal and real property capital assets within 65 days of date placed in service
- Award at least 90 percent of all formal contracts (over $100,000) in less than 180 calendar days (AMQ) and in less than 120 days (Logistics Service Areas) from the time a purchase request is received from the requiring organization

DOT Strategic Goal - Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

The FAA has a serious shortage of government logistics personnel at regions and centers to manage real estate, acquisitions, and materiel for NAS modernization and capitalize agency assets as required by the agency's strategic plan. Without adequate logistics services, real estate will not be acquired, contracts to buy or upgrade equipment and construct facilities will not be awarded, and modernized equipment and systems will not be efficiently installed and commissioned. Additionally, FAA will not be able to adequately document the capital cost of FAA facilities, or comply with mandatory accounting standards set by the Government Accountability Office (GAO) that could put the achievement of a clean audit opinion at risk.

4. How Do You Know The Program Works?

An example of the effectiveness of the LSS contract is the success of the 2010 and 2011 clean audit opinions achieved by FAA. During this time period, LSS resources were utilized across the nine regional offices, Aeronautical Center, and FAA Headquarters to provide the technical support to process capitalized assets, which successfully supported the achievement of a positive outcome of the financial audit. It was as a direct result of the LSS staffing support that allowed FAA to process these assets in a timely and accurate manner. Without such support, FAA might have missed the specified processing metric of 80 percent of the assets within 65 days potentially impacting the overall audit opinion rendered by the DOT IG.

5. Why Do We Want/Need To Fund The Program at the Requested Level?

Any funding reduction would directly impact recently achieved processing efficiencies within acquisition, real estate, and material management, significantly reducing or even eliminating the improvement gains made over the last several years.

Detailed Justification for - 4A04 Mike Monroney Aeronautical Center Leases

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Mike Monroney Aeronautical Center Leases
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Mike Monroney Aeronautical Center Leases	$16,567	$17,000	$17,500	+$500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aeronautical Center Lease Payment	1	$17,500.0

For FY 2013, $17,500,000 is requested to continue Aeronautical Center Leases:

2. What Is This Program?

The Aeronautical Center is the FAA's centralized location that supports FAA National Airspace Systems (NAS) Air Operations/flight checks, engineering, system testing, training (Radar/Navaids), NAS logistics, aviation regulation, registration, certification, aviation and transportation safety research, and Business Services in Oklahoma City.

The Center provides facilities that support the work of 7,100 employees, students, and contractors on a daily basis; and 10,000 - 11,000 visitors annually; the largest concentration of FAA personnel outside of Washington D.C.

The Aeronautical Center leases provide leased land/building rent and insurance that comprise approximately 80 percent of Aeronautical Center space: 2.8 million square feet of leased space and 1,100 acres of land, having a replacement value of $710 million.

The lease is comprised of:

- Master Lease land/building rent, sustainment and insurance
- Airmen and Aircraft Registry Lease land/building rent, sustainment and insurance
- Thomas Road warehouse lease
- Tower space for Terminal Doppler Weather Radar (TDWR) target generators
- Grounds Maintenance Building

The Aeronautical Center requires large parcels of land as NAS test sites for surveillance radar, communications, weather, and navigation/landing systems, as well as warehouse, administrative office space, and training facilities. It is a Level IV security site based on numbers of employees, facility square footage, sensitivity of records, volume of public contact, and mission-critical facilities whose loss, damage, or destruction may have serious or catastrophic impact on the NAS.

DOT Strategic Goal - Organization Excellence

- Diverse and Collaborative DOT Workforce.

Anticipated FY 2013 Accomplishments
- Annual rent for MMAC real property leases
- No FAA personnel work stoppage due to unsafe/unusable facilities. Average age leased buildings: 46 years.

Funding for this program assures continuity of the Aeronautical Center facility and that it remains viable for current and future generations of FAA employees.

3. Why Is This Particular Program Necessary?

Leased Aeronautical Center facilities support FAA missions that include:

- Aviation training for 90,000 FAA and international students per year in resident and distance learning, including approximately 1,000,000 hours of distance learning delivered annually
- Logistics services and supply support to the operational NAS to all FAA Airway Facility locations, Air Traffic, and approximately 70 DoD and international organizations
- Engineering services for NAS systems modification and repair
- Aviation research: medical and human factors for aviation personnel
- Standards and flight inspection services
- Regulation certification of safety related positions and equipment, airmen and aircraft records and registration
- Business services that include DOT/DELPHI/Prism/Castle Data Center Operations, Accounting Operations, Acquisition Services, ATO Data Center, Aviation Safety/Research

4. How Do You Know The Program Works?

This program, combined with the Aeronautical Center Infrastructure Modernization, benefits the NAS and DOT/FAA business services and avoided $66 million in FAA costs during FY 2008-2010 by:

- Lowering lease costs/energy/labor/renovation construction costs than comparable local alternate locations: $19.22 per square foot as compared with OKC GSA Metropolitan lease prices at $25.22 per square foot which was the FY 2009 GSA lease national average
- Allowing flexibility and growth to support NextGen airspace requirements
- Supporting NAS operations/maintenance, current and future ATO initiatives
- Decreasing energy and repair operations costs
- Providing infrastructure that supports new NAS facilities including AOS Precision Runway Monitor (PRM), Instrument Landing System (ILS), and Terminal Automation Modernization Replacement (TAMR)

No work stoppages have been identified due to unsafe/unusable facilities even though the average age of leased facilities at the Center is 46 years.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Funding at the current level is necessary to pay rent under the long-term lease agreement.

There is also significant backlog of building system replacements identified in a 2010 Jacobs Engineering facility life cycle condition assessment for the leased buildings that should be addressed to prevent further deterioration of leased buildings. The backlog can be addressed with incremental funding to improve facility conditions and assure the aging infrastructure is available for many additional years.

Detailed Justification for - 4A05 Transition Engineering Support

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Transition Engineering Support
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Transition Engineering Support	$14,970	$13,000	$14,000	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Centrally Procured Services	---	$14,000.0

For FY 2013, $14,000,000 is requested for the following:

$13,000,000 is requested for National Airspace System (NAS) Integration Support Contract (NISC) to support the modernization schedules for NAS programs. The breakdown of costs is as follows:

Program Support	$2,500,000
NISC Contract Management	$10,500,000

$1,000,000 is requested for Configuration Management Automation (CMA) to develop system requirements and architectural framework to support future enterprise configuration management system enhancements including Business Process Management (BPM), Document Management, single sign-on CM Portal, and Non-NAS Information Technology configuration management.

2. What Is This Program?

NAS Integration Support Contract (NISC) provides engineering and technical resources to FAA organizations responsible for NAS Transition and Implementation. The NISC team, working in partnership with these organizations, ensures that capital investments and regional projects are implemented in the most effective manner to support the NAS mission. The Transition Engineering Services program maps to organizational excellence by providing a highly skilled and experienced workforce at cost effective rates.

DOT Strategic Goal – Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

Due to staffing shortfalls, FAA's technical workforce cannot handle the surge in demand for short-term programs/projects that are critical to managing the volume of diverse systems and equipment associated with National Airspace System (NAS) modernization. As a result, FAA will experience significant NAS modernization scheduling delays if additional support services are not available to complete these projects.

4. How Do You Know The Program Works?

Since the award of NISC-I in 1991 and its successor contracts, this program has supplied from 500 to the current level of more than 1,000 technical full-time equivalent (FTE)s annually to various programs throughout the FAA in support of NAS modernization, transition planning, implementation, and integration. Additionally, the contractors supplying these services consistently received performance award fees in the 90 percent and above range. This support integrates equipment and systems into the NAS and ensures that the equipment functions properly once delivered. It improves facility reliability and availability to the NAS, which results in safe, efficient, and cost effective air traffic services.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$14,000,000 is required for Transition Engineering Services to support the modernization schedules for NAS programs by providing a cost effective contractual vehicle for meeting critical Capital Investment Plan (CIP) projects and FAA organizational technical requirements.

These resources will be used to:

- Meet the minimum contractual obligations as stipulated in the NAS Integration Support Contract (NISC) contract.
- Maintain program stability so that FAA modernization projects remain on schedule.
- Meet FAA and NISC program goals in accordance with the FAA Flight Plan and other internal agency plan.

Increased resource requirements requested from the NISC program (approx $2.0 billion over next 10 years) has increased management and oversight requirements.

With the award of the new NISC III contract on October 2010, the NISC contract continues to grow. The Program Office will need to procure additional oversight support. This level of support is necessary to maintain and support the current contract infrastructure over the next ten years and to support new contract initiatives including NextGen.

Detailed Justification for - 4A06 Technical Support Services Contract (TSSC)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Technical Support Services Contract (TSSC)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Technical Support Services Contract (TSSC)	$21,956	$22,000	$23,000	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Contractor Program Management		$9,000.0
2. Planning, Quality Control, Security, Safety	---	4,900.0
3. Award Fee	---	3,900.0
4. Program Management Support Contracts	---	5,200.0
Total	Various	$23,000.0

For FY 2013, $23,000,000 is to continue the Technical Support Services Contract so other programs can use their funds to buy its services to accomplish more than $100 million of project work each year (73,000 support hours plus subcontracts costs).

2. What Is This Program?

- The Technical Support Services Contract (TSSC) Program is the Agency's primary vehicle to provide a work force multiplier to install equipment and to support the myriad of Capital Budget improvements to the National Airspace System (NAS) in a timely, cost-effective manner. These activities include work planning, quality control, subcontracting, the contractor safety program, and award fee paid under the contract as well as the usual rent, telecomm and utility costs incurred under the contract.
- Significant work is required to install, modify, and relocate equipment by personnel with electronic, mechanical, and civil engineering skills. Often, the engineering and technician support is of short duration and requires skills that FAA government employee work force does not have or exists in insufficient numbers for a specific type of installation need.
- The TSSC Program allows FAA to avoid hiring added employees for a limited duration to handle surge demand such as when new equipment is installed at multiple locations.
- In addition to TSSC infrastructure noted above, this funding also supports DCAA audits and TSSC Program Office support contracts.

DOT Strategic Goal – Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

FAA's technical workforce cannot handle the surge in demand for short-term programs/projects that are critical to managing the volume of diverse systems and equipment associated with National Airspace System (NAS) modernization. As a result, FAA will experience significant NAS modernization scheduling delays if additional support services are not available to complete these projects.

- In a typical year, the TSSC vehicle is used to purchase more than $65 million in labor and accomplish more than $30 million in non-labor cost activities such as site preparation and other public works construction.
- TSSC directly supports modernization of the NAS that ensures operational availability by replacing old equipment and sustaining the infrastructure.
- TSSC supports activities such as the installation of electronic equipment to support the NAS infrastructure modernization to infrastructure work for fiber optic installation and construction management as part of the continuous investment of the FAA.

4. How Do You Know The Program Works?

The Technical Support Services Contract (TSSC) Program has an award fee contract vehicle to promote efficiency and FAA customer satisfaction. The TSSC customer award fee evaluation survey participation return rate is greater than 94 percent. Direct FAA customer award fee feedback rated contractor performance 94.4 percent (out of 100 percent) in the excellent and good range across 502 individual contractor performance evaluations in the 6 month long rating period ending 31 January 2011.

In a typical year, the TSSC vehicle is used to purchase more than $65 million in labor and accomplish more than $30 million in non-labor cost activities such as site preparation and other public works construction.

Based on a program of $23 million and $100 million invoiced for work performed, the TSSC Program provides a leveraging multiplier of 4.3. In other words, the funding provided for TSSC infrastructure enables FAA to accomplish $100 million in NAS project efforts.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The Technical Support Services Contract (TSSC) Program requires $23,000,000 in FY 2013 to fund continuing contract operations. These operations, referred to as infrastructure costs, sustain FAA's basic national capability to supplement and leverage federal skills during site specific National Airspace System (NAS) implementation efforts. TSSC is the Agency's primary installation support service vehicle and it is used by a myriad of Capital Budget improvement program customers to achieve timely and cost effective NAS modernization. Through TSSC, implementation of capacity and safety enhancements are achieved via approved and funded NAS capital projects that would otherwise be delayed.

TSSC infrastructure activities include program and site specific work planning, quality control and assurance, legal compliance with subcontracting law, mandatory contractor safety programs, as well as invariable costs like office space rent, supporting telecommunication and utility costs. The TSSC BLI is used to fund DCAA audits of contractor accounting systems, labor invoices, and other processes to ensure technical and legal compliance.

TSSC infrastructure funding pays for:

- Project implementation safety, security and quality control which helps avoid worker's compensation claims and increased insurance costs that would be passed on to the FAA, and avoids costs to the FAA for rework that would be required to correct defects that occur when quality control efforts fail due to a lack of adequate funding.
- The contractor's subcontractor administration capability which accomplishes award of construction subcontracts for public works projects of approximately $30 million of effort that is accomplished through TSSC subcontracts.

The new contract is scheduled to start in the spring of FY 2012 while the existing is moving toward its conclusion. Therefore, it will be necessary for the FAA to operate two contracts during the spring of FY 2012.

It will be necessary to fund the award fee for two contracts, and the cost of contractor management of its employees along with office space, and other contract infrastructure costs on both contracts.

Detailed Justification for - 4A07 Resource Tracking Program (RTP)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Resource Tracking Program (RTP)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Resource Tracking Program (RTP)	$3,992	$4,000	$4,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Program/Project Management	---	$4,000.0

For FY 2013, $4,000,000 is requested to continue to keep hardware and software licenses current, program/project management support in the National Airspace System (NAS), maintain Technical Support Services Contract (TSSC) and NAS Implementation Support Contract (NISC), upgrade training documentation, and continue to provide training to users and data administrators.

2. What Is This Program?

The RTP is a computer management system (including hardware, software, development, training, and support) used by the FAA Service Centers, the William J. Hughes Technical Center, and the Mike Monroney Aeronautical Center for identifying requirements, internal budget preparation, implementation planning, resource estimating, project tracking, and measuring performance of projects. The Corporate Work Plan (CWP) process is the Air Traffic Organization's method to implement approved projects and to standardize National Processes in support of the National Airspace System (NAS). The CWP system, which falls under the RTP program, enables users to share FAA's project data during the various stages of implementation (i.e., planning, scheduling, budgeting, execution, and closeout). The CWP toolset and its supporting data are continuously used for reporting project metrics to project managers, responsible engineers, program offices, and various other customers.

The legacy RTP systems operated in a distributed environment. The centralized system will help increase the quality of customer service. Both management and engineers will have up to date information on projects. Furthermore, the centralization effort will standardize reporting at all management levels allowing managers to better control overall project costs.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The hardware and software for the CWP TOOLSET which is the key tool that makes up the Corporate Work Plan must be constantly maintained and upgraded, to support FAA and the processes that will be impacted as it continues to evolve into the Air Traffic Organization (ATO). If this program is not funded at the requested level CWP TOOLSET will fall out of sync with other systems and processes and the agency will not be able to retrieve reliable data for ATO Capital projects. The CWP TOOLSET is used to track all ATO Capital projects from cradle to grave. It is also used to develop the CWP and work releases for the TSSC.

It interfaces with DELPHI and Fund Control Module (FCM) and various other systems. CWP TOOLSET is a centralized system with load-balanced servers residing in Oklahoma City, OK.

4. How Do You Know The Program Works?

The CWP TOOLSET continues to meet the FAA performance goal of Improving Efficiency of Mission Support. Three of the primary achievements are:

- Providing reliable data with an automated tracking and reporting system for capital projects that will enable decision-makers to enhance the use of agency resources.
- Keeping major acquisition programs on schedule and within costs by maximizing limited resources linked to budget information and processes. These achievements are reached by providing enhanced program and project management capabilities with cost accounting of capital expenses to FAA. Managers and engineers have up-to-date reliable data on capital projects through CWP TOOLSET.
- Improving productivity by more than 20 percent when a standardized project management process is supported and emulates current operating procedures.
- Providing earned value management capability.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$4,000,000 is required to keep current the CWP TOOLSET software and hardware. This will continue to be modified to support the changing processes and the other systems such as the CWP Toolset. To do this, the NAS Implementation Support Contract (NISC) and the Technical Support Services Contract (TSSC) will be maintained for contractor support, software development efforts, and technical support. Also, hardware and software licenses will be maintained to keep the cost of upgrades to a minimum. This maintenance will cover the Headquarters, Atlantic City and Oklahoma City sites. Documentation that is used to provide training to users and administrators of the system will also be maintained.

A reduction could result in licenses expiring which could result in increased costs for future upgrades. Also it could result in reduction of contractor support which would cause delayed in future enhancement of the CWP Toolset and support of the hardware maintenance.

The CWP system provides end-to-end management of programs and projects.

Detailed Justification for - 4A08 Center for Advanced Aviation System Development (CAASD)

What Do I Need To Know Before Reading This Justification?

- CAASD is the FAA's Federally Funded Research and Development Center (FFRDC) operated for the FAA by The MITRE Corporation.
- MITRE's unique experience and expertise has been indispensable to the FAA in helping define and validate key concepts and evolutionary paths to achieve Next Generation Air Transportation System (NextGen).
- CAASD continued contributions will be critical to FAA in transforming the nation's air transportation system in an effective and timely manner.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Center for Advanced Aviation System Development (CAASD)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Center for Advanced Aviation System Development (CAASD)	$73,755	$78,000	$70,000	-$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. CAASD (Air Traffic Organization)	---	$57,638.0
2. CAASD (Non-Air Traffic Organization)	---	12,362.0
Total	Various	$70,000.0

For FY 2013, $70,000,000 is requested to fund technical, engineering, as well as research and development support for the CAASD program. The FY 2013 funding will support approximately 230 MITRE Technical Staff years (MTS) of research and systems engineering as well as technical and operational analyses. This staffing level is well below the Congressional ceiling of 600 MTS. The FFRDC Executive Board has approved the sixth edition of the FAA CAASD Long Range Plan (FY 2011 – 2015).

2. What Is This Program?

The Center for Advanced Aviation System Development (CAASD) is a Federally Funded Research and Development Center (FFRDC), operating under a Sponsoring Agreement with The MITRE Corporation. CAASD has unique knowledge, skills, and capabilities in aviation research, systems engineering, and analysis. CAASD also conducts a continuing program of research, development, system architecture, and high-level system engineering to meet FAA's long-term National Airspace System (NAS) requirements. MITRE has developed a broad and deep understanding of the entire installed NAS, including NAS systems and their interdependencies. MITRE's unique experience and expertise has been indispensable to the FAA in helping define and validate key concepts and evolutionary paths to achieve NextGen. Its contributions will continue to be critical to FAA in transforming the nation's air transportation system in an effective and timely manner. The CAASD Product Based Work Plan and FAA CAASD Long Range Plan (FY 2011 – 2015), approved by the FAA's FFRDC Executive Board, define an outcome-based program of technically complex research, development, and system engineering assignments designed to support the goals and requirements of the NAS and the NextGen. CAASD activities include:

NAS and NextGen System Integration and Evolution: Develop and integrate the NextGen enterprise architecture, operational concepts, capability action plans, and roadmaps to achieve an integrated evolution and align agencies' enterprise architectures; analyze NAS-wide strategic issues for efficient investment and operational decisions; provide review of and definition, structure, and content for the NAS enterprise architecture (EA) and ensure alignment with the evolving NextGen architecture; provide recommendations on U.S. and international Air Traffic Management enhancements to improve NAS operations and global harmonization; assess and provide recommendations for NAS operational and infrastructure evolution paths to maximize the use of common capabilities and automation platforms supporting cross-ATO portfolio investment decision making; validate the productivity gains, operational feasibility and user benefits of selected individual and sets of NAS operational improvements to effect the transition to NextGen; assess service and cost benefits and provide recommendations for implementing net-centric strategies that reduce NAS complexity and improve user access to information; assess the NAS-wide operational impacts of investment options and decisions; improve understanding of the future environment, including anticipated demand at airports and for airspace; anticipate the impact of planned NAS operational improvements on future airport and airspace capacity; and perform analyses to assess the affordability and long-term economic implications of different investments, operational changes, or proposed policies.

Communications Modernization: Conduct technical analyses on architecture alternatives at the program, service, and domain levels to ascertain which alternatives meet the required level of NAS communications service at least cost; conduct engineering analysis, communications network definition, and transition strategy studies for the FAA's Voice Communications and System-Wide Information Management (SWIM) programs to provide robust network-enabled operations and to reduce the overall FAA communications costs; conduct spectrum analysis focusing on strategic issues related to the availability of adequate spectrum resources to support aeronautical communications for NextGen operational concepts and including airport surface applications; perform technical, architectural, operational, cost analyses and modeling to support the implementation of digital data communications services in the NAS; and conduct analysis of the operations enabled by data communications to ensure that FAA and the user community understand the operational benefits and business case.

Performance-Based NAS: Research new concepts for achieving a performance-based NAS; work collaboratively with FAA's RNAV and RNP Group (ATO) and Flight Standards New Technologies and Procedures Division (AVS) providing technical and engineering analysis and modeling to inform and contribute to FAA's requirements to develop, implement, and validate new PBN criteria, understand operational impacts, and address mid-term and far-term PBN requirements of NextGen; work collaboratively with the FAA and the aviation community to improve and standardize aircraft avionics capabilities and functionality, and airspace and procedures design, leading to improved safety, efficiency and capacity; conduct technical analyses to identify airports and runways that will benefit from RNP and RNAV procedures. CAASD's models and databases provide the ability to estimate benefits; develop algorithms and prototype performance case analyses to validate Flight Standards procedure development tools; identify problems that emerge in the implementation of RNP and RNAV procedures and recommend resolutions and new criteria requirements using CAASD's air traffic, airline, automation, and avionics expertise; and analyze and model all aspects of navigation assets.

En Route Evolution: Perform system engineering analyses for new technologies, capabilities and procedures for the en route system architecture and operational applications that will provide benefits and enable the successful implementation of NextGen solutions; develop integrated operational concepts and prototypes to demonstrate and evaluate new capabilities and procedures for NextGen; develop and validate operational en route evolution plans that are integrated and aligned with the other domains including terminal and traffic flow management; conduct analyses to identify and mitigate key technical and operational risks for specific NextGen mid-term capabilities; validate the operational feasibility and expected efficiency and productivity gains for a specific set of NextGen mid-term capabilities; conduct benefit and cost analyses of key NextGen mid-term capabilities, and assess the prioritization of these capabilities; and develop system-level requirements for NextGen mid-term capabilities that can be transferred to a development contractor.

Terminal Operations and Evolution: Provide FAA with technical analyses that inform decision making on which technical architecture alternatives provide the required level of service and minimize costs; provide technical and operational insight into systems that can be used to safely permit reduced separation standards and/or significantly increase overall system capacity and productivity; provide operational feasibility and implementation risk analyses that assist the FAA in identifying and prioritizing among the more promising operational changes, procedures and enabling technologies; provide technical and operational expertise to enhance the quality and efficiency Terminal Radar Approach Control (TRACON) controller training, to allow for reduced training time and cost, improve trainee success rates, and improved workforce capabilities.

Airspace Design and Analysis: Structure and execute technical analyses that will inform FAA and Industry decisions on airspace design and management; engineer the processes that govern airspace strategic planning and analysis efforts; investigate, innovate, and develop modeling, simulation, and analysis capabilities facilitating airspace design; explore issues that influence strategic airspace management and design policy; integrate all the above efforts to provide a national, system-wide optimization of airspace.

NAS System Operations: Improve the NAS system-level performance by assessing system performance; designing, developing, and evaluating solutions to significant issues with FAA operational personnel and customers responsible for implementing the solutions; develop improved analytic techniques and capabilities for system operations analysis; develop operational strategies to manage emerging and chronic congestion problems by modeling capacity, delay, predictability, ripple effects, and access issues; design and evaluate solutions with FAA operational personnel and customers responsible for implementing the solutions; and develop improved measurement techniques for assessing operations; model and assess major operational problems with integrated analysis to verify alternate solutions and develop new modeling and analysis capabilities for analytic weaknesses; design, model, and assess new system operations procedures for new capabilities and airspace changes that will be implemented in the near future; develop analysis techniques and data to improve information on en route and terminal operations used in FAA operational and investment decision making and develop and evaluate new metrics to measure overall NAS operational performance.

Traffic Flow Management (TFM) Operational Evolution: Provide analysis of the TFM requirements and system design in order to ensure that developed system enhancements will meet the current and future operational needs in a cost-effective manner; assess the benefit of TFM capability enhancements on NAS performance; assessment concept maturity, operational feasibility and implementation risks, including identification of cross-domain dependencies, as input to the FAA's enhancement selection, planning, and risk management decisions and processes; advance the maturity of concepts to account for the dynamic impacts of weather and for related uncertainty in predictions and decision making, by developing algorithms and prototype capabilities and conducting evaluations that will improve FAA's ability to predict imbalances between traffic demand and real NAS capacity; collaborate with the NAS users, other TFM researchers, and FAA development contractors to create consensus on new capabilities, procedures, and priorities for evolving the TFM operations in a way that increases FAA efficiency and productivity and provides NAS users access and insight into the daily NAS operations and problem areas; translate concepts into requirements and assess the impact of enhancement capabilities on the TFM modernization system.

Aviation Safety: Perform technical analyses of NAS-wide accident and runway incursion risk to identify airports or specific types of operations with the highest risk, and prioritize implementation of appropriate operational and technological mitigations, leading to a reduction in accidents and runway incursions; develop metrics and processes that allow FAA to proactively identify potential safety issues with both operations and architecture; identify risks before they lead to incidents or accidents; and identify and assess the feasibility of new or advanced capabilities and standards that mitigate safety issues in the NAS.

Mission Oriented Investigation and Experimentation (MOIE): Develop tools and techniques for studying system capacity, throughput, performance, system dynamics and adaptation to technology and policy driven change; strengthen the systems engineering skills and tools of the FFRDC.

NAS-Wide Information System Security: Provide technical guidance on the most effective way to engineer security capabilities into the NAS, emphasizing a NAS-wide approach that reduces overall cost by leveraging shared capabilities and building security into the underlying Information Technology (IT) infrastructure; provide guidance on security threats, technology, standards, and practices being applied in other government and commercial enterprises in order to evolve Information System Security (ISS) to adapt to changing threats and technology advances; develop requirements and recommend solutions for effective cyber incident management program; advise the FAA on creating an IT infrastructure that will be resilient, flexible, and adaptable, and provide a defense-in-depth strategy; and apply CAASD experience with the

DOD's successful transition to Network Centric Operations and CAASD's NAS domain knowledge to provide technical guidance on deploying network centric technologies within the NAS while maintaining ISS defense-in-depth.

Broadcast and Surveillance Services. Research ADS-B ground and cockpit-based solutions that will permit the FAA to deploy ADS-B throughout the entire NAS in a cost effective and timely manner, while reducing the cost of ownership for FAA surveillance infrastructure and ATC, and improving safety for all NAS users; prototype basic and advanced ADS-B applications that will result in improved efficiency and capacity for FAA and the airlines; assess the impact of ADS-B on safety, capacity, and efficiency benefits for the FAA and users (perform user coordination, analysis, and lab simulations prior to deployment, and data collection and analysis after deployment); develop domestic and international requirements and engineering standards for future ADS-B applications, in close coordination with the users and manufacturers, as part of RTCA, the ICAO, FAA, Requirements Focus Group (RFG), and Eurocontrol standards development activities.

Special Studies, Laboratory and Data Enhancements. Provide the CAASD work program with a research environment where prototypes and capabilities can be brought together with the appropriate mixture of fidelity and development flexibility to facilitate integration investigations, compressed spiraling of operational concepts and procedure development; provide the CAASD work program with the capabilities of the Integrated ATM Laboratory enable an integrated end-to-end evaluation environment to support realistic assessments of new operational concepts and procedures before moving forward with operational field demonstrations; provide the CAASD work program with a data repository system that allows analysts more efficient access to aviation data and associated tools to support data analysis resulting in more useful products across the work program at a lower cost to our customers; and provide the CAASD work program with a flexible model of the NAS capable of quickly and reliably estimating the high-level impacts of new technologies, procedures, or infrastructure improvements on key system performance metrics.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The FAA, along with its aviation partners, faces a broad range of technically complex challenges to achieve the NextGen. Although FAA employees are highly knowledgeable about those technologies, it would be impossible to employ all of the research, science and engineering expertise needed to develop and improve them. The FAA requires highly specialized simulation and computer modeling capabilities that it does not have in-house and are only available through an FFRDC that has unique knowledge, skills, and capabilities in aviation research, systems engineering and analysis. In addition, CAASD's charter permits access to sensitive and confidential agency information and data that is not normally available to support contractors. CAASD's expertise is critical to FAA in transforming the nation's air transportation system in an effective and timely manner.

4. How Do You Know The Program Works?

While the relationship between the FAA and CAASD can be described as a well-functioning partnership, the FFRDC entity must be managed and focused to perform the most important work of the agency, while conserving scarce resources. Periodic program assessments are employed and a structured management framework is in place to ensure that completed work yields effective and efficient results. A major review is conducted every five years to validate and justify the continued need for the FFRDC as well as to assess its efficiency and effectiveness. Two key components of the FAA's ongoing CAASD management program are the FAA's FFRDC Executive Board (FEB) and the Outcome Management Team (OMT). The FEB meets semi-annually to approve Outcomes, formulate and review goals and objectives of CAASD programs, and determine broad policy matters. The OMT, chaired by the Director, Systems Engineering and Safety, is comprised of senior managers responsible for ensuring the optimal allocation of resources, maximizing benefits from CAASD products and services, and ensuring that work performed by CAASD is consistent with the mission and criteria approved for the FFRDC. This senior management involvement illustrates the importance FAA places on CAASD. The CAASD PBWP, the traditional foundation for CAASD planning, defines the research, systems engineering, analysis activities, and products targeted to achieve several defined Outcomes. The FAA CAASD Long Range Plan maps out projected requirements for five years. CAASD is evaluated periodically using several structured mechanisms to ensure FFRDC efficiency and effectiveness.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

MITRE/CAASD conducts high quality research, systems engineering, and analytical capabilities help FAA meet the technically complex challenges in the NAS. CAASD efforts support all strategic plan goals across the board and the FFRDC continues to play a key role in defining NextGen. Its expertise is critical to FAA's efforts to transform the nation's air transportation system in an effective and timely manner.

Detailed Justification for - 4A09 Aeronautical Information Management Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aeronautical Information Management Program
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aeronautical Information Management Program	$18,263	$20,200	$2,000	-$18,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$200.0
2. Software Design and Development	---	1,500.0
3. Telecommunications	---	100.0
4. System Development and Analysis	---	200.0
Total	Various	$2,000.0

For FY 2013, $2,000,000 of funding is requested for Segment 2 to leverage planning efforts in the Next Generation Air Transportation System (NextGen) Common Structure and Status Data (CSSD) program (Part of the Collaborative ATM solution set) to baseline and implement suitably mature AIM technologies and tools for Aeronautical Information exchange comprising the infrastructure for the Aeronautical Common Service and the provision of special activity airspace and airport data. These data feeds through the ACS will deliver information across the NAS using standard SWIM compliant protocols and meet objectives for NextGen in delivering ON Demand NAS Information and RTCA Task Force 5.

2. What Is This Program?

The purpose of the AIM Modernization program is to provide aviation users with digital aeronautical information that conforms to international standards and supports Next Generation Air Transportation System (NextGen) objectives and meets the needs of AIM's customers, both in the short term, and in the longer term. Digital aeronautical data enables the timely processing of data to improve mapping, flight planning, and the timeliness and accuracy of air traffic control instructions. The program will re-engineer the business processes for the management and provision of key aeronautical information using digital technology that is consistent with FAA and international architecture standards.

Following a July 2006 ATO Executive Council Investment Analysis Readiness Decision (IARD), the AIM group was organized, and it was assigned the responsibility for developing a system for managing the generation, processing, storage and distribution of aeronautical information to internal and external aviation customers. This began with the analysis of current system capability, and process deficiencies, and led to the planning, development and implementation of solutions to address identified deficiencies consistent with FAA goals, objectives and targets identified in the Flight Plan.

Segment 2 will build on pre-implementation efforts in the NextGen CSSD program (Part of the Collaborative ATM solution set) to baseline and implement suitably mature AIM technologies and tools for Aeronautical Information exchange.

- ACS will improve workflows for SAA management with web services using a Service Oriented Architecture (SOA) to allow for communication of SAA relevant information among stakeholders. Digital

management of SAAs will also facilitate calculation of metrics, analysis of SAA usage, integration with industrial partners, and scheduling automation.
- ACS will provide critical information about airports including airport mapping and configuration information and a variety of applications for using this data.

Results obtained in CSSD planning phase during FY 2010 include:
- Formed the AIM Community of Interest to foster critical relationships and agreements with the stakeholders for the flow of aeronautical information
- Developed concept of operations for the aeronautical common service
- Developed a National Special Activity Airspace (SAA) Concept of Operations and Enterprise Architecture consistent and integrated with the NASEA
- Demonstrated web services and visualization for the provision of airport data
- Demonstrated capability to aggregate and visualize facility equipment data in context with AIM managed aeronautical data
- Demonstrated capability to provide a standardized, consistent, and managed digital special activity airspace definitions describing the airspace within the NAS for use by external and internal air traffic systems
- Demonstrated capability for digital data capture of taxi routes and runway configuration definitions found in facility standard operating procedures and letter of agreement and data distribution using AIXM and industry standards for information exchange

Based on the projected work plan, products that will be developed in FY 2011 include:
- Deploy new operational sites and deliver NOTAM system disaster recovery site
- Progress towards an In-Service Decision for AIM Modernization Segment 1
  Continue implementing AIM Modernization - Segment 1
- Continue transitioning from legacy AIM systems to AIM Modernization - Segment 1
- Begin phased AIM Modernization Segment 1 deployment
- Perform the investment analysis and develop acquisition package for
  the final AMS decisions supporting AIM Modernization - Segment 2
- Continue solution development for the ACS and the capabilities for airport data provision and SAA that were demonstrated in FY 2010

DOT Strategic Goal - Safety
- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

AIM Modernization Segment 2 is in the process of developing quantitative benefits during the investment analysis phase. It targets enhancements and new functionality to improve and expand AIM services. The segment will improve the accuracy and timeliness of Special Activity Airspace and Airport information management and flow through the development of the Aeronautical common service, a NextGen common service identified in the NextGen segment implementation plan to support multiple NextGen Operational improvements.

Standardizing and centralizing aeronautical data within the NAS will contribute to meeting the FAAs safety performance goals and will enhance the safety of FAA air traffic control systems. NAS safety depends upon the timely and accurate exchange of information between internal and external users.

4. How Do You Know The Program Works?

The capability to enhance and expand standardized and integrated aeronautical information flow was demonstrated in the Common Status and Structure Program in FY 2010 focusing on several key operational threads including provision of special activity airspace information, digital data capture of information found in standard operating procedures and letters of agreement, provision of airport data, and aggregation and visualization of facility equipment information combined with AIM managed Aeronautical information using FAA and industry standards for information exchange. Demonstrations at the AIM Community of Interest session were well received and provided excellent feedback from key stakeholders for refinement of the capabilities.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$2,000,000 is required for AIM Modernization Segment 2 to build on efforts in the NextGen CSSD program (Part of the Collaborative ATM solution set) to baseline and implement suitably mature AIM technologies and tools for Aeronautical Information exchange. This includes the development of infrastructure to support the ACS and services for the provision of SAA information and airport data.

Detailed Justification for – 5A01 Personnel and Related Expenses

What Do I Need To Know Before Reading This Justification?

- This program funds the personnel, travel and related expenses of the Federal Aviation Administration (FAA) Facilities and Equipment (F&E) workforce.
- The FAA F&E workforce includes electronic, civil and mechanical engineers; electronics technicians; quality control and contract specialists; and flight inspection personnel.
- There is active oversight on the expenditure of these funds throughout the FAA.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Personnel and Related Expenses
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Personnel and Related Expenses	$474,050	$475,000	$480,000	+$5,000

For FY 2013, $480,000,000 is requested to pay the personnel, travel and related expenses for the FAA F&E workforce performing work critical to FAA's efforts to modernize the National Airspace System (NAS). Following is a table that reflects the request:

	FY 2012 Enacted	Change	FY 2013 Request
Personnel Compensation and Benefits	$422,000	+$3,200	$425,200
Travel	36,800	+1,800	38,600
Other Objects	16,200	0	16,200
Total	$475,000	+$5,000	$480,000

2. What Is This Program?

This program sustains the current Facilities and Equipment (F&E) workforce and related expenses.

3. Why Is This Particular Program Necessary?

The F&E workforce ensures that new system enhancements, such as the Next Generation Air Transportation System (NextGen), contribute to the overall efficiency, safety, and reliability of the NAS. Civil, mechanical and electrical engineers are required to provide technical support for design reviews, perform site preparation and installation, conduct technical evaluations, and provide systems integration and in-service management.

4. How Do You Know The Program Works?

The F&E workforce succeeds in delivering F&E programs on specification and in ensuring that programs are completed successfully.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

For FY 2013, the agency requests an increase of $5,000,000 to support NextGen implementation and to maintain the NAS infrastructure. The increase includes $3,200,000 in increased pay requirements with $1,580,000 for the 2013 pay raise and $1,620,000 for one additional compensable day.

A program increase of $1,800,000 is requested to cover increased travel requirements driven acceleration of various navigation-related activities, such as NAVLEAN and OAPM (Metroplex). Aviation Safety personnel will accelerate activities related to operator and pilot certification for new procedures. By the end of fiscal 2013, OAPM activities will undergo the following transitions: from evaluation to implementation in Washington DC, North Texas, and Houston; from design to evaluation in Charlotte, NC, Northern California, and Atlanta; from study through design to implementation in Southern California, and from study to design in Florida. Additionally, studies will begin in Chicago and Phoenix and move into the design phase in 2013. Because other program travel requirements will remain undiminished in 2013 (ERAM implementation will continue through 2013), additional travel funds are being requested for OAPM in FY 2013 above the 2012 levels.

Finally, of the total 3,181 positions and 2,907 FTEs requested in FY 2013, up to 257 positions and 216 FTEs are dedicated to NextGen programs, including new positions to support the OAPM/NAVLEAN acceleration proposal included in this budget request.

RESEARCH, ENGINEERING, AND DEVELOPMENT

(CANCELLATION)

(AIRPORT AND AIRWAY TRUST FUND)

For necessary expenses, not otherwise provided for, for research, engineering, and development, as authorized under part A of subtitle VII of title 49, United States Code, including construction of experimental facilities and acquisition of necessary sites by lease or grant, $180,000,000, to be derived from the Airport and Airway Trust Fund and to remain available until September 30, 2015: Provided, That there may be credited to this appropriation as offsetting collections, funds received from States, counties, municipalities, other public authorities, and private sources, which shall be available for expenses incurred for research, engineering, and development.

Of the unobligated balances from prior year appropriations available under this heading, $26,183,998 are hereby cancelled: Provided, That no amounts may be cancelled from amounts that were designated by the Congress as an emergency requirement pursuant to the Concurrent Resolution on the Budget or the Balanced Budget and Emergency Deficit Control Act of 1985, as amended.

PROGRAM AND FINANCING
($ in Millions)

Identification code: 69-8108-0-7-402		FY 2011 Actual	FY 2012 Enacted	FY 2013 Estimate
	Obligations by pro gram activity:			
	Direct program			
0011	Improve aviation safety	85	101	95
0012	Improve efficiency of the air traffic control system	44	44	43
0013	Reduce environmental impact of aviation	36	34	35
0014	Improve the efficiency of mission support	7	8	6
0801	Reimbursable program	2	12	12
0900	Total new obligations	174	199	191
	Budgetary resources available for obligation:			
1000	Unobligated balance carried forward, end of year	52	77	58
1021	Recoveries of prior year unpaid obligations	28	-	-
1050	Unobligated balance (total)	80	77	58
	New budget authority (gross), detail:			
	Discretionary			
1101	Appropriation (special or trust fund)	170	168	180
1133	Unobligated balance of appropriations temporarily reduced	-	-	-26
1160	Appropriation, discretionary (total)	170	168	154
	Spending authority from offsetting collections:			
1750	Offsetting collections (cash)	2	12	12
1900	Total new budget authority (gross)	172	180	166
	Change in unobligated balances:			
3000	Total new obligations	195	158	157
3040	Total outlays (gross)	-181	-200	-201
3100	Obligated balance, end of year	153	152	142
	Outlays (gross), detail:			
4010	Outlays from new discretionary authority	63	86	91
	Offsets:			
	Against gross budget authority and outlays			
4030	Offsetting collections (cash) from: Federal sources	-7	-12	-12
	Net budget authority and outlays:			
4180	Budget authority	170	168	154
4190	Outlays	174	188	189

This account provides funding to conduct research, engineering, and development to improve the national airspace system's capacity and safety, as well as the ability to meet environmental needs. For 2013, the proposed funding is allocated to the following performance goal areas of the FAA: improve safety, economic competitiveness, and environmental performance of the National Airspace System. The request includes funding for several research and development activities of the Next Generation Air Transportation System (NextGen), as well as the Joint Planning and Development Office which coordinates the interagency NextGen efforts, including activities related to unmanned aircraft systems. The Budget proposes to cancel $26 million in unobligated balances from this account.

OBJECT CLASSIFICATION
($ in Millions)

Identification code: 69-8108-0-7-402		FY 2011 Actual	FY 2012 Enacted	FY 2013 Estimate
	Direct obligations:			
	Personnel compensation			
1111	Full-time permanent	28	30	30
1113	Other than full-time permanent	1	1	1
1119	Total personnel compensation	29	31	31
1121	Civilian personnel benefits	8	8	8
1210	Travel and transportation of persons	1	2	2
1255	Research and development contracts	116	127	120
1260	Supplies and materials	2	2	2
1310	Equipment	2	2	2
1410	Grants, subsidies, and contributions	14	15	14
1990	Subtotal, obligations, Direct obligations	172	187	179
	Reimbursable obligations:			
2255	Research and development contracts	2	12	12
2990	Subtotal, obligations, Reimbursable obligations	2	12	12
9999	Total obligations	174	199	191

Employment Summary

Identification code: 69-8108-0-7-402		FY 2011 Actual	FY 2012 Enacted	FY 2013 Estimate
	Direct:			
1001	Civilian full-time equivalent employment	265	270	270

EXHIBIT III-1
RESEARCH, ENGINEERING & DEVELOPMENT
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations

	FY 2011 ACTUAL	FY 2012 ENACTED	FY 2013 REQUEST	CHANGE FY 2012-2013
Improve Aviation Safety	91,321	89,314	94,760	5,446
Improve Efficiency	37,798	34,174	45,144	10,970
Reduce Environmental Impacts	35,134	38,574	34,637	-3,937
Mission Support	5,407	5,494	5,459	-35
TOTAL	**169,660**	**167,556**	**180,000**	**12,444**
FTEs				
Direct Funded	265	270	270	0
Reimbursable, allocated, other	0	0	0	0

Program and Performance Statement

This account provides funding for establishing and overseeing FAA's Research and Development (R&D) policies and plans. Its diverse scientific, engineering and technical workforce supports all aspects of aviation from research on materials to development of new products and procedures.

In partnership with both domestic and international entities within the aviation community, the FAA RE&D programs provide world leadership by conducting high-priority research and developing innovative technologies to support a safe, efficient, and environmentally acceptable global aviation system.

EXHIBIT III-1a

RESEARCH, ENGINEERING & DEVELOPMENT
SUMMARY ANALYSIS OF CHANGE FROM FY 2012 TO FY 2013
Appropriations, Obligations, Limitations, and Exempt Obligations
($000)

Item	Change from FY 2012 to FY 2013 $000	Change from FY 2012 to FY 2013 FTE
FY 2012 Enacted	**167,556**	**270**
Annualization of FY 2012 FTE	0	
FY 2013 Pay Raise	144	
Additional Compensable Day	149	
Non-pay Inflation	0	
Subtotal, Adjustments to Base	**294**	**0**
New or Expanded Programs		
Safety	5,222	
Economic Competitiveness	10,938	
Environmental Sustainability	-3,957	
Mission Support	-53	
Subtotal, New or Expanded Programs	**12,150**	
FY 2013 Request	**180,000**	**270**

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	FEDERAL AVIATION ADMINISTRATION	**FY 2013 Request**	**Page**
A. Research, Engineering and Development		**180,000**	
A11	**Safety**	**94,760**	
a.	Fire Research and Safety	7,667	9
b.	Propulsion and Fuel System	2,882	16
c.	Advanced Structural/Structural Safety	2,569	19
d.	Atmospheric Hazards-Aircraft Icing/Digital System Safety	6,644	24
e.	Continued Airworthiness	13,202	30
f.	Aircraft Catastrophic Failure Prevention Research	1,691	36
g.	Flightdeck/Maintenance/System Integration Human Factors	5,416	40
h.	System Safety Management	11,345	44
I.	Air Traffic Control Technical Operations Human Factors	10,014	50
j.	Aeromedical Research	9,895	56
k.	Weather Program	15,539	63
l.	Unmanned Aircraft System	5,901	69
m.	NextGen Alternative fuels for General Aviation	1,995	73
A12	**Economic Competitiveness**	**45,144**	
a.	JPDO	12,000	78
b.	NextGen Wake Turbulence	10,350	85
c.	NextGen: Air Ground Integration	10,172	90
d.	NextGen: Self-Separation	7,796	96
e.	NextGen Weather in the Cockpit	4,826	101
A13	**Environmental Sustainability**	**34,637**	
a.	Environment and Energy	14,776	107
b.	NextGen Environmental Research Aircraft Technologies Fuels and Metrics	19,861	114
A14	**Mission Support**	**5,459**	
a.	System Planning and Resource Management	1,757	121
b.	William J. Hughes Technical Center Laboratory Facility	3,702	123

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Detailed Justification for
A11.a Fire Research and Safety

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – Fire Research and Safety

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.a Fire Research and Safety	$7,158,000	$7,158,000	$7,667,000	+$509,000

For FY 2013, $7,667,000 is requested for Fire Research and Safety. Major activities and accomplishments planned include:

Improve Aircraft Fire Protection and Occupant Fire Survivability

- Define fire safety performance criteria for cargo containers used for the bulk shipment of lithium batteries.
- Determine the effectiveness of Halon 1301 in controlling bulk shipments of rechargeable lithium batteries under full-scale cargo compartment fire test conditions.
- Develop a standard test procedure for lithium battery fire suppression in the Minimum Performance Standard (MPS) for halon replacement agents in cargo compartments.
- Evaluate the effectiveness of FAA certification criteria to prevent cockpit smoke build-up during an in-flight fire.

Improved Flammability Standards for Aircraft Materials

- Develop a flammability test method for seat structure incorporating potentially combustible materials such as magnesium alloys.
- Upgrade Aircraft Materials Fire Test Handbook in support of rulemaking to revamp FAA flammability regulations.

For FY 2013, FAA research continues to focus on in-flight fire safety in both freighter (all cargo) and passenger-carrying aircraft. In freighter aircraft, work will continue on the development of a practical and cost-effective fire detection and suppression system. Also, the safe transportation of lithium batteries will be emphasized by the evaluation of available agents and systems to extinguish lithium battery fires and the development of fire-hardened containers to ship lithium batteries. Work will continue to meet deadlines proposed by the International Civil Aviation Association (ICAO) to ban halon – an ozone depleting and global warming chemical – used extensively in aircraft fire extinguishing systems. Particular emphasis will be placed on the evaluation of environmentally-friendly replacement agents under full-scale fire test conditions in cargo compartments – by far, the largest and most challenging application for halon.

FAA will continue to develop and standardize new flammability tests to reduce the risk from an uncontrollable in-flight fire, improve existing flammability tests, and develop new tests for novel applications of material that may impact fire safety. This work supports unprecedented FAA rulemaking activity to improve and simplify the flammability requirements for materials. Effective fire tests and performance criteria are needed for hidden area materials (wiring, ducting), fuselage structural composites, and the novel application of magnesium alloy in seat structure.

Research in support of improving the flammability standards for aircraft materials will focus on the development of computational models to predict the impact of material substitutions and ultra-fire resistant materials on cabin fire safety and occupant survivability. Researchers will also continue to develop and evaluate non-hazardous ultra-fire resistant materials for a fire proof cabin.

2. What Is This Program?

The FAA issues aircraft fire safety rules that govern material selection, design criteria, and operational procedures. The new test methods, reports, and journal publications produced by the Fire Research and Safety Program describe the technical basis for these regulations and offer guidance for regulatory compliance. We provide industry with state-of-the-art safety products and information as a result of our ongoing research and produce publications and government-owned patents on new materials, fire test instrumentation, and analytical methodologies.

The program develops technologies, procedures, test methods, and fire performance criteria that can prevent accidents caused by hidden cabin or cargo compartment in-flight fires and fuel tank explosions, and improve survivability during a post-crash fire. Systems fire protection and materials fire safety focuses on near-term improvements in fire test methods and materials performance criteria, fire detection and suppression systems, and hazardous materials fire safety. Fire research addresses fundamental issues of combustion toxicity, the impact of flame retardant chemicals on the fire and health hazards of cabin materials, and the impact of materials flammability on the initiation of in-flight fires and post-crash survivability.

The Fire Research and Safety Program works with the following industry and government groups:

- Aircraft Safety Subcommittee of the FAA Research, Engineering and Development Advisory Committee (REDAC) – These representatives from industry, academia, and other government agencies annually review the program's research activities.
- Technical Community Representative Groups – FAA representatives apply formal guidelines to ensure the program's research projects support new rule making and development of alternate means of compliance for existing rules.
- Aircraft manufacturers (U.S. and foreign), airlines, foreign airworthiness authorities, chemical companies, material suppliers, and aircraft fire safety equipment manufacturers meet regularly to share information on interior material fire tests and improvement of fire detection and suppression systems and jointly funded university research on ultra fire resistant materials.
- National Transportation Safety Board (NTSB) – FAA works with and supports NTSB on in-flight fire incidents, on-site accident investigations, and related testing.
- Pipeline and Hazardous Materials Safety Administration (PHMSA) – FAA works with PHMSA to cooperatively develop requirements/guidelines for the safe transport of hazardous materials (current focus is on lithium batteries).
- International Civil Aviation Organization (ICAO) – FAA provides expertise on the development of a mandate by ICAO to require the replacement of halon in civil aviation by specific dates.
- American Society for Testing and Materials (ASTM) - FAA works with ASTM to update and maintain a new flammability test method based on the FAA microscale combustion calorimeter, codified as ASTM D7309.

Fire Research and Safety Program R&D partners include:

- FAA-sponsored International Systems Fire Protection Working Group – R&D involves lithium battery fire hazards, freighter aircraft safety, hidden fire safety, fire and smoke detectors, halon replacement, and fuel tank protection.
- FAA-sponsored International Aircraft Materials Fire Test Working Group – R&D involves development and standardization of improved material fire tests.

- Memorandum of Cooperation with the British Civil Aviation Administration – R&D involves a variety of fire safety research efforts.
- Cabin Safety Research Technical Group – cooperates in and coordinates cabin safety research conducted and/or sponsored by international regulatory authorities.
- Research consortia with Fortune 100 companies and other agencies to share cost of developing new fire-resistant materials and numerical fire models.

In FY 2012, major activities and accomplishments planned include:

Improve Aircraft Fire Protection and Occupant Fire Survivability

- Completed tests in engine fire simulator to determine the fire extinguishing effectiveness and performance criteria for novel, environmentally friendly dry powder agent.
- Developed a cost-effective halon (an ozone depleting and global warming chemical) replacement system for hand-held extinguishers.
- Evaluated the effectiveness and safety (toxicity) of hand-held extinguishers discharging contaminated halon.
- Determined the capability of existing airline hazardous materials containers for preventing the hazards of a lithium battery fire from spreading outside of the containers.
- Studied novel agents and systems for the suppression of cargo fires in freighter aircraft.
- Extended the FAA ThermaKin burning model to two-dimensional burning of layered and structural composite materials.
- Down-selected computational fluid dynamics models for full-scale aircraft cabin fire model.
- Validated and implemented National Institute of Standards and Technology (NIST) computational fluid dynamics model for cargo compartment fires to assess fire detection, suppression and mitigation (flight plan) strategies.
- Determined the effect of altitude (pressure) and oxygen concentration (partial pressure) on burning rate of plastics in order to develop mitigation strategies (e.g., flight plan, inerting) for in-flight cargo fires.
- Developed a probabilistic model for flame (Bunsen burner) and fire (rate of heat release apparatus) test results using FAA microscale combustion calorimeter data to predict compliance with test criteria (pass/fail).

Improved Flammability Standards for Aircraft Materials

- Defined composite fuselage fire safety design criteria.
- Developed an improved next generation burner test method for the fireworthiness of engine components.

Research continued on in-flight fire safety in both freighter (all cargo) and passenger-carrying aircraft. Related to freighter aircraft, fire extinguishing tests were conducted with promising agents toward the development of a practical and cost-effective suppression system. Also, fire tests evaluated available agents and systems to extinguish lithium battery fires and supported the development of a fire-hardened container to ship lithium batteries. This work was driven by proposed rulemaking by the Pipeline and Hazardous Materials Safety Administration (PHMSA), in consultation with FAA, to improve the fire safety aspects of the transportation of lithium batteries. In addition, because of deadlines proposed by the International Civil Aviation Organization (ICAO), more full and large-scale tests were conducted on engine, hand-held, and cargo compartment applications to replace halon with practical and effective agents that are environmentally acceptable in terms of ozone depletion and global warming. Also, discovery of contamination in recycled halon required testing to determine the effect on extinguishment effectiveness and safety (toxicity).

The FAA also continued its research on the improvement of existing flammability tests and the development of new tests for novel applications of materials that may impact fire safety. A next generation oil burner was adapted for power plant component fire tests because the existing antiquated burner produces variable results. Also, new fire tests and performance criteria were developed for structural composite fuselages, such as the new Boeing 787. Work will be continued on the development of computational models to predict the effect of material substitutions and ultra-fire resistant materials on aircraft fire safety and occupant survivability.

Fire Research and Safety is an in-house program that supports the DOT's strategic goal of increasing aviation safety by reducing the number of accidents associated with aircraft fires and by mitigating the effects of a post-crash ground fire.

FAA will work to reduce the number of accidents and incidents caused by in-flight fire in both passenger-carrying and all-cargo (freighter) aircraft, to prevent fuel tank explosions, and to improve survivability during a post-crash fire. Near-term research will focus on improved fire test standards for interior materials; new fire tests for novel material applications such as composite fuselage structure and magnesium seats; high energy lithium battery fire safety; supporting the replacement of halon, in FAA-required fire extinguishing systems; and new or improved fire detection and extinguishment systems. Long term research will be conducted to support near term improvements and develop computational models to support the enabling technology for a fireproof aircraft cabin.

The following goals directly support the ultimate strategic goals of in-flight fire prevention, fuel tank explosion prevention, and improved post-crash fire survivability:

- By FY 2013, define performance criteria for cargo containers for the safe shipment of lithium batteries.
- By FY 2014, use full-scale cabin fire models to demonstrate the effects of material improvements and substitutions on post-crash fire survivability and the likelihood of in-flight fires.
- By FY 2014, determine viable and environmentally safe agents/systems to replace halon in cargo compartment fire suppression systems.
- By FY 2016, demonstrate the effectiveness of an integrated fire suppression system using nitrogen available from a fuel tank inerting system.

3. Why Is This Particular Program Necessary?

The consequences of fire in commercial aviation are great – the large loss of life in accidents either caused by fire (in-flight fire and explosions) or as a consequence of fire (post-crash fire), and the destruction of the aircraft. It is an awesome challenge to prevent accidents caused by in-flight fire or fuel tank explosions and to improve survivability by mitigating the effects of a post-crash fire when one considers the following: the passengers are in a densely populated and confined space; the wings are laden with tens of thousands of gallons of flammable jet fuel; the cabin is furnished and lined with plastic materials; tens of miles of wiring and cable are routed behind the cabin walls, ceiling and floor; and below the floor in the cargo compartment is flammable passenger luggage and cargo. To prevent or mitigate the effects of fire, the majority of the research is directed toward the development of new or improved fire tests for interior materials and cost-effective fire extinguishing systems.

The FAA Fire Research and Safety Program is largely driven by accidents, NTSB recommendations, new technology, new fire threats, and environmental concerns. In the 1980's and early 1990's the emphasis was on improved post-crash fire survivability. However, three catastrophic accidents in the 1990's have driven research priorities over the past decade: ValuJet (1995, 110 fatalities), TWA 800 (1995, 230 fatalities) and Swiss Air (1998, 229 fatalities). Currently, fire safety research is addressing destructive freighter fires and the continuing threat of in-flight fire (e.g., over 900 incidents of odor and smoke occur each year in the United States in large transport aircraft); structural composite fuselage fire resistance (e.g., B787) and other proposed new interior materials such as magnesium alloys; fuel tank flammability in composite wings; the growing threat of lithium batteries in cargo shipments, passenger personal electronic devices and in aircraft emergency power systems; and the need for environmentally-acceptable and practical replacements for halon extinguishing agents.

As described earlier, there are very significant opportunities for a serious fire in a large transport aircraft. Although the likelihood of such a fire is rare, the consequences can be great. For example, the most catastrophic in-flight fire in the history of aviation caused 301 fatalities (Saudia L-1011, 1980). The goals of the Fire Research and Safety Program are to prevent in-flight fires and fuel tank explosions, and to improve survivability in the event of a post-crash fire. Saving lives and preventing property losses are the obvious benefits of this program. Practically every major fire safety improvement implemented in transport aircraft throughout the world over the past 30 years has been a product of this program. Over the years these improvements have undoubtedly saved many lives. For example, on August 2, 2005 an Airbus A340 with 297 passengers and 12 crewmembers landing at Toronto International Airport during a thunderstorm, ran off the end of the runway, came to a stop in a ravine and was destroyed by an ensuing fire. Similarly, on December 20, 2008 a Continental 737 with 110 passengers and 5 crewmen veered off the runway at Denver International Airport during attempted take-off in a strong crosswind, experienced a post-crash fire and was extensively damaged. Although there were some injuries, none of the 424 occupants of the two airplanes involved in these very serious accidents were killed, likely due at least in part to fire safety improvements that were products of the Fire Safety and Research Program.

In an attempt to quantify the improvement in fire safety over the past 40 years, 672 world-wide survivable accidents involving large transport turbojet and turboprop airplanes were analyzed from 1968 to 2007. It was determined that survivability improved markedly over the study period with a greater proportion of accidents being survivable and a marked increase in the proportion of occupants surviving the accident. In fact, the probability of dying in an aircraft fire has been reduced (improved) by a factor of three. The study is described in the FAA report, "Trends in Accidents and Fatalities in Large Transport Aircraft", which is accessible at http://www.fire.tc.faa.gov/reports/listresults.asp?searchList=DOT%2FFAA%2FAR-10%2F16&listSubmit=Submit.

If the program were not funded potential future improvements in fire safety may not be realized. The large number of unknown smoke and odor incidents – over 900 annually in the United States – continues to be a great concern. New technologies such as composite structure or magnesium seat components would be introduced without adequate safeguards. In addition, the risk of a fire caused by the shipment of hazardous cargo such as lithium batteries would be greater. The major aircraft manufacturers such as Boeing and Airbus do not have programs to increase aircraft fire safety. However, they closely monitor and are dependent upon the FAA's fire safety research and work cooperatively with FAA to evaluate and develop improvements.

4. How Do You Know The Program Works?

Over the past 30 years, every major improvement in aircraft fire safety that has been implemented by FAA through the regulatory and advisory process was a product of this program. As previously discussed, a recent analysis of world-wide accidents has shown that the probability of dying in an aircraft fire has been reduced (improved) by a factor of three. Major recent examples of these regulatory products are (1) in-flight fire resistant thermal acoustic insulation (effective 9/2/05), (2) explosion prevention fuel tank inerting systems (effective 9/19/08), and (3) burn-through resistance thermal acoustic insulation (effective 9/2/09). The future benefit of the first two rules was projected by FAA to be the prevention of two to three catastrophic aircraft accidents, which would have caused many hundreds of fatalities. Also, in 2010, based on FAA fire safety R&D, (1) a Safety Alert for Operators (SAFO) was issued entitled "Risks in Transporting Lithium Batteries in Cargo by Aircraft", (2) a proposed revised advisory circular "Hand-Held Fire Extinguishers for use in Aircraft' was published in the Federal Register, and (3) a final rule became effective for the fire-safe shipment of oxygen cylinders and generators.

Almost all of the work is conducted in-house by internationally recognized experts in aircraft fire safety and research. The FAA operates the world's most extensive aircraft fire test facilities. The vast majority of the work is directed toward the improvement by FAA fire safety regulations. In addition, FAA certification engineers receive training in these facilities on the material flammability test standards developed by this program that are now FAA regulations. At the request of the NTSB, program personnel participate in major fire accident and incident investigations. The Fire Research and Safety Program annually publishes over two dozen reports and papers (available to the public online at http://www.fire.tc.faa.gov/reports/reports.asp) highlighting research results that have led to major improvements in aircraft safety. In addition, the results of FAA's research is often published in peer-reviewed scientific journals, presented at technical conferences, and/or discussed at technical workshops. In 2009, 17 publications were authored by fire safety researchers, which accounted for about 30% of the publications by researchers at the FAA's William J. Hughes Technical Center.

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure that FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms. The Subcommittee on Aircraft Safety (SAS), in particular, is the arm of the REDAC that oversees and critiques the FAA's aircraft safety R&D programs. Over the years the SAS has been complimentary and supportive of the Fire Research and Safety Program. The following SAS commentary illustrates the generally positive assessment of this program by the SAS: "The Safety Subcommittee believes that fire facility and personnel at the Tech Center are truly world-class, and it continues to provide meaningful benefits to the FAA, industry, and traveling public. The Safety Subcommittee believes that the FAA needs to ensure that this research capability is retained in the future and that its facilities are identified and maintained as critical national resources. The Ultra-fire Resistant Polymer program appears to be producing amazing results for very little resource expenditure. This is an excellent example of a proactive research approach and capability development."

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The Fire Research and Safety Program develops the enabling technology to improve fire safety in transport aircraft. The products of the research are implemented into aviation by rulemaking, advisory materials and technology transfer. It is the only comprehensive program of this type and the researchers are recognized throughout the world as the experts in aircraft fire safety. Reductions in funding could would delay the implementation of fire safety improvements and increase the risk of an accident caused or accompanied by fire and the likelihood of fire fatalities.

Specific items in the program that could be impacted by a reduction in funding, depending on the actual level, that have a direct bearing on aircraft fire safety include the following:

- Performance criteria for lithium battery shipment containers.
- Efficacy of Halon 1301 in controlling a large shipment of rechargeable lithium batteries.
- Development of a cost effective fire suppression system for the main cargo compartments of freighter aircraft.
- Effectiveness of current aircraft design and operational procedures in preventing the accumulation of visibility-impairing smoke in the cockpit during an in-flight fire.
- Flammability test method for magnesium alloy seat structure.
- Standardization of more stringent and realistic fire test methods for aircraft wiring and ducting.
- Development of computational cabin fire models for predicting the impact of material substitutions on cabin fire safety and survivability.

- Determining the impact of a proposed ban on a class of fire retardants on the ability of industry to adhere to current material flammability regulations.
- Identification of environmentally acceptable halon replacement agents, through full-scale fire testing, that effectively extinguish, suppress, or control in-flight fires (should the availability of halon in the near future become problematic to the aviation community).

Detailed Justification for
A11.b Propulsion and Fuel Systems

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – A11.b Propulsion and Fuel Systems

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.b Propulsion and Fuel Systems	$2,301,000	$2,300,000	$2,882,000	+$582,000

For FY 2013, $2,882,000 is requested for Propulsion and Fuel Systems. Major activities and accomplishments planned include:

Incorporate Damage Tolerance into the Safe Life Rotor Design Process

- Release an enhanced version of DARWIN® (Design Assessment of Reliability with Inspection), the probabilistic rotor design and life management code.

The Probabilistic Design for Rotor Integrity (PDRI) program continues to address material and manufacturing anomalies that can increase the risk of failure of critical rotating turbine engine parts by advancing DARWIN®, the probabilistically-based turbine engine rotor design and life management code in order to enhance its predictive capability. These enhancements map directly to future Advisory Circulars (ACs) planned by the Engine and Propeller Directorate (ANE), and benefits will accrue in the form of a reduced risk of engine failures and fewer accidents, which in turn will lead to fewer injuries and fatalities.

The PDRI program also continues to develop advanced damage tolerance methods for turbine rotor disks through experimentation and modeling to address the effects of complex time-temperature stress histories, small crack sizes, anomalies in nickel alloys, crack geometries, and surface residual stress on fatigue crack growth life. The program also contributes to the continued airworthiness of turbine engines by developing additional fleet assessment capabilities within DARWIN®.

2. What Is This Program?

FAA establishes rules for the certification and operation of aircraft engines, fuels, and airframe fuel management systems. The Propulsion and Fuel Systems Program provides the technical information, R&D resources, and technical oversight necessary for the agency to enhance the airworthiness, reliability, and performance of propulsion and fuel systems. The agency uses the results of this research to generate ACs and various other forms of technical information detailing acceptable means of compliance to guide certification and airworthiness specialists and inspectors.

The Propulsion and Fuel Systems Program supports the FAA Flight Plan 2009-13 Goal 1 (Increased Safety), Objective 1 (Reduce commercial air carrier fatalities).

The Propulsion and Fuel Systems program develops technologies, procedures, test methods, and criteria to enhance the airworthiness, reliability, and performance of civil turbine and piston engines, propellers, fuels, and fuel management systems. To improve safety, the program conducts research needed to develop tools, guidelines, and data to support improvements in turbine engine certification requirements.

The Propulsion and Fuel Systems Program works with the following industry and government groups:

- Aircraft Safety Subcommittee of the Research, Engineering and Development Advisory Committee – representatives from industry, academia, and other government agencies annually review the program's activities.
- Technical Community Representative Groups (TCRGs) – FAA representatives apply formal guidelines to ensure the program's research projects support new rulemaking and development of alternate means of compliance for existing rules.
- The Aerospace Industries Association (AIA) – working subcommittees on rotor integrity and rotor manufacturing.

Propulsion and Fuel Systems Program R&D partners include:

- PDRI Program – Southwest Research Institute has teamed with Pratt and Whitney, General Electric, Honeywell, and Rolls Royce to develop DARWIN®, the probabilistic-based rotor life and risk management certification tool.
- The AIA working subcommittees on rotor integrity and rotor manufacturing.

In FY 2012, major activities and accomplishments planned include:

Incorporate Damage Tolerance into the Safe Life Rotor Design Process

- Continued the enhancement of the DARWIN® probabilistic rotor design code.

The main research area within the Propulsion and Fuel Systems Program is to ensure the structural integrity and durability of critical rotating engine parts in turbine engines throughout their service life. This research is providing analytical tools to meet the requirements of AC 33.14-1, "Damage Tolerance for High Energy Turbine Engine Rotors," allowing aircraft turbine engine manufacturers to assess the risk of fracture and manage the life of rotor disks. The research goal is:

- By FY 2015, develop a certification tool that will predict the risk of failure of rotor disks containing material and manufacturing anomalies.

3. Why Is This Particular Program Necessary?

In spite of a history of safe turbine engine operation in commercial aviation, the threat of an engine failure is always present and the potential consequences are enormous – the large loss of life in accidents and the destruction of the aircraft. Although they are few, accidents such as United Airlines Flight 232 on July 19, 1989 in Sioux City, Iowa, and Delta Airlines Flight 1288 on July 6, 1996 in Pensacola, Florida are noteworthy because they were caused by the failure of turbine engine components that caused catastrophic loss of life and aircraft. Turbine engine research is conducted to study the causes of failures and determine how to prevent them in the future.

FAA Propulsion and Fuel Systems research, conducted in conjunction with the manufacturers, has shown that the primary inherent failure modes in these accidents result from the presence of material and manufacturing anomalies that can degrade the structural integrity of high energy turbine rotors. The primary failure mode of the Sioux City accident was a fatigue crack that originated from an undetected titanium alloy melt-related defect. From the research, the FAA made recommendations related to the improvement of titanium metallurgical quality, nondestructive inspection, and turbine rotor structural design and lifing standards. This research has yielded a probabilistic damage tolerant rotor design and life management code (DARWIN®) to determine the risk of fracture of turbine engine rotor disks containing undetected material anomalies which is used by many of the major engine manufacturers. The goal of the research continues to be the prevention of turbine engine related accidents.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

The initial version of the DARWIN® code was developed to address the subsurface defect known as hard alpha and to meet the requirements of a new AC on "Damage Tolerance for Turbine Engine Rotors", 33.14-1. Another version of DARWIN® addressed surface damage in bolt holes and provided the basis for AC 33.70-2, "Damage Tolerance of Hole Features in Turbine Engine Rotors". DARWIN® is an acceptable means of compliance to both of these new ACs.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A reduction would delay implementation of new ACs on surface damage in blade slots and on turned surfaces of turbine engine rotors, due to the fact that new versions of DARWIN® will provide the basis and an acceptable means of compliance to these new ACs.

Detailed Justification for
A11.c Advanced Materials/Structural Safety

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – Advanced Materials/Structural Safety

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.c Advanced Materials/Structural Safety	$2,534,000	$2,534,000	$2,569,000	+$35,000

For FY 2013, $2,569,000 is requested for Advanced Materials/Structural Safety. Major activities and accomplishments planned include:

Advanced Materials

- Damage Tolerance of Composite Structures
  - Characterize and quantify the threats to composite aircraft structures while at the service gate and on the flight line.
  - Document accepted certification methodology for damage tolerance and fatigue, including full-scale test and analysis protocols for repeated loads and damage threats.
- Composite Maintenance Practices
  - Develop training and conduct workshops to review progress in damage tolerance, adhesive joints, and maintenance.
- Environmental and Aging Effects for Composite Structures
  - Develop information on the effect of environmental and heat exposure on structural properties and durability of composite structures.
- Structural Integrity of Adhesive Joints
  - Provide detailed background research addressing gaps testing and validation of durability of bonded structures.
  - Gain consensus from industry and regulators from around the world on standard durability substantiation methodology certification and continued airworthiness.

In Advanced Materials, the program will continue to focus on damage tolerance and fatigue issues of composite structures, including the assessment of impact damage threats (e.g., in-flight hail, ground vehicle collisions), and the aging of composite materials. Composite control surfaces degradation on transport airplanes will be explored and linked to aircraft safety issues. Quality control procedures will be studied for adhesive joints. Important field variables will be evaluated for bonded and bolted repairs. Properties of new materials and applications, which are used in primary aircraft structures, will be studied and evaluated. Safety awareness trainings in structural engineering for advanced composite materials have been developed and provided to related workforce. Work will continue supporting the composite safety awareness training development for a manufacturing course.

2. What Is This Program?

The Advanced Materials/Structural Safety Program provides technical support for rule making and develops guidance to help the aviation industry comply with agency regulations. This program is divided into two related structural research areas: Advanced Materials and Structural Safety.

Advanced Materials

FAA establishes rules for the certification of safe and durable materials for use in aircraft construction. While the rules are the same for composite or metal structures, different behavioral characteristics of structural materials call for different means of compliance. Although Advisory Circular (AC) 20-107B, "Composite Aircraft Structure," has been recently published, advances in technologies and materials require periodic updates and expansion of safety information. These updates are contained in research workshops and reports which provide immediate information to the aviation community and a suite of policy and guidance documents pertaining to composite structures that are under constant revision. The FAA Chief Scientific and Technical Advisor disseminates current technical information developed in this program to regulatory personnel through technical reports, handbooks, guidance, policy, and related training courses. This data exchange allows regulatory processes to keep pace with industry advances and benefit from state-of-the-art technology and design. This efficiently provides safety and certification information to the FAA certification service and industry.

FAA sponsors, with the cooperation of other government agencies and industry, a primary, authoritative handbook (Composite Materials Handbook 17) facilitating the statistical characterization data of current and emerging composite materials. This international reference tool is the best available data and technology source for testing and analysis, and also includes guidance on data development, design, inspection, manufacturing, and product usage. On recommendations by regulatory guidance, material data contained in this handbook are acceptable for use in the certification process. The FAA research is also coordinated with SAE standards organizations for advanced materials (e.g., Committee P-17 for composite materials specifications, the Commercial Aircraft Composite Repair Committee (CACRC), ASTM, and Society for the Advancement of Material & Process Engineering).

The Interagency Advanced Structures Working Group, which consists of FAA, NASA and the Department of Defense, was established in FY 2010. This working group will coordinate all current and future advanced composite research programs between federal agencies to ensure effective research efforts by interchanging information, identifying and filling technical gaps, and avoiding duplication.

The FAA has established an Interagency Agreement with NASA to collaborate on safety issues for composite research.

Structural Safety

FAA revises or updates crashworthiness-related Federal Aviation Regulations to accommodate new information for overhead stowage bins, auxiliary fuel tanks and fuel systems, aircraft configurations, seat and restraint systems, and human tolerance injury criteria. FAA, through this program, is developing alternative methods to streamline the certification process (i.e., certification by analysis and component tests in lieu of full-scale tests).

The program maintains cooperative interagency agreements in the structural safety area with the U.S. Army and in the analytical modeling area with the U.S. Navy. Memoranda of cooperation and exchange of personnel have been established between the program and the French, Italian, and Japanese governments in the crash testing area. The program has worked closely with Drexel University to develop dynamic crash computer modeling codes for transport airplane structures.

The Advanced Materials/Structural Safety Program assesses the safety implications of new and present-day composites, alloys, and other materials, and associated structures and fabrication techniques that can help to reduce aviation fatalities. In addition, the Advanced Materials/Structural Safety Program helps FAA achieve its strategic goals in international leadership and organizational excellence by providing a developmental basis in aircraft certification guidance and training in all areas of study that can be used throughout the world.

The Advanced Materials/Structural Safety Program complies with or cooperates with the following legislation and industrial and government groups:

- The Aviation Rulemaking Advisory Committee – this FAA committee and its subcommittees help to ensure the effectiveness of the agency's rulemaking by identifying R&D requirements and priorities, providing guidance for the update of documents, such as AC 20-107B and encouraging industry's full participation in implementing new rules.
- Aircraft Safety Subcommittee of the Research, Engineering and Development Advisory Committee (REDAC) – representatives from industry, academia, and other government agencies annually review the program's activities.
- Technical Community Representative Groups – FAA representatives apply formal guidelines to ensure the program's research projects support new rule making and development of alternative means of compliance for existing rules.
- The Joint Center of Excellence for Advanced Materials and Structures led by Wichita State University and the University of Washington – The Advanced Materials/Structural Safety Program benefits from a close working relationship with the Center. The research performed under this program is leveraged by the monetary and intellectual contributions of its partners including many major commercial aviation companies.
- Interagency Agreement with NASA – The FAA is collaborating with NASA on safety issues for composite research.

In FY 2012, major activities and accomplishments planned include:

Advanced Materials

- Damage Tolerance of Composite Structures
  - Conducted a study for the types of threats to composite aircraft structures while at the service gate and on the flight line.
  - Documented an accepted certification methodology for damage tolerance and fatigue, including full-scale test and analysis protocols for repeated loads and damage threats.
- Composite Maintenance Practices
  - Expanded developments in composite training with the initial emphasis on levels of safety awareness for structural engineering and manufacturing.
  - Developed training and conducted workshops to review progress in damage tolerance, adhesive joints, and maintenance.
- Advanced Materials and Processes
  - Evaluated the safety of new material forms (e.g., discontinuous fiber composites) that have found application in primary aircraft structures.

Structural Safety

- Crash Impact Response
  - Developed analytical modeling protocols and methodologies of aircraft structures crash conditions for certification use.
  - Developed standards and methods to characterize dynamic properties of composite material systems.
  - Supported new rulemaking and guidance development for Part 25 composite and metallic aircraft crashworthiness for structural substantiation certification.

Advanced Materials/Structural Safety supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation. To prevent accidents associated with the airframe use of advanced materials and to improve the crashworthiness of airframes in the event of accidents, the Advanced Materials/Structural Safety research focuses on developing analytical and testing methods for standardization; understanding how design, loading, and damage can affect the remaining life and strength of composite aircraft structures; developing maintenance and repair methods that are standardized and correlated with training and repair station capabilities; enhancing occupant survivability and reducing personal injury from accidents; improving crash characteristics of aircraft structures, cabin interiors, auxiliary fuel tanks, fuel systems, and occupant seat and restraint systems; and improving the efficiency of aircraft certification through the use of better analytical modeling of crash events.

The goals of the focused research endeavors are:

- By FY 2013, develop criteria for damage tolerance assessments of stiffened laminated composite structures.
- By FY 2013, generate methodology for demonstrating aircraft structure crashworthiness certification by analysis.
- By FY 2014, evaluate field bonded and bolted repair practices to update related guidance and training for composite aircraft structures.
- By FY 2015, evaluate existing and emerging bonded airframe technology to update guidelines and standards.

3. Why Is This Particular Program Necessary?

The use of new materials, processes and forms on aircraft continues to push the knowledge base for certification to provide safe aircraft for civilian applications. In the last decade, this has been accelerated due to the rapid expansion of the use of composites in increasingly large structures. Dominating the rapid expansion has been the use of fiber-reinforced polymers to provide lighter, fuel efficient airframe components including, in recent applications, full fuselage barrels and wings. The understanding of these emerging technologies is paramount to assuring the safety of the civil aviation and the flying public. The current certification process for many advanced materials and structures were established for smaller, less critical components and service conditions. As the current certification protocols are applied to the larger structures, uncertainty exists in the applicability which has to be demonstrated for these aircraft products. In addition to operational issues, these changes in materials, construction methods, and processes have altered the response of these structures to dynamic crash events. The difference in structural characteristics needs to be understood and incorporated in certification and operational plans to assure safety for new aircraft that incorporate these advances.

FAA Advanced Materials/Structural Safety research requirements are driven by industry advancements in construction of airframes and related components presented for certification. The FAA must assure that the changes maintain an equivalent or improve the level of safety compared to that achieved with currently operational aircraft. Requests from the Aircraft Certification Offices and from the aircraft manufacturers seeking Type Certification (TC) approval are major influences that shape research requirements, as the FAA seeks to evaluate the safety of planned new concepts using advanced materials, processes and forms. Additional requirements are developed from assessments of existing techniques, protocols, and service histories of previous advanced products to determine if modifications are required for the ever expanding materials, processes, and forms that are being introduced on civil aircraft. The National Transportation Safety Board review of accidents (AA587, R22, etc.) involving these structures provides additional focus for the information and research required to understand these emerging technologies. Currently the program is researching the damage tolerance and fatigue of composite structures; bonded structures; maintenance and repair of composite structures; and aging and environmental effects.

4. How Do You Know The Program Works?

The REDAC reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

A reduction in funding to the Advanced Materials/Structural Safety Program would decrease funds to the work done in Environmental and Aging Effects for Composite Structures. It would extend the schedule by several months. This estimate of the delay is contingent on restoring expected funding levels in subsequent years. While this delay is small, the availability of information on current structural certification protocols adequacy to assure safe design of type certificate applicant data will not be available, possibly allowing less safe designs though the certification process. Furthermore, this would stop the work and extend the schedule for investigation of aging effects and certification requirement adequacy in addressing the aging effects on currently operational composite structures, for approximately 15 months. This impact is a combination of work stoppage and restart which would be required after a year without activity on that project. It is expected that the investigators would not be available after the layoff period requiring additional training for the new investigators. The availability of information on current structural certification protocols adequacy to assure safe design of TC applicant data would be delayed an extended period of time, possibly allowing less safe designs through the certification process.

Detailed Justification for
A11.d Aircraft Icing/Digital System Safety

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – Aircraft Icing/Digital System Safety

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.d Aircraft Icing/Digital System Safety	$6,534,000	$5,404,000	$6,644,000	+$1,240,000

For FY 2013, $6,644,000 is requested for Aircraft Icing/Digital System Safety. Major activities and accomplishments planned include:

Aircraft Icing

- Research on Ice Crystal and Other Appendix C Exceedance Conditions
  - Conduct full field campaign out of Darwin, Australia to collect atmospheric data necessary for high fidelity facility and analytical simulation of High Ice Water Content (HIWC) ice crystal conditions (Note: Funding under A11.d supplements funding provided under the A11.k Weather Program. Effective simulation, the primary goal of the activity listed here, is not possible without high quality atmospheric data, so the two efforts are intimately intertwined.)
- Safe Operations and Take-off in Aircraft Ground Icing Conditions
  - Complete data and information package needed to update annual winter notice providing guidance for formulation of ground de-icing plans as required by airlines in CFR 121.629.
- Simulation Methods Development/Validation to Support Appendix C Icing Certification and Continued Operational Safety
  - Complete development of 3D model for testing of ice accretion/aerodynamic effects of ice on 3-D lifting surfaces.
- Rotorcraft Flight in Known Icing Compliance Criteria
  - Identify candidate minimum required icing instrumentation requirements, flight and wind tunnel test points required for verification of ice protection systems on rotorcraft.

The major activity planned for FY 2013 is the HIWC ice crystal field campaign out of Darwin, Australia. The data collected will be used in the development and evaluation of facility and analytical simulation tools and in the assessment and possible improvement of the proposed ice crystal regulatory atmospheric envelopes. The ground icing research results are incorporated into the annual winter notice needed by the airlines. The rotorcraft research is a new initiative which is expected to be completed by FY 2014, resulting in improved guidance to the industry on certification of rotorcraft for icing conditions.

Digital System Safety

- Onboard Network Security and Integrity
  - Provide initial (Phase 1) input for the development of RTCA SC-216 Subgroup 3 Aircraft Systems Cyber Vulnerability-Prevention Recommended Practices.
  - Perform an additional phase of work in the development of the airborne network security simulator that integrates industry and government aeronautical simulators to assess and identify network security threats in an airborne network environment.

- Software Development Techniques and Tools
  - For Phase 2, determine assurance case applicability to digital systems by examining previously developed assurance cases in various regulated sectors for approaches, successes, failures, and providing a comparison to existing development assurance standards (e.g., RTCA/DO-178B and RTCA/DO-254).
  - For Phase 1, assess, validate, and clarify DO-178C criteria for model-based development.
- Airborne Electronic Hardware Techniques and Tools
  - Investigate airborne electronic hardware (AEH) design assurance in the initial category of commercial off-the-shelf (COTS) electronic hardware.
  - Assess alternative approaches to electronic hardware design assurance for complex custom micro-coded devices and identify candidate approaches for further study.

Digital System Safety researchers will continue to evaluate onboard network security and integrity, system considerations for complex digitally intensive systems, software development techniques and tools, and integrity, AEH design techniques and tools, and COTS reliability and continued operational safety.

2. What Is This Program?

FAA establishes rules for the certification and operation of aircraft that encounter icing conditions as well as rules for the use of digital systems. The agency uses the research results to generate Advisory Circulars (ACs) and various other forms of technical information detailing acceptable means for meeting requirements, to guide government and industrial certification and airworthiness specialists and inspectors.

The Aircraft Icing/Digital System Safety Program develops and tests technologies that detect frozen contamination, predict anti-icing fluid failure, and ensure safe operations both during and after flight in atmospheric icing conditions. To improve digital system safety, researchers are proactive in ensuring the safe operation of emerging, highly complex software-based digital flight controls and avionics systems.

A major goal of the program is to reduce aviation's vulnerability to all in-flight icing hazards through the application of its research to improve certification criteria. Commercial airplanes are not yet certified to fly in icing conditions to an icing envelope that includes supercooled large droplet (SLD) and ice crystal icing conditions. The program's researchers have contributed to the development of technical data and advisory materials to correct this omission. A study by the Engine Harmonization Working Group indicates that over 100 in-service engine events, many resulting in power loss and at least six in multiple engine flameouts, occurred in HIWC environments from 1988 to 2003. A current collaborative research effort addresses this issue.

The program will develop new guidelines for testing, evaluating, and approving digital flight controls, avionics, and other systems for the certification of aircraft and engines. Additionally, the program supports development of policy, guidance, technology, and training needs of the Aircraft Certification Service and Flight Standards Service that will assist and educate FAA and industry specialists in understanding digital system safety and assessing how it may be safely employed in systems such as fly-by-wire, augmented manual flight controls, navigation and communication equipment, and autopilots.

The Aircraft Icing/Digital System Safety Program collaborates with a broad segment of the aviation community to improve aircraft certification, inspection, and maintenance, including:

- Aircraft Safety Subcommittee of the Research, Engineering and Development Advisory Committee – representatives from industry, academia, and other government agencies annually review the activities of the Aircraft Icing/Digital System Safety Program.
- The Aerospace Industries Association Ice Crystal Consortium – this is a private sector working group that coordinates ice crystal ground facility research testing with the FAA.

- SAE G-12 Aircraft Ground Deicing Committee– this subcommittee assists in updating holdover time guidelines and establishing standards for de/anti-icing methodologies, deicing fluids, and ground ice detection.
- SAE AC-9C Aircraft Icing Technology Committee – this subcommittee assists in establishing guidance and standards for icing test and simulation methods.
- Radio Technical Commission for Aeronautics (RTCA) – members of this U.S. Federal Advisory Committee and its special committees (SC) help to ensure the effectiveness of the agency's rulemaking in aviation areas, such as digital systems.
- Certification Authorities Software Team – a group of international certification software and AEH specialists who collaborate and make recommendations to regulatory authorities for digital systems.
- John A. Volpe National Transportation Systems Center – the Center is leading cyber security research in aeronautical system security that supports the onboard network security and integrity goal.

The program maintains a number of cooperative relationships:

- NASA Glenn Research Center - includes various cooperative efforts on aircraft icing activities.
- Transport Canada - based on an international agreement on research on aircraft ground deicing issues.
- Environment Canada - based on an international memorandum of cooperation for research on in-flight icing conditions.
- National Research Council of Canada - based on an international memorandum of cooperation for research on engine and airframe icing.
- Australian Bureau of Meteorology - partner in field campaign in Darwin, Australia to obtain data in HIWC environments.
- Aerospace Vehicle Systems Institute - cooperative industry, government, and academia venture for investigation and standardization of aerospace vehicle systems.
- NASA Langley Research Center – includes cooperative efforts on digital systems.

In FY 2012, major activities and accomplishments planned include:

Aircraft Icing

- Research on Ice Crystal and Other Appendix C Exceedance Icing Conditions in Support of Rulemaking
  - Continued experimental work on the physics of engine icing in high ice water content (HIWC) environments.
  - Completed first phase of fundamental research work on ice crystal physics studies to determine physical parameters of importance for ice crystal accretion formation mechanisms that will support simulating these conditions inside engine compressors.
- Simulation Methods Development/Validation to Support Appendix C Icing Certification and Continued Operational Safety
  - Continued research on aerodynamic effects of ice on 3-D lifting surfaces.
- Safe Operations and Take-off in Aircraft Ground Icing Conditions
  - Continued the development of improved methods for simulation of ice pellet and mixed conditions for determination of fluid failure and holdover times and allowance times.

  - Continued evaluation of Remote Onboard Ground Ice Detection System (ROGIDS) for pre-takeoff contamination check and other applications, including data package for Society of Automotive Engineers (SAE) spec and advisory material.

Digital System Safety

- Onboard Network Security and Integrity
  - Pursued efforts to cover cyber security effects on aircraft network security, such as Phase 6 onboard network security and integrity work on insuring consistency with aircraft safety and certification.
  - Identified certification issues, including security vulnerabilities introduced by network connectivity to multiple aircraft systems, and potential mitigation techniques.
- Software Development Techniques and Tools
  - Researched software development techniques and tools, such as verification of adaptive systems.
- Airborne Electronic Hardware Design Techniques and Tools
  - Investigated airborne electronic hardware (AEH) design techniques and tools, such as AEH design assurance.
- System Considerations for Complex Digitally Intensive Systems
  - Evaluated systems considerations for complex intensive systems, such as system architecture virtual integration.
- COTS Reliability and Continued Operational Safety
  - Studied commercial off-the-shelf reliability and continued operational safety, such as obsolescence and life cycle maintenance of avionics.
  - Developed COTS electronic hardware reliability prediction tools and techniques for the latest generation of the COTS electronic components.

Aircraft Icing/Digital System Safety supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation. To reduce the number and severity of accidents, or potential accidents, associated with icing and failures to software-based digital flight controls and avionics systems, the program develops and assesses ways to ensure airframes and engines can safely operate in atmospheric icing conditions and while using digital systems.

The goals of the focused research endeavors are:

Aircraft Icing

- By FY 2014, complete second phase of fundamental research work on ice crystal physics studies to determine physical parameters of importance for ice accretion formation mechanisms that will support simulating these conditions inside engine compressors.
- By FY 2014, complete processing and primary analysis of the ice crystal cloud data from field campaigns and provide ice crystal cloud parameters in a format that will allow for their evaluation as an updated engineering standard for convective weather ice crystal icing conditions.
- By FY 2015, develop data and methods for guidance material for the airworthiness acceptance criteria and test methods for engines in simulated HIWC environments.

Digital System Safety

- By FY 2013, identify safety issues and propose mitigation approaches when software development techniques and tools are used in airborne systems.

- By FY 2014, identify safety issues and propose mitigation approaches when airborne electronic hardware techniques and tools are used in airborne systems.
- By FY 2014, evaluate approaches to AEH COTS component design assurance.

3. Why Is This Particular Program Necessary?

Aircraft Icing

Aircraft icing due to the freezing of supercooled water on aircraft surfaces is a continuing concern in all realms of aviation, due to the insidious nature of icing problems for takeoff, cruise, holding, and landing. Fatal accidents fall into two major categories: takeoff accidents due to failure to properly de-ice or anti-ice prior to takeoff, and accidents due to accretion of ice while in-flight. The latter class affects all phases of flight, but particularly holding and approach and landing. Since 1980, takeoff icing accidents have claimed many hundreds of fatalities, while in-flight icing accidents have claimed at least 200 fatalities. Icing problems due to flight in ice crystals in HIWC environments were not fully recognized as posing a serious safety hazard until recent years. Although ice crystals bounce off aircraft surfaces, when ingested into engine cores and pitot tubes, the crystals have resulted in serious events. The FAA, working with industry, has identified 140 ice crystal turbine engine power loss events in reviewing 16 years of recent data (a power-loss event is a surge, stall, rollback, or flameout of one or more engines). There were also 11 total power loss events from flameout and 1 forced landing due to ice crystals. The FAA has also received recent feedback on pitot tube ice crystal events where the probe stopped working.

Digital System Safety

The goal of the Software and Digital Systems (SDS) research is to improve and maintain manned and unmanned aircraft safety and prepare for the FAA's Next Generation Air Transportation System by conducting research in the area of advanced, airborne digital systems (software-based and programmable logic-based), such as fly-by-wire flight controls, navigation and communication equipment, autopilots, and other aircraft and engine functions. Software and digital systems are concerns in aviation due to the large quantity of aircraft computer software code and AEH used to implement the software code. Also, the field of digital systems continues to change rapidly and is becoming increasingly more complex and pervasive within aircraft. More importantly, the effect of software and AEH upon the ultimate safety of the aircraft in which this equipment resides is yet to be fully determined. The SDS research focuses the research on areas that will help prevent normal equipment failures (faulty software code and AEH) and abnormal equipment failures through security vulnerabilities exposed by cyber security threats. This research supports the aircraft certification process that includes work to assure digital systems function properly and safely. The results of the research are technical data, reports, compliance methods, verification methods, and certification techniques that can be used to develop policy, guidance, and training materials, and to enforce aircraft continued airworthiness. The research assists both the FAA and industry in meeting their safety objectives. Although there have been no aircraft accidents directly attributable to the failure of software or AEH, it is prudent to take research and development actions that will prevent such accidents.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

Ground icing research is used each year in the development of guidance is published annually in the FAA's ground deicing notice, which is needed by airlines to formulate their required ground icing plans for the coming winter. In-flight atmospheric research was used in the development of the envelopes included in the notice of proposed rulemaking which was published in June 2010 for supercooled large drop (freezing drizzle and freezing rain aloft in and out of clouds and at the surface) conditions. A final rule is anticipated in the first half of 2012. A GAO report entitled *Improved Planning Could Help FAA Address Challenges Related to Winter Weather Operations* was published in July 2010. This report covered all aspects of the FAA's policies and activity in the area of aircraft icing, and a portion was devoted to research. The report praised the FAA's research investment strategy with its icing research partners, NASA and NCAR in particular.

The SDS research has provided numerous inputs to the certification authorities in the development of policy, guidance, rules, and regulations. Object oriented technology research provided input to RTCA Special Committee-205/WG-71 for DO-178C development and object oriented technology in aviation handbook development, training input, and handbook tools. Research on COTS avionics and software provided inputs for FAA ACs and orders. Research on Data Network Evaluation Criteria and Ethernet-Based Aviation Databuses provided handbook tool and input to databus evaluation criteria that was used by industry. For Flight Critical Data Integrity Assurance for Ground-Based COTS Components, provided input to Rotorcraft Directorate level for knowledge and security-related items in LANs in aircraft research and RTCA SC-216. For Software Development Tools and Software Verification Tools, research provided input to DO-178C. Research into Networked Local Area Networks in Aircraft Safety, Security, and Certification Issues, and Initial Acceptance Criteria provided input to RTCA SC-216.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Any reduction in funding would restrict the full HIWC ice crystal field campaign in Darwin, Australia. This would likely take the form a shortened campaign or less support from our research partners, who are partially dependent on FAA for funding support for their participation. This could result in a substantially smaller ice crystal atmospheric database than is needed to develop high fidelity facility and analytical simulation tools.

A reduction could also adversely impact the testing to determine ground anti-icing allowance times and other guidance for ice pellet conditions, including ice pellets mixed with other forms of precipitation. Guidance is published annually in the FAA's ground deicing notice, which is needed by airlines to formulate their required ground icing plans for the coming winter. This is an area where there are issues that have led to strong expression of concern by some airlines, concerns that need to be resolved.

If funding for Digital Systems Safety were reduced, the ability of the FAA and industry to evaluate emerging, highly-complex, digital hardware and software for use in advanced flight controls and aircraft systems would be negatively impacted. Consequently, certification specialists would find it difficult to properly assess proposed aircraft and systems designs which employ this technology for flight-essential and flight-critical applications. Further, the FAA would not be able to determine if certification policy, criteria, or training would be needed to accommodate new technologies or methodologies. A further risk of not performing this research is the reduced ability to develop, validate, and improve certification methods and the inability to reduce time and cost to both FAA and industry in certifying aircraft employing advanced digital airborne systems.

Detailed Justification for
A11.e Continued Airworthiness

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – Continued Airworthiness

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.e Continued Airworthiness	$10,632,000	$11,600,000	$13,202,000	+$1,602,000

For FY 2013, $13,202,000 is requested for Continued Airworthiness. Major activities and accomplishments planned include:

Health Monitoring of Structures and Complex Flight Critical Systems

- Evaluate the safety impact and other potential benefits related to the more wide-spread application of health usage monitoring technology across all air vehicle systems.

Stall Departure Identification, Recognition, and Recovery

- Develop criteria to categorize and quantify stall departure characteristics for transport category airplanes.

Envelope Awareness and Protection Legacy Transport Airplanes

- Gather incident, accident, and research data, to quantify the required timeliness of low speed alerting system, necessary for in flight recovery of transport category airplanes...

Advanced Nondestructive Inspection (NDI) Methods for Composite Structures

- Develop and publish the protocol for the validation of legacy and advanced NDI methods for detection of hidden flaws in complex, solid composite laminates.

Nondestructive Evaluation (NDE) for Critical Engines Components

- Develop AMS specification for industrial ultrasonic forging inspection for critical engine components.

Rotorcraft Health and Usage Monitoring Systems (HUMS)

- Develop methods with direct and indirect evidence approaches guided by Advisory Circular 29-2 MG15 for the certification of HUMS for rotorcraft usage credits.

Advanced Control Systems

- Investigate and define new and unique rotorcraft hazards associated with advanced control systems incorporating non-traditional control methodologies.

Risk Assessment and Risk Management Methods for Small and Transport Airplane Continued Operational Safety (COS)

- Publish a report on feasibility/applicability of Probabilistic Risk Analysis (PRA) approach for transport airplane corrosion problems.
- Develop data and methodologies for structural life evaluation of small airplanes.

Development of Control Surface and Stabilizer Freeplay Limits to Preclude Flutter

- In collaboration with other aerospace stakeholders, including USAF, NASA, Navy and Industry, develop a joint research plan to establish modern freeplay limits.

Emerging Technology – Active Flutter Suppression

- Initiate a survey of flutter and aeroservoelastic research involving active flutter suppression systems, including military application of the technology and NASA/industry research.

MMPDS Support and Design Values for Emerging Materials

- Lead the Metallic Materials Properties Development and Standardization (MMPDS) steering group in updating the metallic materials properties handbook.

Damage Tolerance and Durability Issues for Emerging Technologies

- Continue survey and testing to assess application of advanced aluminum-lithium alloys for aircraft primary structure.
- Continue testing and analysis to assess environmental durability of bonded repair technology.

In FY 2013, the above planned major activities and accomplishments focus on six technical areas: Electrical Systems (ES); Flight Controls and Mechanical Systems (FCMS), Maintenance and Inspections (M&I), Propulsion Systems (PS), Rotorcraft Systems (RS), and Structural Integrity Metallic (SIM).

Research in the ES will be focused on health monitoring of structures and complex flight critical systems, which will enable the insertion of health monitoring (HM) technologies of structural, mechanical, and electric systems in commercial transport airplanes for current and future applications. The research will be done in collaboration with other technical areas in this Program such as SIM, FCMS, and PS.

In the FCMS effort, the study on stall departure identification, recognition, and recovery will leverage existing industry and NASA data and available methods to generate technical information to support the development of guidance and means of compliance to prevent stall departure. Research in envelope awareness and protection legacy transport airplanes will focus on supporting standard development and rulemaking on envelope awareness and protection for new and legacy transport airplanes.

Maintenance and Inspection (M&I) research will develop advanced NDI methods for composite structures. It will include validation of NDI methodology to determining bond strength; generation of reliability data on capabilities of various NDI methods, and support updating training materials as required by relevant parts of the rules for maintenance and repairs. Research activities will be coordinated and in collaboration with the SIM research effort as well as the Advanced Materials and Structure Safety Program.

NDE research effort in the PS technical area will develop and evaluate inspection methods for critical engine component. It will generate technical information to support the development, validation, and issuance of standards for various NDE techniques to improve inspection and monitoring capabilities on manufacturing induced anomalies on critical high energy rotating components.

The RS technical area has two separate efforts: HUMS and advanced controls. In the HUMS effort, research will be focusing on the development of methodologies, direct and indirect evidence approaches, in determining usage credit of rotorcraft dynamic components and/or mechanical systems. It will also evaluate advanced technologies and develop methods with the guidance of the Advisory Circular. The advanced control system is a new requirement and initial effort will focus on the development of a research plan with technology status, existing regulatory requirements, available standards, technical challenging areas, and proposed research initiatives.

The SIM technical area consists of five requirements for both transport and small airplanes. Although the legacy requirements of MMPDS and damage tolerance are essential to support the airframe structural safety and continued airworthiness, research initiatives have been expanded into emerging technologies such as damage tolerance and durability issues of new aluminum-lithium alloys, new and emerging alloys to be studied for inclusion of MMPDS, and risk management methods to support the Aircraft Certification Services Monitor Safety/Analyze Data (MSAD) initiative, which is a data-driven, risk-based continued operational safety decision-making process. Research effort will also include studies of control surface freeplay limits and predictive analytical methods, and investigation of active flutter suppression systems using existing fly-by-wire technology to actively eliminate and suppress flutter.

2. What Is This Program?

FAA issues rules and advisory materials for regulating aircraft design, construction, operation, modification, inspection, maintenance, repair, and continued operational safety. Further understanding of the technologies, procedures, technical data, and analytical models produced by the Continued Airworthiness Program provide a major source of technical information used in developing these regulations and related information. Through this research, the FAA also works with industry and other government agencies to provide the aviation community with critical safety technologies and data.

The Continued Airworthiness Program promotes the development of technologies, procedures, technical data, and performance models to prevent accidents and mitigate accident severity related to civil aircraft failures as a function of their continued operation and usage. The program is focused on long-term maintenance of the structural integrity of fixed-wing aircraft and rotorcraft; continued safety of aircraft engines; development of inspection technologies; and safety of electrical wiring interconnect systems (EWIS), flight control systems, and mechanical systems.

The Continued Airworthiness Program coordinates with an extensive network of government and industry groups, including:

- Aviation Rulemaking Advisory Committees – industry representatives propose cost-effective rulemaking and research to address aircraft safety issues.
- Aircraft manufacturers, operators, foreign airworthiness authorities, academia, and industry trade groups consult on a wide range of current and future aging aircraft and continued airworthiness issues.

The Continued Airworthiness Program activities are closely coordinated with industry, the National Aeronautics and Space Administration (NASA), and the Department of Defense (DoD). FAA maintains interagency agreements with NASA, U.S. Army, U.S. Navy, U.S. Air Force, the Department of Energy, and the Forest Service. DoD and NASA have co-sponsored 13 joint Aircraft Airworthiness and Sustainment Conferences (formerly known as Aging Aircraft Conference) with FAA.

FAA collaborates closely with several private and public organizations, including:

- MMPDS - Government/Industry Steering Group – a joint government and industry working group that funds and develops the metallic materials properties handbook.
- Cooperative Research and Development Agreement with Boeing for joint research on structural integrity of bonded repairs and emerging structural technologies.

In FY 2012, major activities and accomplishments planned include:

Risk Assessment and Risk Management Methods for Small and Transport Airplane COS

- Completed assessment on surveyed corrosion data for transport aircraft and on feasibility of using data from accelerated corrosion testing to determine applicability of the probabilistic risk analysis approach.

MMPDS Support and Design Values for Emerging Materials

- Continued to lead the Metallic Materials Properties Development and Standardization (MMPDS) steering group in updating the metallic materials properties handbook.

Damage Tolerance and Durability Issues for Emerging Technologies

- Continued damage tolerance and durability research for emerging structural technologies to ensure safety, support maintenance, and support future FAA policies and guidance.
- Enhanced FAA's Full-scale Aircraft Structural Test and Evaluation facility capabilities and demonstrated residual strength of panels fabricated from advanced materials.

Rotorcraft Health and Usage Monitoring Systems (HUMS)

- Developed HUMS database for commercial rotorcraft operations in order to assess its application in usage credit determinations.

NDE for Critical Engines Components

- Continued to develop data to support a specification for industrial ultrasonic forging inspection.
- Completed the evaluation of thermal acoustic technology as an inspection technique for engine disks

Advanced NDI Methods for Composite Structures

- Completed assessment of baseline POD curves for portable ultrasonic devices for detection of hidden flaws in complex, solid composite laminates.
- Assess performance of an advanced inspection system for identifying environmental damage of composite structures caused by heat, chemical, and ultraviolet sources.

Advanced Control Systems

- Define mechanical and electrical maintenance inspection criteria to maintain continued operational safety

Health Monitoring of Structures and Complex Flight Critical Systems

- Continued research to assess the performance of prognostic and health monitoring systems that are in use or under development for transport airplanes.

Stall Departure Identification, Recognition, and Recovery

- Continued research to develop enhanced models of full stall departure characteristics for transports.

Flight Critical Systems Design Assurance

- Began addressing improvement of the design development processes for flight critical systems to assure that design errors in complex flight critical system designs are found before certification, rather than in service through incidents or accidents.

GA Automation and Envelope Protection

- Completed research on basic envelope protection. Technical data will support development of FAA guidance and policies for general aviation autopilot systems.

Envelope Awareness and Protection for Legacy Transport Airplanes

- Continued research to develop enhanced models of full stall departure characteristics for transports.
- Start to determine appropriate thresholds for low speed awareness, data available to trigger threshold indication, appropriate indications pilot impact of such information, and parameters available to determine threshold encroachment.

The Continued Airworthiness Program supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation. The goal of the Continued Airworthiness Program is to understand and develop methods to counter the effects of age and usage on the airworthiness of an aircraft over its lifetime, including potential effects of modifications and repairs. The program conducts research in developing technologies and processes, and assesses current practices to eliminate or mitigate the potential failures related to aircraft aging, thereby reducing the number and severity of accidents. The research also supports development of methodologies for both inspection and maintenance protocols to assure the continued airworthiness of advanced composite aircraft.

To satisfy these goals, the program conducts research to assess causes and consequences of airplane structural fatigue, corrosion, and other structural failures, and develop effective analytical tools to predict the behavior of these conditions. This includes research on NDI technologies being developed to detect these conditions. Similar research is conducted on aircraft engines and rotorcraft. Aircraft systems research to understand the causes and consequences of EWIS and mechanical systems failures, and the relationship of these failures to other aircraft systems and safety completes the program. The goals of the focused research endeavors are:

- By FY 2013, assess the feasibility and benefits of determining bond strength of repair as compared to original manufactured strength.
- By FY 2013, develop technical data on rotorcraft to establish more detailed guidance for certification of HUMS for usage credits.
- By FY 2013, develop a predictive methodology and tools for damage tolerance risk assessment and risk management for continued operational safety of small airplanes.
- By FY 2014, provide technical data to develop guidelines for implementing structural health monitoring in commercial transport category airplanes
- By FY 2014, develop technical data to assess the application of advanced aluminum-lithium alloys for aircraft primary structure
- By FY 2016, develop technical data to assess the fatigue and environmental durability of bonded repairs to metallic structure
- By FY 2016, develop technical data to assess methods to preclude and suppress flutter

3. Why Is This Particular Program Necessary?

The Continued Airworthiness Research Program came into existence as a direct result of accident involving an Aloha Airlines Boeing 737 in 1988. The aircraft experienced an explosive decompression during flight that tore off a large section of the top of the fuselage. The research program that subsequently developed was called the Aging Aircraft Program because that structural failure was connected with the aircraft's age and its large number of takeoff-landing cycles. The program's research scope grew to address causes of subsequent accidents. For instance, aircraft engines were included as a result of a 1989 United Airlines DC-10 crash caused by an uncontained engine failure, and electrical systems were added as a result of a 1998 Swiss Air MD-11 crash most likely caused by wire arcing. Today, the breadth of the research has grown to include safety of transport and small airplanes as well as rotorcraft. The program title was changed to Continued Airworthiness to better match the FAA's aircraft regulatory language regarding "Continuing Airworthiness." The technical scope of the research includes inspection and maintenance of structures and engines, structural integrity of fixed wing aircraft and rotorcraft, and flight controls and electrical systems. Although research results from this research program have been implemented to support the issuances of aging aircraft related rules, policies, and guidance materials, recent in-flight incidents, such as Southwest Airlines flights 2294 in 2009 and 812 in 2011, demonstrate the technical challenges of maintaining continued airworthiness, predicting potential failures, and determining inspection intervals. The program focus is on the continuing safety of all aircraft (new and in-service) throughout their lifetime.

The current research program is based on requirements developed by the FAA Office of Aviation Safety. The requirements reflect the need of the regulatory office for technical data and information to support regulatory activities or for possible solutions to real world questions and problems. For example, the inspection of composite, metallic, and bonded structures in an accurate and reliable way is challenging. The program's research looks at improved inspection technologies and procedures, as well as quantifiable measures to describe the accuracy. A research output might be a feasibility demonstration of an inspection technology, a characterization of new inspection methods and procedures, or a proposed inspection standard for the aviation industry. There is almost always cooperation and sometimes even partnerships with aircraft manufacturers, systems manufacturers, air carriers, and academic researchers. A similar description can be applied over the full range of research areas within the Continued Airworthiness program. In certain areas the partners include NASA and elements of the DoD. Finally, the research program provides a core technical competency as well as a unique test facility to serve the interests of FAA and the safety of flying public.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Requested funding levels are based on the research requirements prioritized by the end-user organization within the FAA Office of Aviation Safety. Reduction in funds to any of the technical areas listed in the Program Schedule within the Continued Airworthiness program will delay the completion of some or all of the anticipated accomplishments as outlined in Section 1. A reduction in funding would delay parts of the maintenance and inspection program by three months, particularly affecting the FY 2012 research goal to assess performance of an advanced inspection system for identifying environmental damage of composite structures, and would thereby raise a risk of missing the research goal milestone.

Detailed Justification for
A11.f Aircraft Catastrophic Failure Prevention Research

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aircraft Catastrophic Failure Prevention Research

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.f Aircraft Catastrophic Failure Prevention Research	$1,147,000	$1,147,000	$1,691,000	+$544,000

For FY 2013, $1,691,000 is requested for Aircraft Catastrophic Failure Prevention Research. Major activities and accomplishments planned include:

Advanced Analysis and Risk Assessment Methods for Rotor Burst and Blade Release

- Develop and verify an update to a new material model for the LS-DYNA finite element model for aluminum (MAT224).
- Develop a new generalized damage and failure model with regularization for titanium materials impacted during engine failure events.
- Issue Aerospace Guidelines for LS-DYNA through the LS-DYNA Aerospace Users Group.
- Develop improvements to the existing Uncontained Engine Debris Damage Assessment Model (UEDDAM) to address industry feedback.

FAA engineers and industry need publicly available tools to standardize the analysis of engine and aircraft for rotor burst and fan blade containment. All new commercial engines require a full scale destructive test for FAA certification to verify that an engine can survive a single blade failure at the most critical location. Besides being extremely expensive, this test offers limited capability for demonstrating margins of safety especially when subsequent design changes are incorporated into an existing engine. Finite element modeling offers much more insight but historically, an increasing number of engine and aircraft projects are relying on proprietary analysis tools to show compliance, complicating the FAA task of making compliance findings and allowing potential variation in the standard of safety. In addition, new companies with limited turbine engine experience are now entering the aircraft industry. These companies do not have the benefit of years of blade release testing and model simulations. A need exists for publicly available analysis methods and standardization for the FAA to be able to approach certification by analysis for engine containment.

Many derivative engines based on already certified engines use analysis to show compliance to the fan blade containment regulations on a case by case basis. New concept fan containment configurations may only be tested once for the baseline engine. The goal is to have a public tool with standardized generic models, user guides, training, software quality control process, and validated public material models. This will allow engineers to validate the proprietary tools, streamline the certification process, and help mitigate fatalities and injuries when these events occur.

Regarding research related to uncontained engine failure mitigation, this program has developed an uncontained engine Debris Damage Assessment Model (UEDDAM) to improve new aircraft designs in being able to mitigate damage from uncontained engine events. A large numbers of small jet powered aircraft in the process of being certified and proposed for certification, each with special challenges for engine rotor burst mitigation. These aircraft have composite fuselage sections with diameters on the same order as the engine diameters, limiting the traditional approach of using system separation to minimize the rotor burst effects. Research will develop improvements to the UEDDAM model to address these issues.

2. What Is This Program?

The Aircraft Catastrophic Failure Prevention Research Program supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation. To reduce the number of fatal accidents from uncontained engine failures, the program develops data and methods for evaluating aircraft vulnerability to uncontained engine failures and provides analytical tools for engine containment systems and for protecting identified critical systems that may need shielding from uncontained engine debris. Through the LS-DYNA Aerospace Users Group, FAA is working with industry to establish standards for finite element analysis and guidance for use in support of certification. With technical data from the Aircraft Catastrophic Failure Prevention Program, FAA establishes certification criteria for aircraft and revises regulations to certify new technologies. The Agency also publishes Advisory Circulars to outline acceptable means for meeting these rules. The program's objective is to ensure safe aircraft operation in the National Airspace System (NAS).

The program also uses historical accident data and National Transportation Safety Board (NTSB) recommendations to examine and investigate:

- Turbine engine uncontainment events, including the mitigation and modeling of aircraft vulnerability to uncontainment parameters stated in AC 20-128, Phase II.
- Fan blade out analysis and other engine-related impact events like bird strike and ice ingestion.

The goals of the focused research endeavors are:

- By FY 2013, develop and verify a generalized damage and failure model with regularization for aluminum (MAT 224) and titanium materials impacted during engine failure events.
- By FY 2013, issue Aerospace Guidelines for LS-DYNA through the LS-DYNA Aerospace Users Group.
- By FY 2015, refine the LS-DYNA Quality Control regiment for Aerospace Users based on improved Aerospace generic models based on new requirements and lessons from industry.
- By FY 2016, complete development of material models for planned metal materials.
- By FY 2017, develop plan for modeling of aerospace composite impact problems.

For FY 2012, major activities and accomplishments include:

Advanced Analysis and risk Assessment Methods for Rotor Burst and Blade Release

- Completed all material testing to support a new material model for titanium in LS-DYNA.
- Issued improvements to the Uncontained Engine Debris Assessment Damage Model (UEDDAM) code in collaboration with the Naval Air Warfare Center (NAWC) Weapons Division China Lake.
- Research continued on the FAA/NASA/industry-sponsored quality control program for modeling aircraft problems in manufacturers-supported finite-element code (referred to as LS-DYNA).
- Research continued on the NASA/FAA/industry program for modeling aircraft engine failures in LS-DYNA. The FAA, NASA, and academia continued to evaluate improved material models and incorporated them into LS-DYNA upon acceptance by the Aerospace Users Group. Users' guidelines and training continued to be developed and made available through George Washington University.
- Additional research continued on developing a generalized damage and failure model with regularization for titanium materials impacted during engine failure events. Also, research continued on material characterization tests to support development of damage and failure models for aircraft materials.

The program collaborates with a broad cross section of the aviation community, including:

- The Aviation Rulemaking Advisory Committee (ARAC) – helps to ensure the effectiveness of the agency's rulemaking. Members of the subcommittee and full committee identify research requirements, priorities, and provide guidance for the update of documents such as AC 20-128, and encourage industry's full participation in implementing new rules.

The Aircraft Catastrophic Failure Prevention Program partners with industry and other government agencies, including:

- NASA and industry in support of the development and validation of explicit finite element analysis. The industry participates in the LS-DYNA Aerospace Users Quality Assurance Group to support quality control reviews of the code and also critique research objectives in material testing, model development, and verification. NASA and FAA are teamed to develop high-quality test data and analytical models that support the Aerospace Users Quality Assurance Group efforts. The end goal is to develop guidance for the use of LS-DYNA in the certification process.

The Aerospace Industries Association (AIA) Transport Committee – with participation of FAA and industry, has examined propulsion system malfunctions, identified inappropriate crew response, and recommended development of specific regulations and advisory materials to correct safety hazards.

3. Why Is This Particular Program Necessary?

The threat of catastrophic failure in commercial aviation is always present and the potential consequences are great – the large loss of life in accidents and the destruction of the aircraft. It is an awesome challenge to prevent accidents caused by catastrophic failure. Over the years, this research program has supported the FAA to improve regulations and advisory material primarily related to uncontained engine failure. In addition, research has included: loss of flight controls, propulsion malfunction plus inappropriate crew response, and fuel tank explosion.

The Aircraft Catastrophic Failure Prevention Research Program is largely driven by accidents and incidents, but also by NTSB recommendations, new technology, and industry focus groups focused on accident reduction. This program was initiated after the 1989 DC-10 Crash landing at Sioux City, Iowa. The major thrust of the program started in engine containment and uncontained engine failures mitigation. The Aircraft Catastrophic Failure Prevention Research Program has worked closely with the Aviation Rulemaking Advisory Committee, AIA focus groups, Department of Defense (DoD), NASA and academia to leverage existing work and develop data, analytical methods, and processes that make up the foundation for improved policy, regulation and advisory material. Some of the benefits to the FAA, other government agencies, and industry partners, and the public are as follows:

- Develop aircraft material models that improve the state of the art and better represent impacts from engine failures to allow for standardized certification by analysis and increased safety.
  - By 2014, it is planned to complete verification of new material model for aluminum and titanium and by 2016, Inconel 718 material.
- Collaborate with NASA to establish an aircraft material database to be used by industry in aircraft modeling of engine contained and uncontained failures.
  - In 2011, aluminum material characterization testing was completed. In 2012 titanium material characterization testing was completed and by 2014, Inconel 718 testing is planned to be completed.
- FAA/NASA/Industry Quality Control Aerospace Working Group is developing aerospace guidelines for dynamic modeling used in engine containment design, bird strikes, uncontained engine debris, etc. which will benefit both industry and the FAA in evaluating new aircraft designs.
- Continue development of the UEDDAM model with inputs from industry and DoD. DoD is currently using the UEDDAM analysis for new aircraft designs to mitigate uncontained engine debris damage.

- Published over 50 technical reports documenting testing, data, and improved analytical methods.

If this program was not funded, important working groups making tremendous progress to come together and standardize critical safety analysis procedures would cease. The research team has developed knowledge of the work and is a primary contributor to technology improvement. FAA must maintain an active presence in safety related development as it is often an area of little return on investment to the manufacturers, making it an area where our investment provides direct safety benefit to the public.

4. How Do You Know The Program Works?

The Aircraft Catastrophic Failure Prevention Program has been in existence since 1990. During that time, the major thrust of the program has been research into preventing catastrophic aircraft failures associated with engine failures with primary emphasis on engine uncontained failures. The research has produced the UEDDAM tool kit which allows new aircraft designs to be analyzed for vulnerability to uncontained engine fragments. The UEDDAM code has been released to industry and is being used on a volunteer basis by industry for commercial designs. The military is also requiring UEDDAM be used in the design of aircraft.

The joint FAA/NASA sponsored LS-DYNA Aerospace Users Quality Assurance Group has members from government, the aerospace industry, and academia all working together to address aerospace modeling problems associated with aircraft impact events, i.e., engine containment/uncontainment, bird strike, water landings, tire failure, ice impact, etc. The establishment of an LS-DYNA Aerospace Quality Control System has identified several problems and solutions in the LS-DYNA software and compatibility with different computer platforms and compilers that were causing errors in the results. In addition, an LS-DYNA aerospace user's guideline manual is being developed by the group which will guide LS-DYNA aerospace users to use correct industry practices in the modeling. The draft guidelines are already being used by industry.

The new material models being developed under this research program are extremely valuable to industry and the FAA in modeling impacts from engine uncontained failures. They surpass the research limitations identified in pre-research models that were limited in predicting failure modes. The new models will be able to establish benchmarks for FAA engineers and industry in evaluating and designing for engine containment and aircraft shielding. When used in conjunction with the UEDDAM model (or similar vulnerability model), the new material models can be used to better predict impact resistance in specific areas identified and needing protection.

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the NAS and works to ensure that FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality RE&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The funding requested will fund multiple universities and subcontractors to develop the material models necessary to support FAA certification. All of the universities and subcontractors work as a team to deliver parts of the models and /or testing to support the models. A modest reduction will cause the program to reduce their staff and delay completion of the material models and validation by one to three months. A larger reduction will most likely cause the program to be unable to complete the material models and validation since there is a team depending on the results of other team members.

Detailed Justification for
A11.g Flightdeck/Maintenance/System Integration Human Factors

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Flightdeck/Maintenance/System Integration Human Factors

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.g Flightdeck/Maintenance/System Integration Human Factors	$7,083,000	$6,162,000	$5,416,000	-$746,000

For FY 2013, $5,416,000 is requested for the Flightdeck/Maintenance/System Integration Human Factors Program. Major activities and accomplishments planned include:

Flight Training Methods for Jet Upset Prevention, Detection and Recovery

- Develop and test new models to increase the flight envelope that can be simulated with today's technologies.

ADS-B Human Factors – AIR & AFS Equipment Design, Evaluation, and Operational Approval Guidance

- Develop human factors regulatory and guidance material on issues associated with ADS-B integration with current generation TCAS (e.g., alert thresholds, symbology, display installation).

A Multi-Disciplinary Approach to Fatigue Risk Management in Maintenance

- Provide validation evidence and metrics necessary for interpreting calculated risk with a fatigue risk management assessment tool.

UAS Control Station

- Develop human factors regulatory and guidance material for FAA inspectors and engineers who must evaluate and approve UAS ground control station designs and "pilot"/operator training programs.

Avionics: EFB, Moving Maps, and Multi-Function Display Issues

- Develop human factors regulatory and guidance material to support use and implementation of new evaluation checklist, developed in FY 2012, to identify human factors display issues for aircraft certification engineers, test pilots, and human factors specialists to ensure human factors display issues with multi-function displays are identified during the certification approval process.

Flight Crew Error and Inadvertent Operation Means of Compliance

- Provide recommendations for issues and recommended practices for flightdeck systems complying with new flight crew error regulation 14 CFR 25.1302.

Research continues to produce human factors input for Flight Standards and Aircraft Certification to develop design, evaluation and operational approval guidance for ADS-B enabled implementations; to assist Aircraft Certification in identifying, assessing, and remediating human performance issues involving electronic flight bags, moving map displays and multi-function displays; to support the Unmanned Aircraft Program Office by providing human factors recommendations for the design and operation of unmanned aircraft systems control stations; and to provide technical information for the certification of advanced auto pilots and related automation technologies in general aviation (GA) airplanes, which may include research on systems mode awareness, energy state management, and distraction.

2. What Is This Program?

The Flightdeck/Maintenance/System Integration Human Factors Program supports the DOT STRATEGIC safety goal from the DRAFT FY 2010 – FY 2015 U.S. DOT STRATEGIC PLAN. It provides the research foundation for FAA guidelines, handbooks, orders, advisory circulars (ACs), Technical Standards Orders (TSOs), and regulations that help to ensure the safety and efficiency of aircraft operations. It also develops human performance information that the agency provides to the aviation industry for use in designing and operating aircraft, and training pilots and maintenance personnel.

A major goal of the program is to improve pilot, inspector and maintenance technician task performance. Research results support enhanced methods for training and evaluating performance especially associated with new technologies and aircraft systems. Performance and evaluation capabilities are also enhanced through research that facilitates an improved understanding and application of risk and error management strategies in flight and maintenance operations.

The Flightdeck/Maintenance/System Integration Human Factors Program collaborates with industry and other government programs including:

- Department of Defense Human Factors Engineering Technical Advisory Group – FAA participates in this group to promote a joint vision for automation and related technical areas. Information is shared regarding similar areas of concern, for example training for automation, synthetic and enhanced vision systems, and head up displays.
- Domestic and international aviation maintenance industry partners such as Boeing, Continental Airlines, British Airways, and the International Association of Machinists –the emphasis is on achieving research results that can be applied to real-world problems.
- Society of Automotive Engineers (SAE) G-10 subcommittees – FAA participates on all of the Society's subcommittees involving human factors to adapt their findings to aviation standards, guidelines, etc.

In FY 2012, major activities and accomplishments planned include:

Flight Training Methods for Jet Upset Prevention, Detection and Recovery

- Reported on literature review to assess the state of the art in scenario modeling and execution for jet upset prevention, detection and recovery.

ADS-B Human Factors – AIR & AFS Equipment Design, Evaluation, and Operational Approval Guidance

- Analyzed the effects of imperfect Automatic Dependent Surveillance-Broadcast (ADS-B) generated traffic information including the loss of traffic targets and the depictions of such information to the pilot and report out technical results.

UAS Ground Control Station

- Provided analyses and human factors recommendations for unmanned aircraft system control stations to ensure safe and effective operator performance.

Avionics: EFB, Moving Maps, and Multi-Function Display Issues

- Provided human factors evaluation checklist of human factors display issues for aircraft certification engineers, test pilots, and human factors specialists to ensure human factors display issues with multi-function displays are identified during the certification approval process supporting compliance to Technical Standard Order (TSO) C113 and Advisory Circular 25-11A.
- Completed analysis of Aviation Safety Reporting System (ASRS) and NTSB accidents and incidents related to surface moving maps and Capstone 3 airline data highlighting human factors certification issues.

Head-up and Head-Mounted Displays: Certification Requirements and Operational Approval Criteria

- Completed literature review and product review addressing human factors aspects of head-up and head-mounted displays.

Flight Crew Error and Inadvertent Operation Means of Compliance

- Provided analysis and recommendations for issues and recommended practices for flight deck systems complying with new flight crew error regulation 14 CFR 25.1302.

Pilot System Interface and Human Factors Issues and Guidance for the Certification of Advanced Autopilots and Related Automation Technologies in General Aviation Airplanes

- Completed literature review and product review addressing aspects of advanced autopilots and automation technologies in small airplanes.

A Multi-Disciplinary Approach to Fatigue Risk Management in Maintenance

- Provided validation evidence necessary for interpreting calculated risk with a fatigue risk management assessment tool.

The Flightdeck/Maintenance/System Integration Human Factors Program supports the DOT Strategic Goal of Safety by reducing transportation related injuries and fatalities on commercial air carriers and in GA.

The goals of the focused research endeavors are:

- By 2013, develop human factors guidance material to support certification of cross regulatory display work including alerting, multi-function displays, moving maps, and electronic flight bags (EFB) which can host a variety of applications.
- By 2013, develop human factors guidance material for the certification of UAS automation including guidance for control station design and pilot training.
- By 2013, develop pilot system interface and human factors guidance for current and proposed autopilot and flight management automation systems used in single pilot GA airplanes.
- By 2014, provide human factors guidance material for FAA Certification and Flight Standards personnel to evaluate traffic displays and traffic applications/operations that use ADS-B technology.
- By 2014, develop training guidelines for jet upset prevention, detection and recovery.
- By 2015, develop human factors criteria and guidelines for approving head-up displays and head-mounted displays.

3. Why Is This Particular Program Necessary?

Human error continues to be a major contributor to aircraft accidents and incidents both in commercial and general aviation. This research program has, over the years, identified human factors issues and developed training, mitigation, and guidance material used by government and industry to address problem areas. For example, Crew Resource Management (CRM) research supported the development of an FAA Advisory Circular as well as training for air carriers. The research program has provided substantial support for the FAA's Voluntary Safety Programs. One of these programs, the Line Operations Safety Audit, is a direct result of our research and is now mandated by ICAO as a worldwide safety monitoring requirement for airlines. Additionally, the Human Factors Aircraft Certification Job Aid provided guidance to the Aircraft Certification Flight Test Pilots, Engineers, and Human Specialists who must evaluate new aircraft and old aircraft with new displays and/or controls. The Job Aid compiled over 100 human factors research and reference reports and tied them to the regulations. This database tool was instrumental in providing a structured way to evaluate systems submitted for FAA approval. Similarly, the electronic flight bag checklist provides a structured way to identify human factors issues with new EFBs submitted for approval. These tools have provided human factors and human performance data on which our FAA staff can make approval decisions.

The human factors research program continues to focus on the needs of pilots, inspectors and aircraft maintainers. Flight deck design and operational practices are experiencing a revolution in digital avionics, enabling new head up displays, surface moving maps, electronic flight bags, advanced controls, communications, navigation, surveillance systems, and tools for aircraft system management. With these advances come important human performance and human factors implications which must be understood and the appropriate guidance material developed for policy, procedures, operations and training. Our research supports the development of these products. History has taught us that the introduction of new automation to the flightdeck has resolved some human error tendencies but also introduced new ones. One goal of current research is to try to be proactive in identifying error tendencies and thereby enhance the safe and effective introduction of new technologies and procedures into the NAS.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms. The HF Subcommittee was briefed on the FY 2013 Flightdeck/Maintenance/System Integration Human Factors Program and found the research program was appropriate to FAA's mission and covered the area of need as understood by the subcommittee.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Any current or future reduction in funding to the Flightdeck/Maintenance/System Integration Human Factors Program would result in a delay in the FY 2013 requirement entitled "A Multi-Disciplinary Approach to Fatigue Risk Management in Maintenance" and the associated deliverables that support the development of regulatory and guidance material on fatigue risk management for aircraft maintenance personnel.

Detailed Justification for
A11.h System Safety Management

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – System Safety Management

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.h System Safety Management	$11,694,000	$10,027,000	$11,345,000	+$1,318,000

For FY 2013, $11,345,000 is requested for System Safety Management. Major activities and accomplishments include:

System Safety Management

- Aviation Safety Information Analysis and Sharing (ASIAS)
  - Expand ASIAS to new aviation communities (e.g., general aviation, rotorcraft, corporate, and military).
  - Incorporate new digital sources, such as Automatic Dependent Surveillance-Broadcast (ADS-B) and Air Traffic Control (ATC) voice data.
  - Initiate development of vulnerability detection capabilities that monitor each ASIAS database for potential safety issues, analyzing disparate data drawn from multiple sources, and enhancing discovery and identification of safety risks.
  - Develop a modeling capability that is able to assess potential vulnerability of anomalous behavior discovered from the databases using a knowledge-based approach.
  - Transport Airplane Risk Analysis Evaluative Metrics
  - Further development of a quantitative risk analysis methodology for transport airplane continued operational safety (COS) and the data necessary to perform such analyses.
- Prognostic Air Traffic Analysis Capability for Operational Safety (referred to as Prognostic Safety Analysis of Air Traffic Control Operations with ASIAS in FY 2012)
  - Develop a capability that integrates air traffic databases and permits prognostic trend analysis of air traffic safety performance for operational oversight.
  - Complete the development of a user interface and trend analysis capability for equipment performance.
  - Test the equipment module for facility performance.
- Operational Safety Measurement of Future Systems
  - Conduct safety impact analysis of the NAS due to the future improvements for each NAS operational domain, such as tower, TRACON, enroute, or for each phase of flight, such as taxi, departure, climb, cruise, approach, and landing.
- Facility Risk Assessment Tool (FRAT)
  - Initiate development of a capability that can identify and prioritize risk areas of ATC facilities warranting further analysis and intervention strategies.

Terminal Area Safety

- Develop Models that Enhance the Ability to Use Advanced Flight Simulators for Advanced Maneuvers
  - Determine data requirements to improve the mathematical models of stalls, and conduct research on damping values and control effectiveness in the roll and yaw axis to match the in-flight values.
- Determining Runway Friction from Airplane Data
  - Evaluate methods to determine the runway friction level or runway slipperiness condition by using data obtained from an airplane's flight data or quick access recorder.
- Simulator Motion Cueing Criteria
  - Conduct research to investigate errors across simulators by replicating testing conditions with same sensors and their placement for developing criteria for achieving more uniform training across today's fleet of simulators.

In summary, research projects in the System Safety Management Program are designed to increase system safety through the use of safety information. This will occur with the development of enhanced methods of data collection and analysis spanning a wide range of operational areas (e.g., Part 121, Part 135, Part 91), aircraft types (e.g., Part 23, 25, 27, 29), as well as across the certification lifecycle from the development of initial regulations and guidance through actions associated with continued operational safety. Projects also include the development and enhancement of technologies aimed at increasing the level of safety specifically in the terminal area; current projects are focused on technologies that address events associated with the highest accident and fatality rates.

2. What Is This Program?

The System Safety Management Program will release in 2013 an infrastructure that enables the free sharing and analysis of de-identified safety information that is derived and protected from government and industry sources. This infrastructure will be enhanced with additional capabilities, i.e., vulnerability discovery, improved data fusion and expanded data sources and users. In addition, the program provides methodologies, research studies, and guidance material that provide the capabilities of systematically assessing potential safety risks and applying proactive solutions to reduce aviation accidents and incidents. The program also conducts operational research and analysis to maintain or improve safety and to improve terminal area efficiency.

The program encourages broad industry and government participation across all projects, including:

- Aircraft Safety Subcommittee of the Research, Engineering and Development Advisory Committee – representatives from industry, academia, and other government agencies annually review the program's activities.
- Technical Community Representative Groups – FAA representatives apply formal guidelines to ensure the program's research projects support new rulemaking and the development of alternative means of compliance with existing rules.
- The Joint Planning and Development Office Safety Working Group – a national-level integrated safety management framework that addresses all facets of the air transportation system, building safety design assurance into operations and products.
- Commercial Aviation Safety Team (CAST) – an FAA/industry collaborative effort to develop and implement data-driven safety initiatives.

The Program partners with industry, academia, and other governmental agencies, including:

- The Civil Aviation Authority of the Netherlands to conduct joint research on aviation system safety initiatives via a Memorandum of Cooperation.

- Technical expertise from air carriers to provide industry reviews and recommendations regarding safety and efficiency of terminal area operations as well as air carriers' cooperation with data sharing agreements and governance models that allow for the free sharing of aviation data in accordance with approved voluntary safety information sharing agreements.
- Center of Excellence for General Aviation Research, via grants, to increase data and tools available for cooperative general aviation safety analyses among industry stakeholders.

In FY 2012, major activities and accomplishments planned include:

System Safety Management

- Aviation Safety Information Analysis and Sharing (ASIAS)
  - Expanded the ASIAS prototype to include the concepts of sharing information and applications among industry stakeholders from an enterprise-level, allowing diverse industry stakeholders to analyze data on an industry-wide basis rather than individual organizational level.
  - Initiated testing of an advanced infrastructure and laboratory for conducting and sharing analysis tools and aggregated safety information that allows industry stakeholders to perform standardized data analysis and limited vulnerability discovery on diverse sets of data.
  - Conducted safety analytical studies and safety assessments using ASIAS and other aviation safety data.
- Transport Airplane Risk Analysis Evaluative Metrics
  - Further developed a quantitative risk analysis methodology for transport airplane continued operational safety (COS) and the data necessary to perform such analyses.
  - Reviewed and analyzed existing historical and ongoing transport airplane operational and design data; research, identification, and collection of new transport airplane data; directed research to develop risk analysis supporting data; the statistical analysis of such data; and compilation of the data into the form and format best suited for efficient use in transport airplane risk analysis.
- Operational Oversight of NAS Facilities through ASIAS (referred to Integrating NAS Facility Services Data into ASIAS for Operational Safety Oversight in FY 2011)
  - Completed development of a facility/equipment operations module that includes a collection of information that provides a view of NAS equipment maintenance functions, combined with ASIAS/ATC baseline data, specific to NAS safety oversight.
- Prognostic Safety Analysis of Air Traffic Control Operations with ASIAS
  - Initiated development of a user interface and trend analysis capability that monitors NAS equipment operations with respect to failures, risk, and other off-nominal occurrences.
  - Conducted an analysis of the requirements resulting from the intended uses of data for safety oversight.

Terminal Area Safety

- Develop Models that Enhance the Ability to Use Advanced Flight Simulators for Advanced Maneuvers
  - Identified methods to model unusual attitude encounters outside the normal operating envelope.
- Performance Based Navigation
  - Completed initial evaluation regarding the connection of required navigation performance (RNP)/performance based navigation (PBN) paths for terminal area operations by using human-in-the-loop simulations.

- Determining Runway Friction from Airplane Data
  - Completed preliminary analysis of contributing factors and develop models for landing performance of selected make, model, and series aircraft using standard operating practices to improve the safety and capacity in terminal areas.
- Cockpit Advanced Systems
  - Identified new cockpit-centric navigational technologies and data for the development of new procedures to enhance safety and capacity within the terminal area.

The System Safety Management Program supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities for both commercial air carrier and general aviation operations. This will occur through development of a secured safety information and analysis system that provides access to numerous databases, maintains their currency, enables interoperability across their different formats, provides the ability to identify future threats, conducts a causal analysis of those threats, and recommends solutions.

The goals of the focused research endeavors in the domain of aviation safety information are:

- By 2013, develop advanced infrastructure and laboratory for conducting and sharing analysis tools and aggregated safety information that allows industry stakeholders to perform standardized data analysis and limited vulnerability discovery on a wide variety of diverse sets of data.
- By 2014, develop a user interface and trend analysis capability that monitors NAS ATC operational safety with respect to risk and other off-nominal occurrences for use by FAA field and headquarters safety inspectors to more economically identify facilities with higher safety risks.
- By 2014, complete the compilation of risk analysis data and/or statistical data into a format best suited for efficient use in transport airplane risk analysis.
- By 2015, expand ASIAS system safety analysis to other domains (e.g., general aviation, rotorcraft, corporate, military).
- By 2016, develop a capability that can identify and prioritize risk areas of ATC facilities warranting further analysis and intervention strategies.
- By 2017, enhance vulnerability assessment capabilities of discovery, identification, and evaluation of safety risks not currently known to the aviation community.

Goals specific to Terminal Area Safety research are:

- By 2014, identify initial credit granted for synthetic or enhanced vision system installation and the level of operations.
- By 2014, develop modeling techniques that result in changes to the math model structure to match flight data in aerodynamic stalls.
- By 2016, complete the evaluation of the reported runway friction level from all potential runway surface conditions and airplane configurations.
- By 2016, develop test criteria by varying motion characteristics to span the domain of the criteria and compare variations against subjective opinions of motion quality.

3. Why Is This Particular Program Necessary?

The System Safety Research Program has two primary goals. First, the program is designed to identify and analyze emerging threats in a cooperative nature with the aviation industry. Working cooperatively with aviation stakeholders provides the ability to analyze trends across the aviation community that is much more effective than monitoring individual airlines. Thus, the aviation community and FAA must have regular access to safety information to move toward a risk-based safety management approach. By creating a safety baseline and benchmarks, the program will produce products that regularly monitor safety enhancements to ensure the incorporation of new capabilities does not impact current levels of safety. Therefore, the program has direct impact in several areas that affect the incorporation of new technologies, NextGen capabilities, and evolution of the National Airspace System.

Along these lines, the System Safety Research Program responds to several GAO studies that call for the FAA to collect better data and improve its effort to identify and address safety issues. For FY 2013, development will continue to enhance ASIAS capabilities through developing capabilities, tools and software that will improve safety oversight of the NAS, and through conducting analytical studies and safety assessments using ASIAS and other safety aviation data. Also, research will continue in the development of empirically derived transport airplane data to be used by the Transport Airplane Directorate in their development of safety metrics.

The second major goal is to identify and mitigate the risks associated in the terminal area operations. This effort aims to provide solutions to the airport capacity problem so that maximum benefits for both safety and efficiency can be realized. It supports the FAA's goal of Increased Safety as stated in objectives 1 and 2 to reduce fatal accidents, and the goal of Increased Capacity as stated in objective 1 to meet projected demand, which are identified by the Flight Plan 2009-13. Furthermore, the research efforts also respond to several NTSB safety recommendations:

- A-04-62: Evaluate issues concerning the level of automation appropriate to teaching upset training and develop and disseminate guidance that will promote standardization and minimize the danger of inappropriate simulator training.

- A-07-64: Demonstrate the technical and operational feasibility of outfitting transport-category airplanes with equipment and procedures required to routinely calculate, record and convey the airplane braking ability required and/or available to slow or stop the airplane during the landing roll. If feasible, require operators of transport-category airplanes to incorporate use of such equipment and related procedures into their operations.

For FY 2013, research will include the collection and analysis of motion data on existing platforms and the development of more accurate simulator models to enhance simulator training, as well as the development of technologies to enhance the accuracy of runway friction data.

4. How Do You Know The Program Works?

Through ASIAS, the agency has been able to promote system-wide access and sharing of aviation safety data and analysis tools within the aviation community, providing safety resources that are integrated with operations of aviation industry stakeholders. Directed studies commissioned by the Commercial Aviation Safety Team, e.g., Terrain Awareness and Warning System and Traffic Alert/Collision Avoidance System have lead to the development of intervention strategies that have been implemented and are currently being monitored for effectiveness.

Within the Risk Management Decision Support project, recent research output has been used in the development of the Transport Airplane Directorate Risk Assessment Methodology (TAD RAM) provides Aviation Safety Engineers (ASEs) with guidance for estimating the risk associated with airworthiness concerns. TAD RAM also provides guidance on how ASEs can use estimated risk as a consideration in making unsafe condition determinations and in evaluating corrective actions.

Prior year research outputs have been used in the development of an Advisory Circular on aircraft maintenance tool calibration program; the preparation of recommended best practices for inspection and maintenance of GA aircraft exhaust system to prevent carbon monoxide leakage; and the preparation of FAA Order 8300.14 "Repair Specification Approval Procedures."

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R, E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R, E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Funding at the requested level is necessary to enable FAA to fully address safety issues. Were funding not possible at the requested level, the following initiatives may be compromised:

The Operational Safety Oversight of the NAS through ASIAS research: The FAA is to conduct research to develop an automated tool, i.e., FRAT that collects stores and analyzes both operational resources and event data. The tool will evaluate controllers deployed, procedures used, complexity, traffic counts, and multiple human factors issues. In addition, tool will analyze incidents, pilot deviations, near mid-air collisions, operational error/deviation, and runway incursions. The purpose of FRAT is to identify and prioritize risk areas of NAS facilities warranting further analysis and intervention strategies. A reduction in the System Safety Management budget will delay delivery of an automated capability that would Optimize FAA resources in support of safety in the NAS. This would force the FAA Office of Aviation Safety to continue a manual process of analyzing both operational and safety data with respect to NAS facilities.

The Terminal Area Safety research, particularly the simulator motion cueing research task: The FAA is to conduct research to determine the appropriate objective criteria for flight simulator platform motion. Having validated motion criteria will help standardize motion platform responses and allow users to decide whether or not motion cues are sufficient for safety performing given tasks. Should a drastic reduction in funding occur, the FAA will postpone this research in reducing the motion deficiencies which were identified as a contributor to fatal accidents such as USAir 427 and American Airlines 587.

Detailed Justification for
A11.i Air Traffic Control/Technical Operations Human Factors

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Air Traffic Control/Technical Operations Human Factors

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.i Air Traffic Control/Technical Operations Human Factors	$10,364,000	$10,364,000	$10,014,000	-$350,000

For FY 2013, $10,014,000 is requested for Air Traffic Control/Technical Operations Human Factors. Major activities and accomplishments planned include:

Advanced Air Traffic Systems

- Develop human factors color guidance for air traffic control displays that can be used in the acquisition of future ATC systems.
- Revise five chapters of the Human Factors Design Standard.
- Generate human factors design guidance for Air Traffic Control Tower Alerts.
- Demonstrate a prototype of a Design Process Guide that will provide human factors design requirements for the ergonomic aspects of workstation and workplace design.

Individual and Team Performance

- Conduct an experiment to measure the effects of time on task, workload intensity, break duration, and break activities on the recovery from mental fatigue and associated decrements in air traffic control task-related performance.
- Develop an evaluation methodology for the fatigue mitigation strategies that educate air traffic controllers and managers about the factors that affect fatigue.
- Develop a plan for a field study leading to better management of fatigue risk from air traffic controller job tasks that may increase susceptibility to fatigue.

Personnel Selection and Training

- Implement Air Traffic Color Vision (ATCOV) test revision at Regional Flight Surgeon offices that incorporates ERAM requirements.

Advanced Technical Operations Systems

- Develop technical operations Graphical User Interface guidelines.
- Generate a draft standard that will be used to guide the development of acronyms/abbreviations for future Technical Operations systems.

The program will continue to make progress on sponsor requirements in the areas of Advanced Air Traffic Systems, Advanced Technical Operations Systems, Individual and Team Performance, as well as Personnel Selection and Training. As the National Airspace System moves toward modernization under the NextGen plan, this program will emphasize the development of human factors design standards for ATC systems and determine the feasibility of applying a design process guide for these systems. In the domain of technical operations, the program will continue the development of standards for multi-media maintenance publications and documentation to enhance maintenance procedures and reduce the probability of human error. The program will also continue research examining various strategies to minimize fatigue-related degradations in controllers' ability to monitor and control traffic. Finally, the program will continue to validate and improve selection tests to help reduce the costs to the agency of hiring Air Traffic Control Specialists (ATCS) by refining selection. Better selection will reduce the number trainees who are unable complete training and increase the number of applicants who would make good ATCSs, but are not currently being selected.

The effort to develop a Human System Integration road map for the technical operations domain will continue through FY 2013. This new working environment will drive a need for alterations in personnel selection, training, and management of human error as the consequences of errors become more far-reaching in terms of National Airspace System (NAS) availability. Related to this effort is a project to revise the maintainer job task analysis to determine if there is a need and valid basis to add medical screening (e.g.: color vision) and basic skill requirements (keyboard and computer use) to the selection process.

2. What Is This Program?

The Air Traffic Control/Technical Operations (ATC/TO) Human Factors Program provides leadership and products to motivate NAS evolution to ensure the system's human component will safely and reliably perform to meet the flying public's needs. Outputs include:

- Air traffic workstations and concepts that increase workforce productivity by identifying key workload factors and mitigation principles that must be mitigated to enable the humans in the system to manage the future NAS traffic flow
- Assessments of the effectiveness of fatigue-risk-management strategies.
- Future controller and maintainer personnel selection criteria to enhance screening process efficiency and effectiveness.
- Guidelines and standards for design of computer-human interfaces used in TO.

The ATC/TO Human Factors Program supports the Department of Transportation's safety and economic competitiveness goals by developing research products and promoting the use of those products to meet the future demands of the aviation system. The human factors research program for FY 2013 will emphasize the concept of human-system integration (HSI) and safety aspects of the functions performed by air traffic controllers and technical operations (maintainer) personnel. The HSI concept will address the interactions between workstation design, personnel selection, training, and human error/safety. The ATC/TO Human Factors Program generates requirements for human interface characteristics of future air traffic and technical operations workstations and enhances our understanding of the role that system design plays in mitigating human error, which is a major contributor to operational errors, runway incursions, and errors that result in NAS equipment outages. Additionally, researchers are developing methods to select new air traffic controllers and maintainers so that the applicant screening process is valid, reliable, and fair, and also to improve HSI in the maintenance arena to increase reliability and availability of the NAS.

The research program works to improve safety by:

- Improving:
  - Effectiveness of safety analyses that concentrate on detecting the potential for human error during the concept and research phases of system development.
  - Methods to select and train new controllers and maintainers.

The program works to improve the ATC and TO contributions to economic competitiveness:

- Developing:
  - Integrated workstations that allow TO specialists to meet increased availability and service demand.
  - Methods to assess the value of proposed changes to workstations to determine if human-in-the-loop performance is enhanced.

  - Advanced concepts for maintenance workstations that use automation and advanced technology to increase availability of the NAS, and decrease the probability of system outages.

- Improving:
  - HSI in a manner that allows controllers and pilots to cooperatively manage traffic loads as cockpit technology and air traffic workstations are more closely connected to efficiently move air traffic in the NAS.
  - Allocation and sharing of roles and responsibilities between controllers and pilots as technology evolves to meet future demands.

The ATC/TO Human Factors Program receives requirements from its internal FAA sponsoring organizations (primarily the following FAA Air Traffic Organization (ATO) ATC/TO research groups) and collaborates with national and international research organizations:

- Advanced Air Traffic Systems Requirements Group – En Route and Terminal Service units as well as System Engineering in Operations Planning, operational personnel, and systems developers articulate human factors research requirements for developing human factors standards to be applied in system
- Individual and Team Performance Requirements Group – ATO Safety, En Route, Terminal, Technical Operations and System Engineering service units participate to identify human performance research needs involving fatigue, safety culture, human error hazard identification, age, operational errors, runway incursion prevention, and supervisor practices
- Advanced Technical Operations Systems Requirements Group – The Technical Operations, En Route, and Terminal service units recommend NAS infrastructure operational and maintenance research, including ATC systems maintenance displays, controls, and maintainability features specifications
- Personnel Selection and Training Requirements Group – ATO Technical Training and Development, Human Resources, FAA Academy, Workforce Services, Office of Aerospace Medicine, Administration and Talent Management groups recommend research to evaluate and improve personnel selection and training
- Collaborative research with the National Aeronautics and Space Administration that includes human factors areas such as the measurement of fatigue risk management effectiveness
- Collaboration with EUROCONTROL, including joint development of a Human Reliability Assessment Tool, participation in semi-annual Air Traffic Management (ATM) seminars, and leadership of an Action Plan 15 Safety workgroup to identify ATM human factors issues
- Cooperative research agreements are in place with Massachusetts Institute of Technology, St. Louis University, Ohio State University, and The American Institutes for Research

In FY 2012, major activities and accomplishments planned include:

Advanced Air Traffic Systems

- Continued development of a human factors color standard for Air Traffic Control (ATC) displays that is harmonized with the color vision testing used during controller selection.
- Continued development of an ATC symbology and style guide to aid the efficient development of ATC display details.
- Continued work on a revised Human Factors Design Standard that can be cited as a design requirement during ATC system procurements.

Individual and Team Performance

- Reported on the effectiveness of the ATC Quick Reference Guide for supervisor best practices.

- Continued the Preventive Maintenance Tasks Vulnerable to Human Error study that seeks to identify and prevent human errors resulting in ATC system outages.
- Performed fatigue research measuring the effectiveness of fatigue risk management interventions that are scheduled for implementation.

Advanced Technical Operations Systems

- Continued a project to evaluate multi-media documentation in the technical operations domain to enhance efficiency in field maintenance.

Personnel Selection and Training

- Continued longitudinal validation of ATC selection instruments.
- Documented the effectiveness of a selection battery to place controllers by option (i.e., tower versus radar positions) and match skills to optimal placement.
- Continued a study of controller entry and retirement age.
- Concluded a grant regarding potential approaches to increase the efficiency of air traffic controller training and staffing.

3. Why Is This Particular Program Necessary?

The safety and performance of the National Airspace System (NAS) is directly linked to the performance of human operators. Among the most complex problems facing aviation today are those involving human error. To achieve quantifiable improvements in aviation safety and economic competitiveness, increasing emphasis is being placed on the human operator and those involved with the safe and efficient conduct of flight (e.g., supervisors, air traffic controllers, maintenance technicians).

Enhancing safety will require a reduction in human error and increasing economic competitiveness will involve the development of techniques and tools that increase controller efficiency. Some of these tools and techniques involve augmenting the human decision maker with a recommendation generated by automation. This program addresses the required balance between reliance on the automation and assuring that the human, who has a much better ability to make decisions in the presence of incomplete information or multiple simultaneous competing priorities, can and will take the correct action when necessary. The human issue will be made even more complex as a large percentage of the agency's controllers become eligible to retire within ten years. With total losses expected to exceed 10,000, FAA must develop effective recruitment, selection, and training procedures to ensure those who are hired have the necessary knowledge, skills, and abilities to be successful.

FAA Human Factors R&D for ATC/TO is motivated by a need to reduce the potential for human error and increase the efficiency of ATC operations. To meet these challenges, the FAA is focused on integrating the human into the development cycle. The major areas of human system integration are in effective workstation design, human error reduction, effective and fair personnel selection, and efficient training. The requirement to include the human component in the development of the NAS is being addressed by this research program.

The Air Traffic Control/Technical Operations Human Factors Program provides a unique service for the Air Traffic Organization and other FAA organizations. The program gathers the various organizations' research requirements and develops integrated research products. If this program was not funded, the organizations named in Area 2 above would not be able to address the important human factors issues cited above. The personnel and laboratories funded by this program are unique national assets and not available elsewhere. There is ample historical evidence in the agency that prior to the availability of these research products, the consequences of a lack of application of human factors research resulted in cost and schedule overruns on acquisition programs such as STARS. The application of our personnel selection and training products has resulted in a more efficient screening process that reduces the time and cost of controller selection and training. The AT-SAT screening test for controllers is a product of this research program, as is the ATCOV test to assure that candidates with job-related color vision deficiencies do not enter the workforce.

4. How Do You Know The Program Works?

This program is reviewed by two Research, Engineering and Development Advisory Committee (REDAC) Subcommittees: Human Factors and NAS Operations. The REDAC reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on RE&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure that FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development Program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

After the REDAC Human Factors (HF) Subcommittee was briefed on the Air Traffic Control Human Factors programs, the subcommittee found that the FY 2013 research portfolios and their underlying structure were appropriate to FAA's mission and covered the area of need as understood by the subcommittee. In particular, the HF Subcommittee was impressed that other entities within the FAA are actively coordinating with, or seeking human factors input from, specialists in human factors including the FAA Human Factors Research and Engineering Group (HFREG, AJP-61), especially related to NextGen activities. The subcommittee recommended that the HF community within FAA continue their work in the areas presented, and that the funding continue at (at least) current levels.

There is ample evidence that the program works as illustrated in the following examples. Every candidate for a controller position entering the workforce from the general public is now taking the Air Traffic Selection and Training screening test to enhance the probability of success during training and on the job. The ATCOV test is now in use during the medical screening process to assure that new controllers with job-related color vision deficiencies are selected out of the workforce. The Front Line Manager Quick Reference Guide that is a recent output of this program has been strongly endorsed by the ATO service units and has been distributed by the ATO Safety organization to every front line manager in the ATO. It is also being used as course material in the FAA academy and other FAA management courses. The Human Factors Design Standard is a robust document containing human factors design criteria that is cited in every FAA acquisition contract that has a human interface.

Satisfaction surveys are one of several methods utilized to ensure that project sponsors are satisfied with the program. The survey attempts to determine the effectiveness of the project team during the acquisition process and receives a critique of the program manager's performance.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The human component of the NAS (i.e., the people in the ATO) is arguably the most important, most complex, and most expensive element and the most critical portion of the NAS to accomplish the mission. Without our controllers, maintainers, traffic flow coordinators and other people in the NAS it would be impossible to deliver services to users of the airspace. This program is dedicated to enhancing human performance in the conduct of our mission. A reduction in the requested level of funding will cancel or delay major elements of the program. For example, important research on controller fatigue would be delayed at least one year, and fatigue research data collection for the Technical Operations maintainer community delayed at least two years. The area of controller fatigue is a high visibility topic and our sponsors in ATO Safety have recently generated a large number of research requirements to respond to recent initiatives for fatigue countermeasures. This research program recently invested substantial resources into a survey of the state of fatigue of the controller work force (which was initiated prior to the recent controller fatigue-related events) to support the ATO Fatigue Risk Management System. The Air Traffic Control/Airway Facilities Human Factors program would continue to make investments in fatigue research, but at a slower pace and spaced further apart under a reduced funding level. The Human Factors

Design Standard used during acquisition programs to reduce human factors risk would be updated at a later date. A further reduction will require cancellation of the Human Factors Design Standard for Display Symbology and reduce the funding available for the completion of a study regarding Preventive Maintenance Tasks Vulnerable to Human Error.

One of the critical elements of this program relates to the human performance aspects of safety in the NAS. Our efforts to assure that the human component to safety risk management is reflected in system and airspace development have not kept pace with the changes in the NAS. We are attempting to mitigate this shortcoming, but will be unable to do so at a more austere funding level. Important agency metrics such as loss of separation events and runway incursions are usually the outcome of human error. Decisions on the acquisition of new systems to enhance safety and the application of new or modified procedures to reduce the likelihood of human error should be based on human performance research that is the output of this program. A reduction of funding to this program will have a negative impact on our ability to support these decisions and respond to the safety and human factors engineering needs of our sponsors in the ATO.

Detailed Justification for
A11.j Aeromedical Research

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aeromedical Research

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.j Aeromedical Research	$11,098,000	$11,000,000	$9,895,000	-$1,105,000

For FY 2013, $9,895,000 is requested for Aeromedical Research. Major activities and accomplishments planned include:

Civil Aerospace Medical Institute (CAMI) Aeromedical Research Program

- Aeromedical Systems Analysis
  - Assess accident investigation cases involving atrial fibrillation relative to aeromedical decision making processes.
  - Evaluate aeromedical hazard trends in fatal accidents based on the integrated aeromedical review of individual cases assessing forensic toxicology, autopsy, and medical records information.
  - Determine the prevalence of vision deficits and eye pathologies in accident pilots.
- Accident Prevention and Investigation
  - Evaluate frequency of the presence of tricyclics (used to treat mood disorders) in pilots involved in fatal aviation accidents to determining whether their use was a contributing factor to the accident.
  - Investigate the feasibility of hypoxia biomarkers in rapid decompression studies to elucidate the effects of this stressor on gene expression and further develop mitigation strategies.
- Crash Survival
  - Develop anthropometric test dummy (ATD) calibration methods and dummy modifications that will ensure consistent lumbar load measurements during seat certification tests.
- Aviation Physiology
  - Investigate the feasibility of hypoxia biomarkers in rapid decompression studies to elucidate the effects of this stressor on gene expression and further develop mitigation strategies.
  - Develop educational materials for suborbital flight crew concerned with the radiation environment during suborbital space travel.
- Prevention of Injuries that Impede Egress
  - Determine human impact tolerance levels and methods for predicting occupant unconsciousness and leg injuries that can occur during a survivable crash.
  - Investigate enhanced means of mitigating injury causing mechanisms for the brain and leg.
- Evacuation Analytical Tools

- Develop and maintain analytical tools, empirical data and scientific expertise to support regulatory actions, standards development, accident investigations, and enhanced safety of airplane interior arrangements and emergency equipment/operations.

Airliner Cabin Environment Research Program

- Airliner Cabin Environment: Purification of Environmental Control System Air Supplies; Bleed Air Contamination
  - Develop and test systems and techniques that reliably provide in-flight detection of lubricating oil and hydraulic fluid bleed air contamination air quality incidents.

The Civil Aerospace Medical Institute (CAMI) will conduct aeromedical research pertaining to the human aspects of protection and survival from exposure to hazardous conditions relative to civil aerospace operations. Research activities will develop new and innovative ways to support FAA regulatory and advisory missions to improve the safety, security, health, and survivability of aviators, cabin crew, and the flying public. There are four research requirement areas: (1) Aeromedical Systems Analysis, (2) Accident Prevention and Investigation, (3) Crash Survival, and (4) Aviation Physiology. The research requirements "Prevention of Injuries that Impede Egress" and "Evacuation Analytical Tools" are Fire and Cabin Safety requirements performed under Crash Survival.

The goals of the Aeromedical Systems Analysis research requirement are to: a) Analyze medical certification, accident, and other biological data to derive methods, recommendations, and/or tools to enhance aircrew health, medical certification decision-making processes, and AME education programs, b) Evaluate trends in physiological, human factors, and clinical findings from civil aviation aircraft accidents and incidents to support accident investigation processes and develop strategies to mitigate aeromedical risks, c) Develop and maintain comprehensive aeromedical research databases towards an Aeromedical Safety Management System and the development of Probabilistic Risk Analysis Methodologies. Support the development of safety policy by providing evidence-based aeromedical recommendations and manage safety risk by reporting emerging health problems that would impact medical certification processes or technology Safety Risk Management, Safety Assurance, and Safety Promotion, an d) Investigate current and anticipated aeromedical issues and technology that may impact human performance in aviation activities.

The goals of the Accident Prevention and Investigation research requirement are a) Develop advanced toxicological and biochemistry methodologies to analyze human biological samples for emerging drugs, toxins, and other substances that may impact pilot performance or assist in determining accident causality. As a result of this effort, provide technical reports, procedures, recommendations, criteria, and associated products that would assist the aeromedical scientific, drug abatement, and certification communities; accident investigation personnel (AAI, NTSB, DOT); and FAA legal counsel (AGC) in realizing their goals and b) Develop gene expression (biomarker) methodologies to quantify the effects of alcohol, drugs, fatigue, hypoxia, and other environmental or aeromedical stressors relating to pilot performance and accident investigation. Determine collection methods, develop and assess analytical procedures and technologies, and ultimately provide an approach to identify or predict these effects, towards a "genomics black box."

The goals of the Crash Survival research requirement are a) Develop design and certification test methods and criteria to ensure occupant survival at maximum airframe impact tolerance. Address seats, seat cushions, seat restraints, air bags, and related devices, b) Develop and validate mathematical models to simulate, facilitate, and improve (A); validate these models in conjunction with biodynamic testing, provide recommendations for the development of industry-wide standards; and coordinate/participate in these standardization efforts through professional associations and workshops to ensure industry understanding, c) Develop safety and emergency equipment standards, procedures, and criteria to ensure evacuation capability for all aircraft occupants from all aircraft incidents and survivable aircraft accidents, and d) Provide recommendations for the development of industry-wide standards and coordinate/participate in these standardization efforts through professional associations and workshops.

The goals of the Aviation Physiology research requirement are to a) Investigate the effects of ionizing and non-ionizing radiation on living systems; identify radiation hazards in the aviation environment; and develop methods of protection from such hazards and b) Investigate environmental factors that influence human physiology and performance in aerospace environments.

2. What Is This Program?

Agency outputs proceed from the FAA Office of Aviation Medicine, specifically 1) CAMI and 2) the National Air Transportation Center of Excellence for Research in the Intermodal Transportation Environment (RITE).

CAMI Aeromedical Research Program

CAMI's Aeromedical Research Program provides research data to assess new technology and evaluate existing bioaeronautical guidelines, standards, and models for aerospace craft cabin equipment, procedures, and environments. Aeromedical research serves as the basis for new regulatory action and evaluation of existing regulations to continuously optimize human performance and safety at a minimum cost to the aviation industry. This research program analyzes pilot medical and flight data, information from accidents and incidents, and advanced biomedical research results to propose standards and assess certification procedures that optimize performance capability. This research program is conducted by in-house resources, specifically the CAMI Aerospace Medical Research Division, and supports Airliner Cabin Environment Research efforts.

The Aeromedical Research Program supports FAA's regulatory and medical certification processes that develop safety and health regulations covering all aerospace craft occupants and their flight environments; Recommending and developing equipment, technology, and procedures for optimal (a) Evacuation and egress of humans from aerospace craft, (b) Dynamic protection and safety of humans on aerospace craft, and (c) Safety, security, and health of humans on aerospace craft.

Research program outcomes include:

- Improved safety, security, protection, survivability, and health of aerospace craft passengers and aircrews
- Exploiting new and evaluating existing bioaeronautical guidelines, standards, and models for aerospace craft cabin equipment, procedures, and environments
- Providing research data to serve as the basis for new regulatory action in evaluation of existing regulations to continuously optimize human performance, health, and safety at a minimum cost to the aviation industry
- Analyzing pilot medical and flight data, information from accidents and incidents, and advanced biomedical research results to propose standards and assess certification procedures that optimize performance capability
- Evaluating the complex mix of pilot, flight attendant, and passenger activities in a wide range of environmental, behavioral, and physiological situations to propose standards and guidelines that will enhance the health, safety, and security of all aerospace travelers

Airliner Cabin Environment Research Program

Airliner Cabin Environment Research Program was formulated in response to issues raised in a 2002 National Research Council Report regarding the airliner cabin environment and the health of passengers and crew during normal and events outside the normal operational envelope and continued public and congressional concern. The airliner cabin environment research addresses public, aircrew, and congressional concerns regarding these issues, including, contaminant transport, ozone (including chemical reactivity of aircraft cabin interiors), pesticides (residual and sprayed), contaminants that may be carcinogenic, additives in hydraulic and lubricating fluids in aircraft engines and auxiliary power units and identified as possible neurological toxins in crew members. The Airliner Cabin Environment Research program also conducts R&D on cabin air quality sensors; advanced environmental control systems; and on chemical and biological agents, and disinfection techniques and processes. The research is primarily conducted by the RITE.

The Airliner Cabin Environment Research Program supports FAA's Flight Plan goal for Increased Safety by: Developing and testing adaptive environmental control techniques to enable a safe and healthy cabin air environment including during in-flight incidents; Validating software tools and methods to mitigate possible air contamination incidents during flight and ground operations; Developing advanced scientific models and experimental data of airborne and surface transmission of existing and emerging infectious diseases within aircraft; Evidence-based development of appropriate hazard identification and risk management criteria guidelines to maximize safety and health in the air transportation system in response to infectious disease; Recommending and developing equipment, technology, and procedures for optimal (a) evidence-based development of appropriate policy, regulations, and guidelines to maximize safety and health from the cabin air quality environment and (b) identifying hazards and characterizing risks of the major infectious diseases likely to be carried on-board aircraft; Providing air quality incident identification to alert crew to potential problems and provide signals to the environmental control system for appropriate response; and providing for safety, security, and health of passengers and crewmembers on commercial aircraft.

Both the CAMI Aeromedical Research and ACER Programs support numerous DOT and FAA organizations, public laws, customers, and stakeholders including: the Executive Office of the President, National Science and Technology Council, Office of Management and Budget, Office of Science & Technology Policy, European Aviation Safety Authority, Transport Canada, World Health Organization, and the Department of Health and Human Services.

CAMI has established a professional relationship with over 90 organizations and 55 committees, including holding fellowships and other leadership positions. These scientific, medical, academic, and bioengineering relationships include working in partnership on a multitude of efforts with these organizations, including Cooperative Research and Development Agreements and advisory groups. RITE has over 30 industry partners participating in the research and development effort. RITE researchers and Office of Aerospace Medicine staff members collaborate with leading organizations associated with aerospace medicine, aviation health, airliner cabin environment, and safety.

In FY 2012, major activities and accomplishments planned include:

CAMI Aeromedical Research Program

- Aeromedical Systems Analysis
  - Examined and modeled aviation accidents in Alaska over time. The model will provide a way of assessing risk within the Alaskan aviation community.
  - Reported on the review of all fatal and high profile accidents to determine reporting accuracy of medical certification applications and provide insight on possible corrective measures.
  - Assessed the vision performance effects of pilots exposed to non-ionizing radiation (ultraviolet, visible, near/mid-infrared) from natural and artificial sources and develop guidance material.
- Accident Prevention and Investigation
  - Analyzed and distributed zolpidem, a prescription medication used for the short-term treatment of insomnia, in postmortem specimens from aviation accident fatalities.
  - Reported on the effects of exposure to combustion gases (CO and hydrogen cyanide) in support of investigation of aviation accidents involving fire/smoke.
  - Developed procedure to validate potential biomarkers by special biochemical methods. These biomarkers will assist in identifying fatigue and other aviation stressors.
- Crash Survival
  - Developed anthropometric test dummy (ATD) calibration methods and dummy modifications that will ensure consistent lumbar load measurements during seat certification tests.
  - Determined human impact tolerance levels and methods for predicting occupant unconsciousness and leg injuries that can occur during a survivable crash. Investigate enhanced means of mitigating injury causing mechanisms for the brain and leg.
  - Continued development of evacuation analytical tools.

- Aviation Physiology
  - Provided guidance for measuring and estimating radiation exposure during commercial aerospace activities and developed instructional materials on radiation exposure to humans during commercial aerospace travel.
  - Evaluated the performance of current aircrew oxygen regulators installed on commercial aircraft.

Airliner Cabin Environment Research Program

- Airliner Cabin Environment: Purification of Environmental Control System Air Supplies; Bleed Air Contamination
  - Assessed bleed air quality on commercial aircraft and to identify oil-based contaminants, air contaminants from cabin materials, hydraulic fluid, and other toxins in the aircraft cabin that affect the safety and health of airline crewmembers and the flying public.
  - Quantified the relative importance for disease transmission on aircraft due to: (i) airborne transmission, (ii) indirect contact through surfaces.
  - Compared the risk of infection in different stage of air operations such as boarding, taxiing, flying, and de-boarding.
  - Developed techniques to model chemical reaction kinetics of high temperature degradation of aircraft engine oil and hydraulic fluids.
  - Selected specific commercial sensing technologies for application to aircraft.
  - Developed a conceptual framework for intelligent integration of the sensors with software controls.
- Evaluation of Aircraft Air Contaminants from Cabin Materials
  - Evaluated the extent of biological contamination of surfaces in the aircraft cabin.
  - Studied controlled exposures to evaluate emissions of hazardous air contaminants as well as uptake and release of compounds from aircraft materials.
  - Conducted a preliminary assessment of PBDEs in typical aircraft cabins.

The Aeromedical Research Program supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation.

The goals of the focused research endeavors are:

CAMI Aeromedical Research Program

- By 2014, establish design criteria for restraint systems that protect occupants at the highest impact levels the aircraft structure can sustain.
- By 2015, establish validation parameters for mathematical models that can evaluate whether aircraft type designs meet requirements for evacuation and emergency response capability, in lieu of actual tests.
- By 2015, incorporate aerospace medical issues in safety strategies concerning pilot impairment, incapacitation, spatial disorientation, and other aeromedical-related factors that contribute to loss of aircraft control.
- By 2015, develop advanced methods to extract aeromedical information for prognostic identification of human safety risks.
- By 2015, develop a methodology to compile, classify, and assess aviation-related injuries, the mechanisms that resulted in these injuries, and their relationship to autopsy findings, medical certification data, aircraft cabin configurations, and biodynamic testing: AAIADS.

- By 2016, apply and develop advances in gene expression, toxicology, and bioinformatics technology and methods to define human response to aerospace stressors.

Airliner Cabin Environment Research Program

- By 2013, develop advanced data and mathematical models for cabin-air-purification systems.

3. Why Is This Particular Program Necessary?

The human components of aviation systems are simultaneously the strongest and the weakest links in aerospace safety. Thus, the Aeromedical Research Program conducts research to maximize the strengths of the human link and minimize inherent human weakness to prevent accidents and improve safety and health in both commercial and general aviation aircraft. The Aeromedical Research Program combines two major efforts: Aerospace Medical Research that is focused on the medical aspects of aircraft accident investigation and pilot medical certification, Crash Survival and Cabin Evacuation Research to ensure post crash survival.

The Aerospace Medical Research Program investigates and analyzes injury and death patterns in civilian flight accidents and incidents to determine their cause and develop preventive strategies. This research supports FAA regulatory and medical certification processes that develop safety and health regulations covering all aerospace craft occupants and their flight environments. A new aspect of the Aerospace Medical Research program combines toxicological and medical aspects of all fatal and high priority aircraft accidents to provide accident investigators, medical certification managers and researchers with near real time data to rapidly identify issues and support for safety information systems.

The Crash Survival and Cabin Evacuation Research Program recommends and develops equipment, technology, and procedures for optimal (a) evacuation and egress of humans from aerospace craft and (b) the crash protection and safety. National Transportation Safety Board reports show the survivability of commercial aircraft accidents including serious accidents is quite high – greater than 94 percent; thus, research to ensure occupants can survive crash impact and safely evacuate the aircraft is essential. The implementation of this research was evidenced by the successful water evacuation of all occupants in U.S. Airways Flight 1549.

The Airliner Cabin Environment Research Program supports FAA's Flight Plan goal and Congressional requests for research to ensure airliner occupant safety and security by developing and testing adaptive environmental control techniques to enable a safe and healthy cabin air environment including during in-flight incidents. This research develops advanced scientific models and experimental data on airborne and surface transmission of existing and emerging infectious diseases within aircraft and develops evidence-based hazard identification and risk management criteria guidelines to maximize safety and health in the air transportation system in response to infectious disease. This program will provide data and systems for air quality incident identification to alert crew to potential problems and provide signals to the environmental control system for appropriate response.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The Aeromedical Research program is principally an in-house effort and the Cabin Environment Research program is principally outsourced. A reduction in funding will extend research time to assess critical aeromedical issues and cabin environment issues such as bleed air quality on commercial aircraft and to identify oil-based contaminants, air contaminants from cabin materials, hydraulic fluid, and other toxins in the aircraft cabin that affect the safety and health of airline crewmembers and the flying public.

Detailed Justification for
A11.k Weather Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Weather Program

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.k Weather Program	$16,143,000	$16,043,000	$15,539,000	-$504,000

For FY 2013, $15,539,000 is requested for the Weather Program. Major activities and accomplishments planned include:

Aviation Weather Forecasting

- Perform preliminary analysis to utilize in-flight icing forecasts to enhance or replace AIRMETs.
- Update high ice water content (HIWC) algorithm to support FY 2013 full flight campaign.
- Commence development and test of probability-based model forecasts utilizing the time-lagged high resolution rapid refresh.
- Commence development of probabilistic turbulence forecasts.
- Document convective storm forecast uncertainty needs of NextGen.
- Develop integration plan and techniques for inclusion of national ceiling and visibility forecasts as value-added to National Weather Service (NWS) terminal area forecasts.
- Develop initial set of performance requirements for volcanic ash.
- Verify and assess weather forecast capabilities utilizing the verification requirements and monitoring capability.
- Use the enhanced aviation weather simulation and demonstration environment at the William J. Hughes Technical Center (WJHTC) to evaluate various aviation weather forecast products.
- Develop capability to measure the quality of information on aviation constraints which have been translated from weather information.

Safety-Driven Weather Requirements for Wake Mitigation

- Select and incorporate real-time wake models into Monte Carlo simulation to determine results sensitivity of wake encounters to weather accuracy.

Terminal Area Icing Weather Information System

- Develop final Terminal Area Icing Weather Information System (TAIWIS) operational definition and identification of key technologies.

Mitigating the Ice Crystal Weather Threat to Aircraft Turbine Engines

- Conduct full flight campaign out of Darwin, Australia using HIWC and particle size measurement instrumentation.

Lower Visibility for CAT 1 Approaches and RVR Conversion

- Evaluate runway visual range (RVR) to ASOS/AWOS and determine new RVR to visibility equivalents.

The Weather Program will continue to develop and enhance forecast and nowcast capabilities to support the DOT safety strategic goal, FAA Flight Plans goals of greater capacity and increased safety, and meet NextGen requirements. This will include applied research in naturally occurring atmospheric hazards including turbulence, severe convective activity, icing, and restricted visibility. Additional turbulence forecast capabilities will be developed to enhance en route safety and capacity. An advanced probabilistic storm prediction capability will be developed to enhance terminal and en route capacity.

Additionally, the Helicopter Emergency Medical Services (HEMS) weather tool will be enhanced to provide additional altitude and location specific data to increase safety. The FAA will continue to partner with NASA, Transport Canada, Environment Canada, and the Australian Bureau of Meteorology to address mitigation of ice crystal weather threats to aircraft turbine engines.

2. What Is This Program?

The Weather Program provides new and improved weather products that support legacy National Airspace System (NAS) systems, NOAA/NWS, and near-term NextGen capabilities as well as enablers necessary for mid-term and far-term benefits. Weather products are enhanced by upgrading algorithms for existing NAS platforms such as the Weather and Radar Processor, and the Integrated Terminal Weather System. NWS platforms also use the algorithms developed. Research is an integral element in providing the advanced forecast and nowcast information that can be integrated into aviation decision-support tools. This information will be transitioned by the FAA's Reduce Weather Impact (RWI) portfolio to accomplish this. The information will be developed in accordance with the NextGen Network Enabled Weather dissemination standards. This will allow universal access to weather information through net-centric capabilities.

The Weather Program will develop advanced forecast capabilities consistent with the NextGen Weather 4D functional and performance requirements document. To support transition of these advanced capabilities to operations, the Weather Program will utilize evaluations of these scientific advancements to verify their performance. These advanced capability requirements for NextGen include the following:

- Advanced convective weather forecast - high-resolution, deterministic and probabilistic 0 to 12+ hour forecasts of convection for air traffic management (ATM) to enhance capacity
- Hourly (nowcasts) and 0- to 18-hour probabilistic forecasts of turbulence for use by ATM, Aviation Operations Centers (AOC), and the pilot in the cockpit to enhance safety and capacity
- Hourly (nowcasts) and 0- to 12-hour probabilistic forecasts for in-flight icing, including its severity for use by ATM, AOC, and the pilot in the cockpit for preflight planning to enhance safety and capacity
- Analysis and 0- to 12-hour probabilistic forecasts of ceiling, visibility, and flight category for use by ATM, AOC, and the pilot in the cockpit, and to support estimation of capacity resources at airports as well as increased general aviation safety

The weather capabilities developed by the FAA provide the following benefits:

- Depiction of current and forecasted in-flight icing areas – enhances safety and regulatory adherence
- Interactive data assimilation, editing, forecast, and dissemination tools – improves aviation advisories and forecasts issued by the NWS as well as accessibility to users of aviation weather information
- Depiction of current and forecast precipitation type and rate – enhances safety in the terminal area

- Depiction of current and forecast terminal and en route convective weather – enhances terminal and en route capacity
- Short-term prediction and forecast of ceiling and visibility in the national area – enhances en route safety
- In-situ, remote detection, and forecast of en route turbulence, including clear-air turbulence – enhances en route safety

The Weather Program supports NextGen goals via applied research and development of the advanced forecast capabilities in support of the NextGen Weather operational improvements. Efforts undertaken in collaboration with the NOAA and the National Aeronautics and Space Administration (NASA) increase FAA's ability to provide the operational improvements required for NextGen. These improvements include short-term and mid-term forecasts of naturally occurring atmospheric hazards, such as turbulence, severe convective activity, icing, and restricted visibility. Improved forecasts enhance flight safety, reduce air traffic controller and pilot workload, enable better flight planning, increase productivity, and enhance common situational awareness.

The Weather Program works within FAA, industry, and government groups to ensure its priorities and plans are consistent with user needs. This is accomplished through:

- Guidance from the Joint Planning and Development Office (JPDO) NextGen initiative and the NextGen Integration and Implementation Office within FAA
- Guidance from the FAA Research, Engineering and Development Advisory Committee
- Inputs from the National Aviation Weather Initiatives, which are strongly influenced by other NAS drivers including "Safer Skies" and Flight Plan Safety Objectives
- Inputs from the aviation community, such as the annual National Business Aircraft Association /Friends/Partners in Aviation Weather Forum; JPDO; RTCA; and scheduled public user-group meetings
- Close collaboration with FAA organizations internal to the Agency such as the Air Traffic Organization Oceanic and Off-Shore Programs Office and various FAA Aviation Safety Offices

The Weather Program collaborates with the Department of Commerce (DOC) in promoting and developing meteorological science, and in fostering support of research projects through the use of private and governmental research facilities. The program also leverages research activities with members of industry, academia, and other government agencies through interagency agreements, university grants, and Memorandums of Agreement.

Partnerships include:

- National Center for Atmospheric Research (in-flight icing, convective weather, turbulence, ceiling and visibility, ground de-icing, modeling, weather radar techniques)
- NOAA laboratories (convective weather, turbulence, volcanic ash, modeling, weather radar techniques, quality assessment/verification)
- Massachusetts Institute of Technology's Lincoln Laboratory (convective weather)
- NOAA's NCEP Aviation Weather Center (in-flight icing, convective weather, turbulence, ceiling and visibility) and Environmental Modeling Center (modeling)
- NASA Research Centers (in-flight icing, turbulence, satellite data)
- Universities (modeling)
- Airlines, port authorities, cities (user assessments)

In FY 2012, major activities and accomplishments planned include:

Aviation Weather Forecasting

- Commenced development of in-flight icing forecast for Alaska.
- Updated HIWC algorithm to support FY 2012 trial field program.
- Evaluated rapid refresh ensemble with 3 km Continental United States (CONUS) and Alaskan nests at National Centers for Environmental Prediction (NCEP).
- Transitioned turbulence forecast capability including mountain-waves for implementation.
- Enhanced the baseline configuration against which convective weather forecast improvements can be measured.
- Developed prototype national ceiling and visibility forecast to improve gridded forecast products in collaboration with the NWS.
- Developed volcanic ash concept of operations and initial set of functional requirements.
- Developed verification techniques and approaches that assess research capabilities in support of the research transition process.
- Enhanced the aviation weather simulation and demonstration environment at the WJHTC.

Terminal Area Icing Weather Information System

- Developed Terminal Area Icing Weather Information System concept design documents including description of operational use.

Mitigating the Ice Crystal Weather Threat to Aircraft Turbine Engines

- Conducted research trial field program using high ice water content and particle size measurement instrumentation.

Helicopter Emergency Medical Services (HEMS) Weather Tool Improvement

- Tested and implemented observation trending and locale specific data capability to HEMS weather tool.

The Weather Program supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation as well as the FAA Flight Plan Goals of greater capacity and increased safety. Research is on-going to provide weather observations, warnings, and forecasts that are more accurate, accessible, and efficient, and to meet current and planned regulatory requirements. The goals of the focused research endeavors in support of the NextGen weather operational improvements are:

- By FY 2015, in support of segment-one: develop timely and accurate deterministic and an initial set of probabilistic aviation weather forecasts for operational use by ATM, dispatchers, and pilots.
- By FY 2018, in support of NextGen mid-term requirements: increase maturity of probabilistic forecasting; using integrated ground, airborne, and satellite weather observation information in real-time for operational use by ATM, dispatchers, and pilots.
- By FY 2025, in support of NextGen far-term requirements: enhance accuracy of net-enabled deterministic and advanced probabilistic weather forecast information for integration into NAS decision support tools and dissemination in real-time from a single authoritative source for operational use by ATM, dispatchers, and pilots.

3. Why Is This Particular Program Necessary?

Weather has been identified as a causal factor for 70 percent of delays and 20 percent of accidents as cited in "The Mission Need Statement for Aviation Weather (#339)". The identified shortfalls are in the areas of weather detection and forecasting as well as product creation and dissemination. These shortfalls are also in line with the NextGen Integrated Work Plan (IWP) requirements and Weather Functional Requirements documents. The National Airspace System (NAS) is a complex system whose safe and efficient operation is dependent on the accurate nowcast and forecast of aviation weather conditions. The FAA's Flight Plan for 2009-2013 cites objectives for greater capacity by reducing the impacts of adverse weather on the operational capacity of the NAS and increasing aviation safety by reducing the number of accidents associated with hazardous weather conditions. Since demand is anticipated to rise sharply during this timeframe, weather impact mitigation is critical to meet that demand.

The Weather Program R&D, while driven by the FAA Flight Plan as well as the NextGen Weather Operational Improvements, is also influenced by NTSB and Research, Engineering, and Development Advisory Committee recommendations. Accidents have also driven the weather program; as an example the Roselawn Halloween accident (American Eagle, 68 fatalities, 1994) led to the capability to forecast the location, severity, and probability of in-flight icing conditions with sufficient accuracy to allow proactive planning of previously denied airspace to uncertified aircraft. Improvements to forecast and nowcast capabilities as a result of the development of in-flight icing, turbulence, ceiling and visibility, and convective weather algorithms have been transitioned into operational or experimental use and have led to improved short-term and mid-term forecasts of these naturally occurring atmospheric hazards. There have been an average of 400 weather-related accidents (general aviation, air taxi, and air carrier) per year, over the 10-year period ending in 2006, resulting in $1.46B (fatalities, injuries, aircraft damage) as well as 42,000 air carrier delay hours in 2008, resulting in $200M in delay costs. Continued evolution of improved now-casting and forecasting algorithms with applicability to achieving higher aviation safety and capacity during hazardous weather is needed. The key is to be able to provide high quality weather nowcasts and forecasts uniquely designed to allow for rapid and effective decision making by traffic managers, air traffic control, and air crews to proactively select safe and optimal reroutes. In the view of the Joint Planning and Development Office, and as espoused in the NextGen Concept of Operations, weather is an essential element to be integrated into TFM safety and capacity tools.

4. How Do You Know The Program Works?

Forecast and nowcast capabilities as a result of the development of in-flight icing, turbulence, ceiling and visibility, and convective weather algorithms have been transitioned into operational or experimental use and have led to improved short-term and mid-term forecasts of these naturally occurring atmospheric hazards. Specifically the Graphical Turbulence Guidance 2 (GTG2), which was operationally implemented at the NOAA Aviation Weather Center in FY 2010, is providing 0-12 hour forecasts of turbulence above 10,000 feet enhancing NAS safety and capacity. GTG2 also uses as an input, in-situ eddy dissipation rate (EDR) data downlinked from aircraft which provides enhanced forecast accuracy. The EDR metric as a result of AWRP funded efforts was approved as an International Civil Aviation Organization standard. Additionally the Forecast Icing Product with severity, which was operationally implemented at the AWC in FY 2011, provides 0-12 hour forecasts of atmospheric conditions conducive to inflight icing including severity and the probability of supercooled large drops, enhancing NAS safety and capacity. The Weather Program has developed an advanced storm forecast algorithm known as CoSPA. It was demonstrated at the Air Traffic Control System Command Center and for other air traffic users during the summer of FY 2010. CoSPA forecasts were found to be equal or better than current operational forecast capabilities and provided information critical for air traffic management. A critical data input for CoSPA is the High Resolution Rapid Refresh (HRRR) model, also developed under the auspices of the Weather Program. The HRRR provides the high resolution granularity for thunderstorm structure depiction needed by air traffic management decision-makers. Additional model efforts of the Weather Program have focused on the Weather Research and Forecasting (WRF) model which was developed to promote closer ties between research and operations while providing improved forecasts of aviation weather hazards. Enhancements to this model have resulted in the WRF Rapid Refresh which will be replacing the Rapid Update Cycle model when it is implemented into operations at the NWS, 4^{th} quarter FY 2011. The Weather Program also sponsored development of a

Helicopter Emergency Medical Services (HEMS) weather tool which provides critical low-level ceiling and visibility information to HEMS operators.

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A reduction in the Weather Program budget would impact on the program's ability to move forward effectively and provide capabilities needed to meet safety and capacity requirements.

Specific impacts are as follows:

Funding for Turbulence research would be reduced. There were more than 5,000 encounters of severe turbulence in 2009. Implementation of a probabilistic turbulence forecasting algorithm for all flight levels has been estimated to provide annual safety benefits in excess of $35M. Elimination of turbulence funding will delay completion of a turbulence probabilistic forecast for all flight levels.

Funding for Ceiling and Visibility research would be reduced. There are more than 60 fatalities per year due to adverse ceiling and visibility conditions within the general aviation and Air Taxi communities resulting in more than $400M per year in fatalities, injuries, and aircraft damage. A national ceiling and visibility probabilistic forecast capability is currently under development in collaboration with the National Weather Service. This funding elimination will delay completion of a ceiling and visibility probabilistic forecast.

Funding for In-flight Icing research would be reduced. The in-flight icing accident rate for GA and Air Taxi operations in Alaska is four times higher than in the CONUS (based on the accident rate/million hours of operations) and results in more than $1M per year in fatalities, injuries and aircraft damage. Forecast and diagnosis capabilities for Alaska are currently under development. This funding reduction will delay completion of an Alaskan in-flight icing capability.

Funding for Convective Weather research would be reduced. Convective weather is the leading cause of weather delays in the NAS (75%). Avoidable delays due to thunderstorms provide a $16 billion (FY 2009 dollars) benefits pool for a 20-year life cycle. The reduced funding in FY 2013 would delay the development of a probabilistic forecasting capability that is critical to enhanced ATM decision making.

Funding for the Volcanic Ash research effort would be reduced. Development of an initial set of performance requirements in coordination with NOAA and ICAO, critical to the development of improved warning and forecast tools for enhanced safety and capacity, would be delayed.

Detailed Justification for
A11.l Unmanned Aircraft Systems Research

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Unmanned Aircraft Systems Research

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.l Unmanned Aircraft Systems Research	$3,635,000	$3,504,000	$5,901,000	+$2,397,000

For FY 2013, $5,901,000 is requested for Unmanned Aircraft Systems Research. Major activities and accomplishments planned include:

Sense and Avoid (SAA) System Certification Obstacles

- Identify the major SAA system certification obstacles, including systems and equipment requirements for an alternate means of compliance to 14 CFR Part 91 to replace pilot see and avoid operational requirements certificated through knowledge testing, practical test standards and flight evaluations of pilot performance.
- Develop technical requirement statements that can be used to derive specific concepts for development of systems and equipment for alternate means of compliance to 14 CFR 91 see and avoid operational requirements.
- Continue to provide FAA flight test support for airborne SAA systems, as needed, to facilitate and learn from their development.

UAS Control and Communication (C2) – Time Critical Low Latency Control Response for UAS with Low Levels of Autonomy

- Model and simulate UAS C2 architectures to assess ability to safely manage trajectory of aircraft during critical phases of flight despite potential delays between control station control inputs and aircraft responses.
- Model and simulate various UAS operational scenarios to validate TT95 for non-critical pilot control actions.
- Perform operational safety, hazard and performance analyses along with interoperability assessments to determine the impact on safety and efficiency of UAS in the NAS with the TT95 validated through other modeling and simulation analyses as noted above.

Sense and Avoid (SAA) System – Certification Considerations for Requirements Based Testing and Validation of Non-deterministic Data Processing

- Determine certification considerations for SAA requirements-based testing and validation of non-deterministic surveillance data processing, tracking, threat declaration and maneuvering logic.

UAS Acceptable Communication Delay Values Associated with Step-ons

- Evaluate impact of C2 technologies on UAS communication and delay values associated with "step-ons" for both line of sight and beyond line of sight communication architectures.

FY 2013 funding will support the UAS program to conduct research on UAS technologies which directly impact the safety of the NAS. The program is focused on sense and avoid and command and control requirements that will enable operation of UAS in the NAS within the 14 CFR regulatory framework.

2. What Is This Program?

Researchers are developing methodologies and tools to establish regulatory standards on UAS design and performance characteristics while operating in the NAS. They are evaluating technologies, conducting laboratory and field tests, performing analyses and simulations, and generating data to support standardization of UAS civil operations. New standards are being implemented to establish UAS certification procedures, airworthiness standards, operational requirements, inspection and maintenance processes, and safety oversight responsibilities. Policies and guidance materials are also being published to provide FAA certification engineers and safety inspectors with the knowledge and tools they need to ensure the safe integration of UAS into the NAS.

The UAS Research Program supports FAA efforts in Next Generation Air Transportation System (NextGen) implementation by studying safety implications of new aircraft operational concepts and technology to the NAS and supporting the development of new and modified regulatory standards to support these new technologies. The program's research activities focus on new technology assessments, methodology development, data collection and generation, laboratory and field validation, and technology transfer.

Full and safe integration of UAS into civil aviation requires FAA to work closely with other government and private agencies that have experience in developing and operating UAS:

- Department of Defense (DoD) – the DoD is the largest UAS user requesting expanded access to the NAS. The FAA collaborates with DoD through Memoranda of Understanding (MOU) and Interagency Agreements to leverage resources and implement new technologies for civil applications.
- Department of Homeland Security (DHS), DOC, NASA, state government agencies, and independent organizations that use UAS for national security, earth science and oceanic studies, and commercial applications.
- The Joint Planning and Development Office (JPDO) – the JPDO has identified UAS integration to NAS and new aircraft technology as one of the emerging challenges to the nation's air transportation system. In particular, the NextGen-related research will be coordinated with the JPDO Aircraft Working Group activities in support of aircraft equipage requirements and necessary enablers to fully utilize NextGen capabilities.
- RTCA Special Committee 203 (Unmanned Aircraft Systems) – members of this special committee will help to ensure the effectiveness of the agency's rulemaking by recommending Minimum Aviation System Performance Standards (MASPS) for UAS, C2 Systems, and SAA Systems.
- FAA Air Transportation Centers of Excellence – various consortiums of university and industry partners who conduct R&D for FAA on a cost-matching basis, which currently consists of seven centers in different technical disciplines.
- The Civil Aviation Authority of the Netherlands – conduct joint research on UAS initiatives via a Memorandum of Cooperation.
- Cooperative Research and Development Agreement (CRDA) with industry to jointly study UAS regulatory compliance issues, e.g., type design, airworthiness, operation, maintenance, and repairs.

In FY 2012, major activities and accomplishments planned include:

Minimum Necessary Sense and Avoid (SAA) Information Required for an Unmanned Aircraft (UA) Pilot to Execute a Collision Avoidance Maneuver

- Determined performance characteristics and operational requirements for SAA technologies.
- Initiated study of minimum necessary SAA information required for a UAS pilot to execute a collision avoidance maneuver, including specific flight path guidance and traffic information, if necessary.

- Continued flight test support of SAA systems to facilitate and learn from developments of airborne SAA systems.

UAS Command, Control and Communication - Time Critical Low Latency Control Response For UAS With Low Levels of Autonomy

- Modeled UAS C2 architectures to assess ability to safely manage trajectory of aircraft during critical phases of flight despite potential delays between control station control inputs and aircraft responses.

The Unmanned Aircraft Systems Research Program supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation. To safely integrate UAS into the NAS, FAA needs to conduct research to develop airworthiness standards, devise operational requirements, establish maintenance procedures, and conduct safety oversight activities. The goals of the focused research endeavors are:

- By FY 2013, analyze data and identify potential system safety implications related to communications latency, which will be used to determine the stability and safety of flight trajectory management transaction time requirements and reduce incidents and accidents.
- By FY 2016, conduct field evaluations of UAS technologies in an operational environment, including SAA, C2, and contingency management. The documented results will be used to develop various certification standards.
- By FY 2017, define SAA systems and equipment certification obstacles to a level of detail sufficient to develop specific concepts for development of SAA systems and equipment.

3. Why Is This Particular Program Necessary?

Safe integration of UAS into the NAS poses substantial technical challenges not only to the FAA, but also to the aviation industry as a whole. UAS uses the most advanced technologies to achieve certain operational capabilities far exceeding the expectations of current NAS users. These unique capabilities have demonstrated its potentials of commercial applications as well as scientific research needs. Data from the recently completed UAS technology survey initiated within the UAS Research Program shows that integrating UAS in the NAS will potentially affect the entire NAS due to the various sizes of UAS (less than a foot up to the size of a commercial jet), wide ranges of maximum take-off weight (less than a pound to the weight of a large jet), large performance disparities in reference to the existing certificated aircraft, and capabilities of operating in all classes of airspace (even the ones weighing less than 100 pounds are capable of operating in Class A airspace), which could potentially disrupt normal aircraft traffic flow and induce unknown safety hazards while interacting with other NAS users.

Research activities within the UAS Research Program will generate technical information to support development of policies, guidance materials, and advisory circulars on utilizing advanced technologies to demonstrate regulatory compliances while operating UAS in the NAS. UAS-specific technical issues, such as "sense and avoid", control and communications with air traffic controls, and emergency response requirements, will also be studied in reference to certifications and operational requirements. It will also be an integral part of the NextGen development.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the NAS and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Delays in FAA UAS safety research will impede the timely and safe integration of UAS into the NAS. Demand for NAS access is growing from multiple operators including DoD, public use agencies, and the private sector.

Detailed Justification for
A11.m NextGen – Alternative Fuels for General Aviation

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – NextGen – Alternative Fuels for General Aviation

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.m NextGen – Alternative Fuels for General Aviation	$998,000	$2,071,000	$1,995,000	-$76,000

For FY 2013, $1,995,000 is requested for NextGen – Alternative Fuels for General Aviation. Major activities and accomplishments planned include:

- Complete initial study regarding the use of high aromatic additives for octane enhancement
- Complete initial study determining the assessment criteria for use of bio-mass derived fuels.
- Establish capability to measure lead emissions from piston aircraft engines operating on ultra-low lead and low-lead fuels.
- Complete testing to characterize the impact of fuel-system and combustion chamber lead deposits on unleaded fuel detonation performance.
- Complete durability study and lubricating oil analyses test on proposed high-aromatic component in a high-compression engine.

Research will support the R&D roadmap and framework being developed by the newly formed Unleaded Aviation Gasoline Transition Aviation Rulemaking Committee (UAT-ARC). The post-ARC R&D framework will involve government and industry cooperative guidance and/or research to safely transition the fleet to an unleaded aviation gasoline. Research will focus on the safety impact from deviation from the current leaded aviation fuel specification properties from use of a new unleaded fuel. Supporting research to address feasibility or impact of reducing high-octane lead additives in aviation gasoline and how that will impact fleet performance and certification. Test data and laboratory analyses of high aromatic fuels will be used to determine the certification and safety impact of reducing lead in aviation fuel as a temporary measure to reduce ambient lead emissions. This research will include the investigation of fit-for-purpose safety critical performance metrics from increased aromatic limits in the low-lead fuel for octane enhancement

The assessment of the impact on safety and operating performance from the use of the traditional 100Low Lead (100LL) avgas without lead will continue. Research will also continue on evaluating high-octane, quasi-drop-in fuels.

Research will continue to support the development of test methods needed to evaluate the performance, safety, durability, and operability of unleaded avgas containing high aromatic or biomass derived compounds. This work will supplement the unleaded fuel and additives specification development protocol task force at ASTM international. This task force was set up to develop guidance to a potential fuel or additive sponsor for performing the necessary specification property and fit-for-purpose properties research to obtain an ASTM fuel or additive approval specification.

Research will also address performance and safety from use of high aromatic fuels throughout the full operating envelope for a high-output turbocharged fleet representative engine. Development of new engine, rig, and laboratory test methods necessary to evaluate fuels which differ from traditional hydrocarbon, refinery based fuels. The data from that testing will be used to support the update of FAA guidance materials for detonation testing and fuel and lubricants approval.

Testing to address the capability to measure lead emissions and bulk gas exhaust emissions from general aviation (GA) engines will be performed. Additionally, research will also examine the impact to safety and operational changes from technologies that could be used to modify the GA legacy piston engines to run on significantly reduced octane unleaded fuels.

2. What Is This Program?

This program will provide data and support to update or create new certification standards and Advisory Circulars (ACs) that promote continued airworthiness of aircraft engines, fuels, and airframe fuel management systems. The Agency also publishes information and sponsors technology workshops, demonstrations, and other means of training and technology transfer related to alternative fuels for GA aircraft, and reviews the specifications and practices recommended by recognized technical societies like ASTM International and SAE International.

The intended outcome is to provide data and research to support the safe transition of the fleet to an unleaded aviation gasoline and lessen aviation environmental impacts to air and water from operation of GA aircraft by enabling the industry to provide safe, secure, and renewable fuels.

The NextGen - Alternative Fuels for General Aviation Program works with the following industry and government groups:

- Unleaded Aviation Gasoline Transition Aviation Rulemaking Committee and the follow-on post-ARC government and industry framework.
- Aircraft Safety Subcommittee of the Research, Engineering and Development Advisory Committee (REDAC) – representatives from industry, academia, and other government agencies annually review the program's activities.
- Technical Community Representative Groups – FAA representatives apply formal guidelines to ensure the program's research projects support new rulemaking and development of alternate means of compliance with existing rules.
- The Coordinating Research Council (CRC) Unleaded Aviation Gasoline Development Group – representatives from ExxonMobil, ConocoPhillips, Chevron, BP, Cessna, Hawker Beechcraft, Teledyne Continental Motors, and Lycoming Engines facilitate two-way transfer of technology between government and industry to benefit all participants.
- Environmental Protection Agency (EPA).
- Aerospace manufacturers.
- Aerospace repair stations and maintenance organizations.
- Aerospace industry associations, such as the General Aviation Manufacturers Association (GAMA) and the National Business Aviation Association.
- Aircraft user groups, such as the Aircraft Owners and Pilots Association and the Experimental Aircraft Association.
- Private, commercial, government, and military operators.
- International airworthiness authorities.
- Standards development groups, such as ASTM International and Society of Automotive Engineers (SAE).
- Academia and national laboratories.

Partnerships include:

- Unleaded Aviation Gasoline Transition Aviation Rulemaking Committee and the follow-on post-ARC government and industry framework.

- CRC Unleaded Aviation Gasoline Development Group – includes ExxonMobil, ConocoPhillips, Chevron, BP, Cessna, Hawker Beechcraft, Teledyne Continental Motors, and Lycoming Engines; this group facilitates two-way transfer of technology between government and industry to benefit all participants.
- ASTM International Standard Practice for Evaluating the Compatibility of Proposed Fuel or Additives with Aviation Otto Cycle Fuels and ASTM TF –the group is developing the alternative aviation piston fuel guidance protocol for unleaded fuel and additive (ASTM) specification approval.
- Cooperative Research and Development Agreements with engine, airframe, and fuel OEMs and enabling technology developers.

In FY 2012, major activities and accomplishments planned include:

- Evaluated the performance of a fleet representative, naturally aspirated engine on ultra-low lead fuels.
- Evaluated the impact based on approved fuels on the GA fleet from the reduction and eventual removal of lead from aviation gasolines.
- Evaluated the safety and performance of high compression engines on unleaded, mid-octane aviation alkylate fuel.
- Completed a flight-test plan for in-flight detonation and performance safety evaluation of turbocharged fleet representative engine using unleaded, high-octane fuel.

The NextGen – Alternative Fuels for General Aviation Program supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation. The FAA will work with the GA community and the Environmental Protection Agency to evaluate the safety, environmental impact, and performance of alternatives to conventional GA fuel. Near-term research will evaluate the safety and performance of reduced lead and drop-in unleaded fuels and provide data and research to support the development of qualification and certification methodologies for those fuels.

Longer term research will evaluate the safety and performance of quasi-drop-in and biomass derived alternative fuels and provide data and research to support the development of qualification and certification methodologies for those fuels. Longer term research includes full-operating envelope and emissions investigation of biomass derived and high aromatic based fuels. Longer term research will also focus on providing data and a knowledge base to industry stakeholders and certification officials on the effects to the safety of the legacy fleet from deviation of the current specification and fit-for-purpose fuel properties. This research will also evaluate new technologies to ensure safe operation on significantly reduced octane fuels by the legacy fleet. The goals of the focused research endeavors are:

- By FY 2014, complete feasibility assessment criteria for the use of high aromatic additives for octane enhancement and assessment of the use of biomass derived fuels regarding the impact on GA aircraft and engine safety, performance, certification methodologies.
- By FY 2014, establish capability to measure lead emissions from piston engines operating on ultra-low lead and low lead fuels.
- By FY 2015, complete analyses to extrapolate lead emissions over GA fleet.
- By FY 2015, develop methodology and acquire tools for full-operating envelope capability to enhance existing capabilities to evaluate high-output, turbocharged engine performance across the entire operating envelope, including high altitude, high and low temperature, and high and low humidity conditions.
- By FY 2016, complete testing to be used to update FAA guidance and regulatory materials regarding detonation testing and fuel and lubricant approval.
- By FY 2017, develop engine and fuel test methods to evaluate the performance, safety, durability, and operability of unleaded avgas.

- By FY 2018, complete test engine emission evaluation of existing biomass derived and high-aromatic, high-octane fuels.
- By FY 2018, determine feasibility of engine technologies to enable high-compression engines in legacy fleet to safely operate on significantly reduced octane fuels.

3. Why Is This Particular Program Necessary?

While energy efficiency and local environmental issues have traditionally been primary drivers of aeronautics innovation, the current and projected effects of aviation emissions on our global climate is a serious long-term environmental issue facing the aviation industry. Aside from their associated health and welfare impacts, aviation emissions are a considerable challenge in terms of community acceptance of aviation activities and this challenge is anticipated to grow.

In the GA piston engine arena, there is a growing need to find a replacement for current leaded avgas (100LL). Recently, there have been significant actions by the Environmental Protection Agency to reduce ambient air lead emissions. General Aviation now accounts for 45% of all ambient air lead emissions.

The replacement fuel should perform as well as 100LL in GA piston engines. This unleaded high octane replacement fuel must not cause any accidents and should be a seamless, transparent change to the GA community. Unleaded fuel suggestions for replacing the current leaded aviation gasoline have focused on removing the lead and using alkylate, to adding specialty chemicals to as much as half the fuel volume. Both of these proposed solutions will have significant safety impact to the existing fleet. Simply removing lead additives from aviation gasoline would leave a fuel with substantially reduced octane resulting in significant safety impact to the current fleet, with a large percentage of the fleet being unable to be utilized. Attempts to replace the octane that the current lead additive provides have resulted in the need to use very high percentages of specialty chemicals. Use of these specialty chemicals, often as much as 50% of the blend, has resulted in the new fuel being unable to meet the many other safety critical specification and fit-for-purpose properties for which the fleet was designed.

Research will evaluate and characterize new alternative fuel formulations that will have maintained the current level of safety and protected the environment while sustaining growth in air transportation. Research will also evaluate the safety of potential technological additions to aircraft to allow safe operation on fuel with significantly reduced octane.

4. How Do You Know The Program Works?

Recent FAA engine and fuel test data have been used to pass the inclusion of a very-low-lead aviation gasoline specification at ASTM to help states comply with the recent EPA reduction in lead NAAQS. FAA data has been used extensively by the Coordinating Research Council to develop unleaded fuel octane model response matrices to predict full-scale engine behavior of a sub-class of unleaded fuels to its octane value.

Almost all of the work is planned and directed toward the development and improvement of current FAA regulations and guidance for approval of unleaded fuels. Further, the NextGen – Alternative Fuels for GA program will publish reports and present findings at peer reviewed councils and standards bodies.

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

A reduction in funding for the NextGen - Alternative Fuels for General Aviation Program could delay the empirical testing and assessments needed to produce data to determine the certification impact and safety assessment of whether the near term reduction in lead content of aviation gasoline could meet the estimated EPA target. More specifically, the EPA's October 2008 90% reduction in National Ambient Air Quality Standard (NAAQS) for allowable ambient air lead inventory included specific regulatory requirements for lead monitoring at and around airports. By Jan 2017 all states have to be in compliance with the new NAAQS regulations. Very recently a major environmental group in California announced their intent to sue every distributor and retailer of leaded aviation gasoline in California, including major oil producers and small airports. Sited for the suit was a 2008 EPA report on the negative health and welfare effects from leaded avgas. Slight reductions in funding will delay the completion of significant testing that is foundational for follow-on research. As an example, lack of funding to complete the lead memory testing to address the real impact of combustion lead deposits on unleaded fuels will result in significant increases to certification, cost, schedule, and testing burden to the aviation community.

Moderate to Severe budget cuts will result in a significant impact to the industry as the safety research will not be completed to support the necessary development and modification of existing regulatory guidelines for recertification of the entire fleet on a new unleaded aviation gasoline. This would likely push the completion of this necessary research past the Jan 2017 lead NAAQS deadline and result in significant curtailing of aviation operations. Due to the economic benefit of general aviation to our country this could have measureable employment and economic impact.

Detailed Justification for – A12.a Joint Planning and Development Office

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – Joint Planning and Development Office (JPDO)

Activity/Component	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	Difference from FY 2012 President's Budget
A12.a Joint Planning and Development Office	$13,792,000	$5,000,000	$12,000,000	+$7,000,000

For FY 2013, $12,000,000 of funding is requested for the JPDO to provide the following activities:

National Goals for UAS Integration
- Formulate the strategic National program plan for UAS integration
- Refine NextGen partner agencies' requirements for UAS operation
- Conduct cost, benefit and risk assessments using modeling and simulations of relevant scenarios to establish possible transition steps and milestones
- Analyze policy options and implications for UAS integration

Interagency Data Exchange Definition and Policies
- Continue to identify information data sharing requirements, processes, and applications that can be applied within specific functional areas (such as surveillance) which can then be shared for use by all NextGen partner agencies.
- Utilize the virtual interagency test environment to address the UAS information sharing and infrastructure requirements, policies, and standards of all agencies (Federal, Local, and State) without impacting the operational environment upfront.

NextGen Research Priorities
- Continually identify, define and coordinate research gaps related to UAS and Trajectory Based Operations (TBO)
- Review technology developments and innovation to recommend opportunities for technology transfer among Federal entities and/or industry
- Apply program management and integration to ensure research content (needs and priorities) is updated within the Joint Planning Environment, a database framework that supports interagency decision-making and plans

Public/Private Partnerships
- Engage industry stakeholders via the NextGen Institute
- With the Institute, continue to develop, test, review and document stakeholder perspectives on NextGen concepts and analyses including the Trajectory Based Operations (TBO) safety case, weather and harmonization of global implementation of air transportation
- Define and conduct a series of stakeholder engagement forums to formulate the UAS program plan across Federal entities
- Convene the Senior Policy Committee (SPC) for the Secretary of Transportation

Federal Requirements for Surveillance Data and Sensors (Integrated Surveillance)
- Define and conduct a series of forums to identify independent activities of the surveillance mission partners that should be synchronized.
- Conduct technical and policy analyses to support governance of joint surveillance capabilities

- All of the above activities will ultimately result in Federal surveillance systems that communicate with each other thereby ensuring common situational awareness that avoids conflicting efforts and costs

2. What Is This Program?

The JPDO executes collaborative processes to ensure efficient coordination between all Federal partners whose decisions impact NextGen, namely the Federal Aviation Administration (FAA), NASA, and the Departments of Defense, Homeland Security and Commerce. The JPDO provides a National "big-picture" perspective that encompasses a broad Federal view of NextGen. The Office is developing a framework for NextGen planning and development, identifying and prioritizing key multi-agency concerns, and driving consensus in the development of investment choices and decisions thereby improving efficiencies, ensuring cross-Federal compatibility, and reducing costs.

In the completion of its work, the JPDO conducts and disseminates a wide variety of studies including cost, benefit and risk assessments; policy analysis; modeling and simulation; and program management and integration. The JPDO was established in 2003, when Congress enacted NextGen under Vision 100 – Century of Aviation Reauthorization Act (P.L. 108-176). Maintaining the NextGen vision and facilitating a public/private partnership to manage critical collaborations needed to make NextGen a reality are among the JPDO's responsibilities.

The JPDO convenes the SPC to provide strategic policy guidance for NextGen. For example in FY 2011, SPC direction enabled the JPDO to engage more than 60 experts from five agencies to initially describe the current, Government-wide research plan for UAS. The SPC is chaired by the Secretary of Transportation and its members include the heads of the participating departments and agencies, as well as the Director of the Office of Science and Technology Policy and the Office of the Director of National Intelligence (ex officio). In support of the SPC, the JPDO governance structure has a Board, chaired by the JPDO Director, whose members are executives from each department/agency who meet quarterly and work continuously to resolve issues directed by the SPC.

The JPDO is comprised of employees from FAA and the other Federal partners. This ensures that all the partners may benefit from a multi-departmental perspective when developing future plans, contract requirements, technical specifications, etc. The JPDO workforce actively facilitates and engages researchers, program managers and executives from among the partner agencies to formulate the interagency view.

The private sector is also an integral part of JPDO's work. In 2006, the NextGen Institute was established as an alliance of major aviation stakeholder communities to ensure industry engagement. The Institute, together with nine government/industry Working Groups, helped formulate the vision for NextGen. Today, the Institute continues to host public/private forums and to bring the right experience and range of viewpoints to inform NextGen analyses. With the Institute, the JPDO has taken steps to ensure NextGen will work seamlessly with other global aviation systems focusing on stakeholder priorities.

The JPDO work directly links to the DOT Strategic Goal of Economic Competitiveness and the FAA's "Destination 2025" goals.

Activities and planned accomplishments for FY 2012, representing a significantly de-scoped research plan for the JPDO compared to prior years, include:

- Formulate the national program planning approach for UAS integration into NextGen emphasizing interagency requirements and gap assessment.
- Leverage NASA resources to conduct cost, benefit and risk assessments directed toward UAS, weather and information data sharing.

- Refine interagency concepts for surveillance sensors and data (called Integrated Surveillance) that will ultimately lead to cost-effective acquisitions addressing civil aviation, defense and homeland security missions.
- Archive all net-centric testbed prototypes that demonstrate how aviation data can be securely accessed by all agencies in the conduct of their missions and promote best practices across Government. Some mature activities will be transitioned for single-agency leadership.
- Streamline stakeholder engagement under the NextGen Institute by replacing standing working groups with an efficient "study team" model. Complete and document existing working group activities in areas such as security, net-centric operations, environment, aircraft certification and operations while continuing TBO safety case planning and weather customer forums under the new structure of study teams and workshops. Our study team model ensures that all points of view are considered and stakeholder priorities are known at the inception of strategic concept definition.

For FY 2013, activities will build on the FY 2012 transition.

1. National Goals for UAS Integration

UAS play an increasing role in both federal and civil missions including homeland security, national defense, law enforcement, weather monitoring and surveying. To date, analysis has focused on identifying and defining research programs to address the technical barriers to their interoperation with manned vehicles in the NAS. In FY 2011, the JPDO partner agencies collaborated on the development of a UAS Research and Development Roadmap. With all partner agencies contributing expertise, the JPDO produced and delivered to OMB a comprehensive roadmap which identified the research gaps and opportunities for UAS integration in the NAS.

In FY 2013 with $3,149 thousand, the JPDO will undertake a new effort and lead the NextGen partner agencies in the formulation, development and tracking of a program plan that identifies National goals for UAS integration into the NAS. This program plan will include agency requirements, transition steps, coordinated activities and milestones in order to accelerate strategic decision making on UAS implementation issues.

2. Interagency Data Exchange Definition and Policies

Information data sharing among federal networks and systems is critical for the transition to NextGen. Full NextGen capabilities cannot be realized without ensuring that the right parties have the right information at the right time. The JPDO has facilitated the development of an information sharing approach that focused on shared understanding, incorporating technical components and leveraging existing interagency infrastructures. The JPDO has developed the NextGen Information Sharing Environment (NISE) which is a holistic and cyclical framework to identify the common set of requirements the community will use to facilitate information sharing across the enterprise.

In FY 2013, with $1,687 thousand, the JPDO will use its interagency collaboration best practices to maintain the management role and governance of the NISE. This role will facilitate the continued development of communities of interest, define enterprise information sharing support agreements, direct configuration control of the environment and sustain shared understanding development. This effort will result in cost savings to the Nation by reducing duplicative efforts in information sharing activities.

3. NextGen Research Priorities

Trajectory based operations (TBO) is a king pin to achieving the ultimate NextGen vision. TBO will provide additional capacity and increase flexibility through precision performance against agreed to and predictable flight paths that are managed by automation to ensure safety. Automation will monitor aircraft performance against a known flight path and detect and resolve potential conflicts, freeing the human from detecting and correcting these situations as they arise. The automated nature of this approach will enable more predictable flights thereby increasing capacity.

The JPDO and its partner agencies recognize the potential benefits of TBO and are simultaneously executing various efforts. In FY 2012, the JPDO deferred refinement of long-term research priorities for trajectory based operations, including human systems integration, air/ground automation, software verification and validation and cyber-security unless they are directly related to UAS integration in the NAS.

In FY 2013 with $1,316 thousand, the JPDO will lead the effort with the partner agencies to identify the necessary research priorities needed to recognize a full TBO environment. The JPDO will provide an overall map with associated interagency budget requirements identifying where activities are required and develop an interagency TBO program plan for execution. This interagency TBO program plan will indicate required research items, policy issues, requirements for implementation and cross organizational agreements. By documenting this interagency TBO program plan, the partner agencies can address issues before they become impediments to progress. The interagency TBO program plan will be incorporated into the Joint Planning Environment.

4. Public/Private Partnership

In FY 2013 with $1,592 thousand, will continue to forge private/public partnerships, most notably, convening the Senior Policy Committee (SPC) for the Secretary of Transportation. JPDO staff will organize the Committee's agenda, apply technical knowledge to prepare briefings for Committee Members, document actions and carry out those actions that are fully interagency in nature.

Also notable, the NextGen Institute will continue to provide a mechanism for private sector engagement in the definition of NextGen though study teams, workshops, information sharing forums and potentially, funded tasks. To support the JPDO's FY 2013 activities, the private sector will likely be asked to participate in UAS workshops on refining capability maturity, TBO Safety study teams or workshops to define gaps in TBO safety related issues, a TBO Concept of Operations definition effort, and forums related to weather and harmonization of global implementation of air transportation. Other activities may be added as they are determined.

5. Federal Requirements for Surveillance Data and Sensors (Integrated Surveillance)

Individual departments and agencies need data and sensors to see all aircraft (cooperative and threats) to meet its own mission. The JPDO led the development of the Integrated Surveillance Support Office (ISSO) at the direction of the SPC. The ISSO acts as the dedicated technical support capability for the governance of national air surveillance. The intent behind the ISSO is to provide independent technical analysis to support collaborative efforts of the partner agencies.

In FY 2013, with $1,817 thousand, the JPDO will continue its efforts to coordinate partner agency activities in the development of technical planning documents which will lead to a formal interagency coordination process for research and development, requirements development and validation, and acquisition of IS capabilities. Specifically, in 2013, the JPDO/ISSO will perform analysis leading to two joint DOT/DHS/DOD/DOC decisions: (1) national surveillance sensor capabilities for non-cooperative aircraft and (2) software that will enable all mission partners to share a common operating picture.

3. Why Is This Particular Program Necessary?

The JPDO provides the multi-agency governance that guides the development of the Nation's air transportation system. The JPDO convenes the Senior Policy Committee, comprised of Cabinet-level Secretaries, to develop goals, align resources, and ensure that stakeholders are involved in decision-making. This dialogue will help prevent duplication and will ensure NextGen systems will work with those of the other Federal partners. The JPDO ensures research coordination with the international community so that NextGen will work seamlessly with other global aviation systems.

The FAA's main focus needs to be NextGen implementation and its normal operational issues. The JPDO is "future" focused and provides coordination among all the Federal partners affected by NextGen decisions. In the future, use of airspace will be more integrated, considering civil aviation, defense and homeland security. This need for integration will make airspace more complex while all missions must operate together. Further, the pace of technology is unfolding rapidly requiring all departments to have full situational awareness of new developments. The JPDO provides the common view.

The JPDO is comprised of employees from both FAA and the other Federal partners (FAA employees represent about 50 percent of the JPDO Federal workforce). This ensures all the partners have the benefit from a multi-Departmental perspective when developing plans. It is more difficult for the FAA to properly consider the implications of its decisions on other Federal systems. The JPDO provides a broader perspective and insights that help Departmental decision-makers in reviewing FAA's NextGen related resource requests and in considering the impact of NextGen decisions on other Administration entities.

The JPDO, working together with partner agencies and industry, defines the capabilities and mechanisms that enable the national air transportation system to accommodate a wide range of customers. The JPDO has a strategic view, assessing needs for research, technologies and policies in a dynamically changing global environment. Because the JPDO is not a research performer, implementer or operator, its role is well-suited to analyze a range of possible solutions and guide the Federal partners to one successful solution that best meets the needs of all the partners.

In recent studies, the Government Accountability Office (GAO) and Office of the Inspector General (OIG) have reported the need for technology transfer, research into human factors and weather, development of integrated surveillance capabilities and integration of UAS. The JPDO's work plan is actively emphasizing these key areas with government and industry partners.

4. How Do You Know The Program Works?

The following items are recent examples to illustrate how JPDO efforts translate into technology transfer and agency action:

- The SPC, a cabinet-level decision-making body chaired by DOT, relies on JPDO support. In 2010, the SPC endorsed the JPDO's Integrated US Air Surveillance Governance Report and called for its expedited implementation as part of the Air Domain Awareness initiative led by DHS. During 2011, the JPDO demonstrated efficient surveillance information exchanges among agencies utilizing a combination of operational and prototype net-centric implementations that forged new partnerships between agencies and industry. Importantly, areas were identified where agencies can now realize potential cost-savings through consolidation of systems and capabilities.
- The SPC charged the JPDO with leading interagency coordination of research toward integration of UAS into the airspace. In 2011, every NextGen partner participated in the initial development of a UAS R&D Roadmap. As stated in the report, FAA's progress to define a clearer path toward certification and routine UAS operations can be accelerated by leveraging research at NASA and DOD while these partners also benefit from stronger FAA involvement in their research programs.
- Prior JPDO analyses identified human factors research, including the balance of human and automation roles for NextGen, as a gap. This gap, if not addressed, would constrain the roles of human operators to current tasks and prevent efficiency gains that automation can provide. During 2010, the JPDO worked with NASA and the FAA to produce a Human Factors Research Coordination Plan. The agencies are executing according to that plan during the current budget formulation cycle.
- In 2008, the JPDO, FAA and NASA established Research Transition Teams to facilitate transfer of research in four areas. In 2011, one of those teams, Flow Based Trajectory Management, successfully completed their effort. The team had defined a common outcome, agreed on roles, and developed means to evaluate, monitor, and report results. Specifically, proven NASA prototype capabilities were mapped to the particular automation systems on which FAA will evaluate implementation strategies.
- The JPDO works with DOC, FAA and DOD on developing a vision for aviation weather management that is focused on the aviation user. The JPDO regularly facilitates a senior executive panel, known as the NextGen Executive Weather Panel, who oversaw the development of a joint program plan. Aligned with the joint plan and its weather information governance structure, during FY 2011 the

FAA and the National Weather Service demonstrated the ability to share and discover many types of weather data within an interagency, net-centric environment.

- In 2010, the JPDO conducted a study on flight prioritization and outlined a framework for best equipped best served options, a concept of critical importance to airline operations that was not well-defined in the early NextGen vision. The JPDO's policy analysis and strategic framework provided the basis for discussion by the FAA's NextGen Advisory Committee to identify the single preferred option for the airlines.

The Research, Engineering and Development Advisory Committee (REDAC) endorsed this level of funding for the JPDO. The REDAC reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Without the requested funding, the JPDO may cease to exist. In FY 2012, the JPDO managed a severe budget reduction through re-prioritization, reduction and/or elimination of every task, activity and job position for ongoing or planned FY 2012 research. Every existing JPDO contract task order was modified in scope or performance period during FY 2012, and backfill of vacant FAA positions was deferred several months to save costs. The JPDO continued a few high priority activities in FY 2012 through judicious management of prior year funds and unexpired contracts. Partner agency contributions (personnel or funding) for the JPDO, which depend on matching FAA resources, were also reduced in FY 2012. These one-time strategies will enable the JPDO to produce a few quality products during FY 2012; however, the FAA cannot repeat this strategy. Plans call for no unexpended funds for the JPDO beyond October 2012.

The JPDO ensures efficient coordination and collaboration among NextGen partner agencies. It addresses key interagency priorities identified by the SPC for NextGen. Without the benefit of a dedicated, co-located interagency entity, the Nation can expect increased costs due to both the duplication of systems and the development of systems that will not work together for all missions (civil, defense and homeland security). The JPDO maintains a future focus and is able to provide the broader perspectives and insights that are necessary for Department decision-makers to review and assess NextGen investment and policy decisions. For example:

Demand for UAS access to the National Airspace System (NAS) is increasing rapidly with the US Government expected to invest more than $19B for UAS during the next three years. JPDO will lead efforts with the NextGen partners to develop a program plan that identifies the National goals for UAS integration into the NAS including agency requirements, transition steps, coordinated activities and milestones.

Every agency needs data and sensors to see all aircraft (cooperative and threats) to meet its own mission. JPDO will ensure there is an understanding of individual agency mission needs, capabilities, and requirements, resulting in coordinated solution decisions. Without cross-agency requirements and implementation plans, duplication, inefficiency and gaps will exist resulting in individual and uncoordinated solutions. Consequently, there is an increased risk to national security.

Information is the backbone of NextGen. The capabilities detailed in the NextGen Concept of Operations will not be successful without ensuring that the right parties have the right information at the right time. The JPDO will coordinate with partner agencies to identify information exchange requirements which will reduce the cost of having multiple stove-piped systems that cannot quickly communicate.

National aviation-related policy issues that the partner agencies have identified as important in NextGen implementation will not be addressed without this program, leading to uncoordinated FAA NextGen decisions which will have a negative impact on other Federal systems.

Detailed Justification for
A12.b NextGen – Wake Turbulence

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – NextGen - Wake Turbulence

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A12.b NextGen - Wake Turbulence	$10,664,000	$10,674,000	$10,350,000	-$324,000

For FY 2013, $10,350,000 is requested for NextGen - Wake Turbulence research. Major activities and accomplishments planned include:

- Develop high level concept for practical application of dynamic wake separations in air traffic control.
- Provide analysis support to airports with closely spaced parallel runways (parallel runways with less than 2500 feet between their center lines) to identify needed changes to enable better arrival capacity when weather causes them to shift to instrument flight rules operation.
- Collaborate with the European participants of the Single European Sky ATM Research (SESAR) program in developing wake turbulence mitigation solutions for the NextGen/SESAR era operations.
- Conduct experiments, develop analysis tools and host aviation community forums to define, in terms of a wake turbulence hazard, unacceptable level of wake turbulence for an encountering aircraft.
- Conduct data collection and analysis to determine the characteristics of wake vortices generated by aircraft – statistical foundation for wake separation standards and wake modeling enhancements.
- Incorporate wake turbulence data analysis results into wake transport-and-decay models and utilize models to review proposed air route and terminal airspace change proposals.
- Develop modeling and other analysis tools required for evaluation of wake encounter risks of Trajectory-Based and other NextGen era operational concepts.
- Continue development of crosswind based concept feasibility prototype for use in determining reduced air traffic control wake mitigation separations to be applied between aircraft arriving to a single runway.
- Provide wake turbulence evaluation support in determining wake separation standards to be for new aircraft being introduced into the NAS.

The program provides the research to achieve near-term objectives of increasing airport runway capacity by reducing aircraft wake separation minima under certain conditions. The program also provides the research and analysis to answer the Next Generation Air Transportation System (NextGen)-era questions of:

- What wake turbulence mitigations will be required in implementing Trajectory-Based Operations?
- How can more aircraft be accommodated in high-demand airspace (terminal and en-route) and still be safe in terms of wake turbulence?

In FY 2013, NextGen - Wake Turbulence Program will continue its NextGen near- and mid-term research agenda, addressing wake turbulence restrictions in today's terminal and en route airspace and in the future NextGen airspace designs. Program outcomes include:

- Increasing runway capacity at airports and capacity for more flights in high-usage airspace

- Providing more capacity-efficient wake separations to aircraft with the same or reduced safety risk

2. What Is This Program?

The NextGen - Wake Turbulence Program conducts applied research to improve, in terms of flight efficiency and safety, aircraft-separation processes associated with today's generalized and static air navigation service provider (ANSP) wake-turbulence-mitigation-based separation standards. As an example, during periods of less than ideal weather and visibility conditions, implementation of an air navigation service provider (ANSP) decision support tool that adjusts required wake separations based on wind conditions would allow ANSP to operate at arrival rates closer to their visual flight rule arrival capacity. Additionally, the research program is developing wake-mitigation application solutions that safely enable reduced aircraft separations in congested air corridors and during arrival and departure operations at our nation's busiest airports.

This program supports the DOT Strategic Plan 2010-2015 Goal "Economic Competitiveness" in the following areas:

- Maximum Economic Returns on Transportation Polices and Investments in Aviation – NextGen-Wake Turbulence research will provide the information and develop the technology for safe, capacity efficient wake separation standards as a component of DOT's commitment to "Implement procedures with supporting infrastructure to increase the efficiency of individual flights, deliver capacity for high density operations, and maintain capacity in low-visibility conditions. (see page 37 of DOT's Plan)
- Advance U.S. Transportation-Related Economic Interests in Targeted Markets Around the World – NextGen – Wake Turbulence research accomplishes by its work in obtaining globally accepted air traffic control wake separation standards and procedures a component of DOT's commitment to: "..... advocate worldwide adoption of harmonized standards and global technical regulations (GTR) through participation in bilateral and regional forums or international organizations at the ministerial and working levels." (see page 41 of DOT's Plan)

Specific goals set for the NextGen – Wake Turbulence research in support of the strategic DOT/FAA goals are:

- By FY 2013, develop as requested, airport specific instrument flight rules (IFR) closely spaced parallel runways (CSPR) approach procedures that would insure wake safety and increase IFR capacity of the airport's CSPR.
- By 2016, develop the algorithms that would be used in the ANSP and flight deck automation systems (if required) for setting and monitoring dynamic wake separation minimum between aircraft and surrounding aircraft.

This research addresses the needs of the FAA Air Traffic Organization and works with the agency's Aviation Safety Organization to ensure new capacity-efficient procedures and technology solutions are safe and that the airports and air routes targeted for their implementation are those with critical needs to reduce airport capacity constraints and air route congestion. The research program works with controllers, airlines, pilots, and aircraft manufacturers to include their recommendations and ensure training and implementation issues are addressed in the program's research from the start. Customers include pilots, air traffic control personnel, air carrier operations, and airport operations. Stakeholders include the Joint Planning and Development Office, commercial pilot unions, FAA ANSP unions, other International Civil Aviation Organization (ICAO) air navigation service providers, and aircraft manufacturers.

In addition to maintaining its partnership with the agency's Aviation Safety organization, this research program accomplishes its work via working relationships with industry, academia, and other government agencies. The coordination and tasking are accomplished through joint planning/reviews, contracts, and interagency agreements with the program's contributors:

- John A. Volpe National Transportation Systems Center
- The Center for Advanced Aviation System Development

- The National Aeronautics and Space Administration (NASA) Langley Research Center (NASA-sponsored research)
- The European Organization for the Safety of Air Navigation (EUROCONTROL) and associated research organizations (coordination and shared research)
- Massachusetts Institute of Technology's Lincoln Laboratory
- National Center of Excellence for Aviation Operations Research
- National Institute of Aerospace

In FY 2012, major activities and accomplishments planned include:

- Maintained and added to the world's most extensive aircraft wake transport data and analysis database – statistical foundation for wake separation standards and wake modeling enhancements.
- Obtained RTCA agreement on weather observation parameters to be transmitted from aircraft – vital to the development of dynamic wake separation processes.
- Incorporated wake transport and decay as well as aircraft navigation performance analysis results into FAA wake-encounter risk models.
- Initiated development of wake turbulence mitigation processes/procedures to support the NextGen era operational environment.
- Continued development of crosswind based concept feasibility prototype for use in determining reduced air traffic control wake mitigation separations to be applied aircraft arriving to the same runway.
- Collaborated with European participants of the Single European Sky ATM Research (SESAR) program in developing wake turbulence solutions for the NextGen/SESAR.
- Evaluated reports of wake turbulence encounters as part of the FAA Safety Management System assurance process for changes to Air Traffic Control (ATC) procedures.
- Continued to conduct experiments, develop analysis tools, and host aviation community forums to define, in terms of a wake turbulence hazard, what is an unacceptable level of wake turbulence for an encountering aircraft.
- Provided analysis support to airports with closely spaced parallel runways to identify needed changes to enable better arrival capacity when weather causes them to shift to instrument flight rules operation.
- Continued development of wake turbulence transport and decay modeling tools for use in evaluating proposed Trajectory-Based and other NextGen era operational concepts.
- Provided wake turbulence evaluation support in determining wake separation standards for new aircraft being introduced into the NAS.

In FY 2012, the FAA continued its development of the capabilities needed to enable aircraft separation processes supportive of NextGen shared separation and dynamic spacing in super density operations. These capabilities are highly dependent on technologies that accurately predict aircraft tracks, the track/decay of their generated wake vortices and the provision of this information to pilots and controllers. Some aspects of the NextGen Concept of Operations are dependent upon the aircraft being a participant in efficient, safe air traffic control processes that would minimize the effects of required wake turbulence mitigation on the flow of air traffic in all weather and visibility conditions. The NextGen - Wake Turbulence research will result in enhanced technology assisted processes for safely mitigating aircraft wake encounter risks while optimizing capacity, for all flight regimes, including the effects of weather.

3. Why Is This Particular Program Necessary?

Wake turbulence research has provided and will continue to provide the data, analysis, models and aircraft wake turbulence information collection systems that are needed to "bring to market" wake mitigation standards, procedures, and processes that allow safe but more capacity efficient aircraft-to-aircraft wake separations. The research has produced airport specific procedures and safety analyses to bring a new air traffic control wake mitigation capacity enabling procedure into everyday operation at airports with closely spaced parallel runways (CSPR). More airports are requesting similar analysis support to allow their use of the dependent 1.5 nm diagonal approach procedure on their CSPR when instrument approach procedures are required. The requested FY 2013 funding will support this activity.

The NextGen – Wake Turbulence Program has produced validated concepts for applying aircraft performance characteristics and runway crosswind information to reduce the required wake mitigation separations applied to aircraft arriving to and departing from an airport's runways. These research products have been transitioned into the FAA F&E projects: Wake Re-Categorization, Wake Turbulence Mitigation for Departures, and Wake Turbulence Mitigation for Arrivals. These F&E projects, when implemented, will provide air traffic control with decision support tools that will allow them to safely reduce the wake separations between aircraft when crosswinds blow the wakes out of the way of trailing aircraft. The reduced wake separations equate to more airport operations per hour when the airport is busiest. Aircraft manufacturers, airports and air carriers agree that squeezing in more operations onto an airport's existing runway structures results in major savings in flight delays during bad weather and time period directly following a major weather event.

The requested FY 2013 NextGen - Wake Turbulence research funding will further explore using predicted and monitored approach corridor crosswinds to allow reduced wake separations between aircraft landing behind each other onto a single runway. This is the next development step after the research's prior work on capacity enabling wake separation solutions for airport CSPR. A wake solution for safely reducing wake separation during instrument flight rule operations to a single runway will allow more operations at an even greater number of the nation's busiest airports.

In 2013, research will continue on wake mitigation solutions that will be needed to effectively achieve the operational benefit of NextGen Trajectory Based and Flexible Terminal Operations. NextGen – Wake Turbulence research will provide safe capacity efficient wake mitigation procedures and processes that must be integrated into the design of future air traffic control tools that implement these concepts. Without NextGen era wake mitigation procedures and processes, the NextGen objective of putting more aircraft through a given airspace or onto a runway will not be fully realized.

4. How Do You Know The Program Works?

The FAA NextGen – Wake Turbulence research applies wake vortex scientific knowledge, technology and modeling to developing feasible safe capacity efficient improvements to the current air traffic control procedures and processes used to mitigate the risk that an aircraft will encounter a hazardous wake generated by another aircraft.

Recent evidence that the research is working is the publishing of FAA Order 7110.308, "1.5-Nautical Mile Dependent Approaches to parallel Runways Spaced Less than 2,500 Feet Apart" in CY2008 with subsequent changes (change 2, September 2010) that have added more airport runway pairs that are allowed use of this airport capacity enhancing wake separation procedure. The order is based on this program's wake data collection and analysis work at Lambert – St. Louis International Airport and other airports in the US and Europe.

Another evidence of the research's effectiveness is the expected operational use in FY11 of an air traffic decision support tool that will advise controllers at George Bush Houston intercontinental Airport when to safely reduce the wake mitigation delay time between departures on the airport's CSPR. NextGen – Wake Turbulence research constructed the operational concept for the decision support tool plus generated the crosswind prediction and monitoring logic for the decision support tool.

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms. This research is reviewed annually by the REDAC's NAS Operations Subcommittee, with its most recent review occurring March 1, 2011. Results of the Subcommittee's review were that the research was vital to the FAA and the aviation community and the NextGen – Wake Turbulence research planned for FY 2013 was appropriate for delivering the research products needed by FAA and other stakeholders (airports, air carriers, aircraft manufacturers, controller, and pilot unions).

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The NextGen – Wake Turbulence research addresses both the FAA's near term needs (capacity enhancing wake mitigation procedures/processes) for current operations and developing wake mitigation solutions that will be needed as FAA transitions to Trajectory Based and Flexible Terminal Operations. The FY 2013 requested funding will provide the needed wake solution concepts and underlying technology, collected data and analyzes in a feasible time frame. Increasing the research funding will not result in the getting the solutions sooner, since there are limited number of researchers that are qualified to work in this problem area and many of them are working the solutions because of this research program. Priority for the research is developing wake separation capacity enhancing changes for today's air traffic control operational environment. A significant reduction in funding would impact the FAA's progress in developing NextGen era wake mitigation procedures/processes and supporting technology/models – specifically delaying the development of the concepts and supporting technology for potential reduction of wake separations during instrument flight rule operations to a single runway.

Detailed Justification for
A12.c NextGen – Air Ground Integration Human Factors

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen – Air Ground Integration Human Factors

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A12.c NextGen – Air Ground Integration Human Factors	$5,603,000	$7,000,000	$10,172,000	+$3,172,000

For FY 2013, $10,172,000 is requested for NextGen – Air Ground Integration Human Factors. Major activities and accomplishments planned include:

Data Communications - Guidance for certification and flight standards personnel

- Displays and User Interface: Recommend minimum requirements for alternative and supplemental data communication displays and controls in the flight crew forward field of view to reduce head-down time.
- Automation: Recommend minimum FMS integration requirements for NextGen 4D trajectory clearances.
- Procedures and Operations: Evaluate and recommend pilot-ATC procedures for negotiations and shared decision making NextGen activities.
- Shared Situation Awareness: Recommend procedures to mitigate loss of available party line information in air/ground radio communications as data communications increase.
- Message Set: Provide recommended human factors improvements to the RTCA SC-214 message set and recommended ICAO training requirements for non-native English speaker proficiency in reading and writing to ensure comprehension and compliance with ATC clearances and instructions transmitted via data communications.

Error Detection and Correction - Guidance for certification and flight standards personnel

- Provide assessment of current design and training methods to support human error detection and correction in NextGen operations.
- Recommend minimum flight deck design requirements and training methods to mitigate mode errors and unintended uses of flight deck equipment in NextGen operations.

Information Requirements - Guidance for certification and flight standards personnel

- Provide inventory of cognitive tasks, associated information needs and recommended display methods for flight deck tasks that require shared flight deck-ATC information.
- Identify human factors issues and mitigation strategies for the use of legacy avionics in NextGen procedures.
- Provide guidelines to address human-automation integration issues regarding the certification of pilots, procedures, training and equipment necessary to achieve NextGen capabilities.

The program continues to assess human system integration issues in use of airborne NextGen concepts, capabilities, and procedures, and Air Traffic Management (ATM) leading to a full mission demonstration by 2017. Each of these research areas, although general in nature, continued to be conducted in the context of specific near-to mid-term NextGen applications such as closely spaced parallel operations, oceanic in-trail procedures, etc. Research continued to enable safe and effective changes to pilot and ATC roles and responsibilities for NextGen procedures and also continued on human systems integration issues related to information needs, interface design and system integration required to support effective guidance for NextGen equipment design, procedure development and personnel training. Research continued to identify and manage the risks posed by new and altered human error modes in the use of NextGen procedures and equipment. Research priorities address the implementation of RTCA NextGen Task Force recommendations as described in the NextGen Implementation Plan.

2. What Is This Program?

The NextGen - Air Ground Integration Human Factors Program supports the DOT Safety Strategic Goal and addresses flight deck and air traffic service provider integration for each operational improvement or NextGen application considered, with a focus on those issues that primarily affect the pilot side of the air-ground integration challenge. Through use of modeling, simulation, and demonstration, the program assesses interoperability of tools, develops design guidance, determines training requirements, and verifies procedures to support certification and flight standards and ATO service units for ensuring safe, efficient and effective human system integration in transitions of NextGen capabilities.

Research goals include:

- Defining, understanding, and developing guidance to successfully implement the changes in roles and responsibilities between pilots and controllers, and between humans and automation required for NextGen capabilities and applications
- Defining human and system performance requirements and guidance for the design and operation of aircraft and ATM systems to include examination of information needs, human capabilities, interface design and systems integration issues
- Developing and applying risk and error management strategies, mitigating risk factors, and reducing human errors

The program provides integration of air and ground capabilities that address challenges for pilots and air traffic service providers. A core human factors issue is ensuring the right information is provided to the right human operators at the right time to make the right decisions. Transitions of increasingly sophisticated automation and procedures must be accompanied by supporting interoperability with baseline systems and refinement of procedures to ensure efficient operations and to mitigate potential automation surprises. Program benefits accrue to pilots and air traffic service providers, and those who perform certification and regulatory oversight of these NAS operators.

The program addresses changes in roles and responsibilities will occur not only between pilots and air traffic service providers, but also for both groups and the respective automation they use to achieve NextGen safety and efficiency gains. Issues such as mode confusion, transitions, and reversions must be understood and addressed to ensure appropriate levels of situation awareness and workload are maintained.

The program focus includes changes in the NextGen environment such as increased reliance on collaborative and distributed decision making. Information must be provided to participants, e.g., pilots, air traffic service providers and airline operation centers in a fashion that facilitates a shared understanding of phenomena, such as weather, wake, etc. The format, content, timeliness and presentation of that information must be well integrated with other information provided to decision makers and their decision support tools.

Program partnerships include researchers who work directly with colleagues in FAA, other government agencies, academia, and industry to support the following R&D programs and initiatives:

- NASA's Aviation Safety and Airspace Programs
- Close collaboration with FAA organizations, notably Flight Standards and Aircraft Certification in the Aviation Safety (AVS) line of business

- FAA Research, Engineering and Development Advisory Committee – representatives from industry, academia, and other government agencies annually review the activities of the program and provide advice on priorities and budget

The NextGen - Air Ground Integration Human Factors Program collaborates with industry and other government programs through:

- Collaborative research with NASA on its safety, airspace and air portal projects including the identification of human factors research issues in the NextGen as technology brings changes to aircraft capabilities
- Cooperative research agreements used with universities to address NextGen human factors issues
- Coordination on research issues and plans with aircraft and avionics manufacturers and operators as well as international civil aeronautics authorities

In FY 2012, major activities and accomplishments planned include:

Roles and Responsibilities

- Completed definition of a standard taxonomy for describing the relationship between flight deck and Air Traffic Control (ATC) automated systems and human operators in the context of NextGen equipment and applications.
- Developed recommendations for function allocation strategies and policy between pilots(s), controller(s), Airline Operations Centers and automated systems to communicate, execute, monitor and resolve conflicts during delegated separation operations.

Human System Integration – Information Needs

- Determined which pilot flight procedures are associated with NextGen applications, using task and information needs analysis techniques, and develop guidelines for each type of procedure in NextGen.
- Completed initial guidance for the design of NextGen flight deck displays and alerts that are compatible with those in ATC, including those required for oceanic in trail procedures.
- Completed initial research to identify human factors issues associated with instrument procedure design and to develop human factors guidelines for instrument procedures.

Human System Integration – Human Capabilities and Limitations

- Completed development of a methodology to address the human capabilities and limitations of pilots (including single-pilot aircraft) to conduct a range of NextGen airspace procedures in normal and non-normal situations.
- Based on pilot performance capabilities and limitations, developed recommendations for system performance requirements and operating limitations that should be applied when using data communications with integrated and non-integrated flight management systems (FMS).

Human System Integration – System Integration

- Completed research to develop flight crew training recommendations for flight deck automation supporting NextGen operations for single pilot and two pilot crews.
- Conducted research to support guidance for data communications procedures, training, displays and alerts.

Risk and Error Management

- Developed guidance to support certification personnel in evaluating risks and mitigation of human error and potential unintended uses of new technology in NextGen systems and procedures.

- Assessed human error impact and mitigation in Automatic Dependent Surveillance-Broadcast (ADS-B) applications including oceanic in-trail procedures, flight deck interval management, and closely spaced parallel operations.

Research will support development of policy, standards and guidance required to design, certify and operate NextGen equipment and procedures from the perspective of Air-Ground Integration. Additionally, this research will include integrated demonstrations of NextGen procedures and equipment in the context of ongoing Air-Ground Integration human factors research. The goals of the focused research endeavors are:

- By 2016 complete research to enable safe and effective changes to pilot and ATC roles and responsibilities for NextGen procedures.
    - By 2013 complete initial research to evaluate and recommend pilot-ATC procedures for negotiations and shared decision making NextGen activities.
    - By 2015 complete research to identify and recommend mitigation strategies to address potential coordination issues between humans and automated systems.
    - By 2016 complete research to identify methods for effectively allocating functions between pilots/ATC and automated systems as well as mitigating any losses of skill associated with these new roles and responsibilities.
- By 2016 complete research to identify and manage the risks posed by new and altered human error modes in the use of NextGen procedures and equipment.
    - By 2013 complete development of guidance to support certification and flight standards personnel in assessing suitability of design and training methods to support human error detection and correction.
    - By 2013 complete initial research investigating methods to mitigate mode errors and unintended uses of NextGen equipment.
    - By 2014 develop initial guidance on training methods to support detection and correction of human errors in near to mid-term NextGen procedures.
    - By 2016 complete research and modeling activities to identify, quantify and mitigate potential human errors in the use of NextGen equipment and procedures.
- By 2016 complete research on human systems integration issues related to information needs, human capabilities and limitations, interface design and system integration required to support effective guidance for NextGen equipment design, procedure development and personnel training.
    - By 2013 complete initial research to identify cognitive tasks, associated information needs and recommended display methods for tasks that require shared flight deck-ATC information.
    - By 2013 complete research to identify human factors issues and potential mitigation strategies for the use of legacy avionics in NextGen procedures.
    - By 2013 complete initial research to address human-automation integration issues regarding the certification of pilots, procedures, training and equipment necessary to achieve NextGen capabilities.
    - By 2014 complete initial research to provide recommendations for displays, alerts, procedures and training associated with data communications.
    - By 2014 complete research to provide initial recommendations for equipment design, procedures and training to support use of 2 ½ to 4 D trajectories.
    - By 2016 complete research to assess procedures, training, display and alerting requirements to support development and evaluation of planned and unplanned transitions between NextGen and legacy airspace procedures.

3. Why Is This Particular Program Necessary?

NextGen involves implementation of new complex systems and flight crew procedures. The NextGen Air Ground Integration Human Factors R&D program supports the FAA Aviation Safety (AVS) team's certification and operational approval processes and also provides tools to address flight crew procedures, maintenance procedures, training development, and continuous safety monitoring. Specific human factors research activities in this R&D program address advanced NextGen procedures such as trajectory operations, and the associated flight deck automation and air ground digital data communications technologies.

The NextGen vision includes a shift to management of traffic by trajectories (Trajectory-Based Operations). Every Instrument Flight Rule (IFR) aircraft that is operating in and managed by the system is represented by a four dimensional trajectory (4DT) either provided by the user or derived from a flight plan by the ground system. The 4DT includes a series of points from departure to arrival representing the aircraft's path in four dimensions: latitude, longitude, altitude, and at least one required time of arrival (RTA). The 4DT gets refined over time as it is used for flight planning through separation management. To be effective, the trajectory must be maintained and exchanged with ground automation at sufficient intervals to reflect the latest detailed data, including intent information. Both controller and pilot must monitor aircraft conformance with the negotiated 4DT, supported by their respective ground and flight deck automated systems. Human factors efforts ensure conformance alerts and recommended recovery maneuvers are consistent and effective.

Data communications permit exchanges concerning complex 4DT clearances. Data communications also reduces errors that can occur when flight crews transcribe and read back voice communications. Planned human factors R&D efforts are addressing flight deck displays, message content, and procedures for disseminating data communications to support transfer of routine ATC clearances, exchange of four dimensional flight plan trajectory information (to support trajectory operations), reroute requests, transfer of voice frequency channels, exchange of near term hazardous weather information, and allow flight crew reports for appropriately equipped aircraft. Current human factors research efforts are addressing data communication message set design factors to prevent recurrence of incidents involving human factors issues such as flight crew misunderstanding of clearances containing terms BY, AT, and EXPECT, and concatenated (compound) clearances with multiple elements.

The NextGen Air Ground Integration Human Factors R&D program includes critical work to ensure flight deck controls, displays, alerts, and procedures that are implemented to achieve the NextGen capabilities related to trajectory operations and associated flight deck automation and air ground digital data communications technologies are compatible with flight crew capabilities and limitations. Specific research plans are developed in coordination with FAA stakeholders including those in the Aviation Safety (AVS) line of business including Aircraft Certification Service and Flight Standards Service, and ATO program offices such as Data Communications, Surveillance and Broadcast Services, and other offices within the NextGen and Operations Planning (AJP) organization. This research provides the foundation for guidelines, handbooks, advisory circulars, rules, and regulations that help ensure the safety and efficiency of NextGen aircraft operations.

4. How Do You Know The Program Works?

Air Ground Integration research and development products inform and support critical NextGen technologies and applications. For example, a human factors analysis of the RTCA SC-214 message set produced recommendations that were incorporated at ICAO. The program is reviewed and evaluated by the Research, Engineering and Development Advisory Committee (REDAC), and in particular the Human Factors subcommittee. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A reduction in funding to the NextGen - Air Ground Integration Human Factors program would defer until FY 2014 the planned FY 2013 completion of development of guidance to support certification personnel in evaluating risks and mitigation of human error and potential unintended uses of new technology in NextGen systems and procedures. This work provides human factors recommendations using scientific and technical information to assist Aircraft Certification Service personnel in their evaluation of new technology supporting NextGen applications. The result is a delay in research products by one year.

Detailed Justification for
A12.d NextGen – Self-Separation Human Factors

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen – Self-Separation Human Factors

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A12.d NextGen – Self-Separation Human Factors	$5,260,000	$3,500,000	$7,796,000	+$4,296,000

For FY 2013, $7,796,000 is requested for NextGen – Self-Separation Human Factors. Major activities and accomplishments planned include:

ADS-B Applications

- Recommend air traffic and flight deck procedures and operating limitations based on human factors research to address cockpit display of traffic information (CDTI) applications such as Closely Spaced Parallel Operations, In Trail Procedures, Enhanced Visual Approach, Interval Management, and Surface Alerting.

Advanced Vision Technologies for Low Visibility Operations

- Conduct human factors simulation and flight trials to evaluate and recommend safe decision height and flight crew qualification and training requirements to allow operations beyond current 14 CFR 91.175 use of Enhanced Flight Vision Systems (EFVS) for approach below minimums to 100 ft., such as operational credit for EFVS for approach to touchdown and operational credit for use of Synthetic Vision Systems (SVS) to 100 ft in low visibility conditions.
- Apply human factors techniques to determine minimum characteristics for aircraft equipage and operational procedures for approval to use EFVS and SVS technologies for additional operations, including surface movement, rollout and takeoff, merging and spacing, or in lieu of certain infrastructure requirements.

Instrument Procedure Design and Use

- Through human factors analysis, identify and evaluate instrument procedure design factors leading to flight crew error in RNAV departures and arrivals.
- Conduct human factors analytical techniques to recommend instrument procedure design guidance, and flight crew procedural and training approaches to mitigate flight crew errors related to characteristics of instrument procedures.
- Develop human factors guidance for procedure designers, including general human factors considerations, procedure naming conventions, and linkage of RNAV/RNP procedures to conventional procedures such as SIDs and STARs.
- Provide human factors recommendations for improved charting to enable complex NextGen operations using paper and electronic depictions of instrument procedures and related NAS navigation infrastructure, such as NRS waypoints, Q routes, T routes, and Taxi routes.

The program continued to assess human system integration issues in use of airborne NextGen concepts, capabilities, and procedures, and Air Traffic Management (ATM) leading to a full mission simulation in 2019. Research priorities address the implementation of RTCA NextGen Task Force recommendations as described in the NextGen Implementation Plan. Research continued to enable enhanced aircraft spacing for surface movements in low visibility conditions guided by enhanced and synthetic vision systems, as well as cockpit displays of aircraft and ground vehicles and associated procedures.

2. What Is This Program?

The NextGen – Self-Separation Human Factors Research Program supports the DOT Safety Strategic Goal and develops human factors scientific and technical information to address human performance and coordination among pilots and air navigation service providers (air traffic controllers), human system integration, and error management strategies to implement NextGen capabilities. Human factors technical information will also support the development of standards, procedures, training, policy, and other guidance material required to implement the operational improvements leading to enhanced aircraft spacing and separation.

Research goals include:

- Evaluating and developing recommendations for operational credit for advanced vision technologies. Because today's scheduling is based on VFR conditions, capacity is significantly reduced with IFR conditions. EFVS and SVS can reduce the impact of weather on the national air transportation system by providing additional information to the pilot despite deteriorated weather/visibility conditions. Human factors research will enable recommendations for policy and rulemaking leading to greater operational credit with low minimums, in direct alignment with the goal of increasing capacity within the national air transportation system.
- Recommending air traffic and flight deck procedures which apply ADS-B technology with CDTI displays to increase safety and efficient operations in high density airspace. ADS-B is a new technology on which the FAA has had very little human factors guidance in the Advisory Circulars and Technical Standard Orders. Although a rule has been issued for ADS-B out, very large gaps exist in regulations, guidance, and standards regarding how ADS-B will be used. CDTI-based applications continue to be developed at a rapid pace, yet these applications have very little or no human factors research behind them. By addressing human factors issues, this research will generate guidance that will help prevent unsafe displays of traffic information and help prevent unsafe operational use of these displays, so that the intended safety benefits of ADS-B can be realized.
- Developing requirements for better depiction of instrument procedures. Research is needed to produce a set of human factors guidelines for design of instrument procedures and associated charts that are usable and flyable by appropriately qualified pilots without being susceptible to making errors. The guidelines should address known difficulties with use of instrument procedures, and also address future instrument procedure requirements. Research results inform regulatory guidance and orders such as FAA Order 8260.3 (TERPS) and associated guidance material for flight checking and operational approval documents (AC 90-100 and AC 90-101), and charting guidelines.

Program partnerships include researchers who work directly with colleagues in FAA, other government agencies, academia, and industry to support the following R&D programs and initiatives:

- NASA's Aviation Safety and Airspace Programs
- Close collaboration with FAA organizations, notably Flight Standards and Aircraft Certification in the Aviation Safety (AVS) line of business
- FAA Research, Engineering and Development Advisory Committee – representatives from industry, academia, and other government agencies annually review the activities of the program and provide advice on priorities and budget

The NextGen Self-Separation Human Factors Program collaborates with industry and other government programs through:

- Collaborative research with NASA on its aviation safety and airspace projects including the identification of human factors research issues in the NextGen as technology brings changes to aircraft capabilities
- Coordination on research issues and plans with aircraft and avionics manufacturers and operators.
- Coordination with appropriate RTCA Committees, e.g., Airborne Separation Assurance System

In FY 2012, major activities and accomplishments planned include:

Surface/Runway Operations Awareness

- Conducted research to evaluate the effects of Enhanced Flight Visibility System (EFVS) Head-Up Display (HUD) clutter and masking on detection of potential ground conflicts during taxi operations across a range of visibility and lighting conditions and develop recommended mitigations.
- Initiated research to evaluate and recommend display methods to ensure pilot awareness of selected operating modes of Cockpit Display of Traffic Information (CDTI), including research to assess manual and automatic methods of transitioning between CDTI display of ground and air traffic for both takeoff and landing operations.
- Conducted research to provide and evaluate alternatives and recommend minimum acceptable cockpit display method(s), alerts, and operational procedures to mitigate the effects of position uncertainty when degraded positioning information or other system failures introduce position uncertainty in closely-coupled all-weather ground operations.

Reduced Separation

- Conducted initial research to evaluate the impact and potential risks associated with use of Traffic Alert and Collision Avoidance System (TCAS) in NextGen procedures.
- For near to mid-term NextGen reduced separation operations, initiated research to develop and evaluate recommendations for pilot/controller phraseology for clearances, instructions and effective communication of degraded systems and residual capabilities as well as transitions to and from NextGen unique airspace and procedures. For closely spaced parallel approach operations, this included abandoning a closely-spaced parallel approach when a blunder or Mode C intruder is detected or in the event of abnormal situations (system malfunction, weather, etc.).

Delegated Separation

- Initiated research to evaluate Automatic Dependent Surveillance-Broadcast (ADS-B)/CDTI displays and procedures in a robust evaluation of merging and spacing operations for a range of controller-specified spacing and a variety of aircraft (not all same carrier or aircraft type).
- Continued research to evaluate and recommend procedures, equipage and training to safely conduct oceanic and en route pair-wise delegated separation.

Cross-cutting

- For proposed delegated separation procedures and equipment, continued research to support development of training guidance for NextGen applications and technologies.
- Continued research to develop risk and error management strategies to identify and mitigate human-system errors.
- Initiated research to develop recommendations for location and grouping of NextGen related displays relative to the primary field of view.

Research will support the development of standards, procedures, training, policy, and other guidance material required to implement the NextGen operational improvements leading to enhanced aircraft spacing and separation including improved awareness of surface/runway operations, reduced separation, and delegated separation. The goals of the focused research endeavors are:

- By 2016, complete research to enable enhanced aircraft spacing for surface movements in low visibility conditions guided by enhanced and synthetic vision systems, as well as cockpit displays of aircraft and ground vehicles and associated procedures.
  - By 2013, evaluate approach decision heights and recommend certification and regulatory changes to allow EFVS and SVS operational credit consistent with human performance factors.
  - By 2015, evaluate and recommend minimum display standards and operational procedures for use of CDTI to support pilot awareness of potential ground conflicts and to support transition between taxi, takeoff and departure phases of flight.
- By 2016, complete research and provide human factors guidance to reduce arrival and departure spacing including variable separation in a mixed equipage environment.
  - By 2014, complete initial research to provide recommended guidance for design of cockpit displays and alerts to support delegated separation.
  - By 2015, complete research to identify likely human error modes and recommend mitigation strategies in closely spaced arrival/departure routings, including closely spaced parallel operations.
  - By 2016, enable reduced and delegated separation in oceanic airspace and en route corridors.
- By 2015, develop a repository of NextGen human factors data containing research roadmaps, results, and data from relevant ongoing and historical research, demonstrations and operational experience to provide a foundation for flight deck human factors research to support policy decisions, standards development, certification and approval to enable NextGen operational improvements, and to ensure the future system adequately considers human systems integration issues.

3. Why Is This Particular Program Necessary?

NextGen involves implementation of new complex systems and flight crew procedures. FAA's Aviation Safety mission dictates that we ensure those systems are reliable and safe, even when they fail, and that we address the operational aspects of these systems. The NextGen Self-Separation Human Factors R&D program supports the FAA Aviation Safety Team's certification and operational approval processes and also provides tools to address flight crew procedures, maintenance procedures, training development, and continuous safety monitoring. Specific human factors research activities in this R&D program address NextGen procedures such as area navigation (RNAV) and required navigation performance (RNP), and NextGen capabilities such as those derived from the use of Automatic Dependent Surveillance-Broadcast (ADS-B) as a surveillance source and to broadcast aeronautical information.

RNAV/RNP procedures provide new arrival and departure routes, and become more effective with performance-based Air Traffic Management capabilities such as time-based metering and the adoption of ATC digital communication that can dynamically define those procedures. With new ADS-B technologies, users will be provided cockpit-based surveillance and near real-time access to aeronautical flight information. In the near term, user situational awareness in both visual meteorological conditions and instrument meteorological conditions (IMC) will be enhanced. Flight crews on the airport surface and aloft will have the capability to detect conflicts or hazards created by aircraft, obstacles, weather areas, airspace restrictions, and airport surface vehicles. In the long-term end-state environment, select spacing, sequencing, and separation tasks may be performed by qualified and certified aircrews/aircraft within defined criteria and/or in designated situations or areas. An example of a key ADS-B initiative is the development of standards supporting Closely Spaced Parallel Operations (CSPO). The NextGen Self-Separation Human Factors R&D program supports studies on simultaneous independent approaches to parallel runways to investigate potential reductions of runway separation standards. By completing the standards and obtaining agreement with the operators on a timeframe for their equipage, airports will likely be able to increase capacity and have greater design flexibility as they plan for new runways.

The NextGen Self-Separation Human Factors R&D program includes critical work to ensure flight deck controls, displays, alerts, and procedures that are implemented to achieve the NextGen capabilities related to RNAV/RNP procedures and ADS-B technologies are compatible with flight crew capabilities and limitations. Specific research plans are developed in coordination with FAA stakeholders including those in the Aviation Safety (AVS) line of business (Aircraft Certification Service and Flight Standards Service), and ATO program offices such as Data Communications, Surveillance and Broadcast Services, and other offices within the NextGen and Operations Planning (AJP) organization. This research provides the foundation for guidelines, handbooks, advisory circulars, rules, and regulations that help ensure the safety and efficiency of NextGen aircraft operations. Initiatives span assessments of new information requirements to allow pilots to safely maintain aircraft separation, especially during low visibility ground operations, and transition of integrated air and ground capabilities to ensure interoperability with baseline systems and refinement of procedures to ensure efficient separation and mitigate potential automation surprises.

4. How Do You Know The Program Works?

Self-Separation Human Factors R&D products inform and support critical NextGen technologies and applications. For example, NASA completed a human factors analysis of the Navigation Reference System (NRS) waypoint nomenclature identified a number of critical human factors issues that are being addressed to minimize error potential in NextGen 4D trajectory operations. The program is reviewed and evaluated by the Research, Engineering and Development Advisory Committee (REDAC), and in particular the Human Factors subcommittee. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

This work allows crews of ADS-B-In – equipped aircraft to efficiently use the ADS-B-In data in flight operations involving multiple applications and modes of CDTI, and enhanced vision operations in lower visibility conditions than were previously possible. Reduction in funding would defer until FY 2014 the planned FY 2013 completion of development of guidance to support Aircraft Certification Service personnel to develop minimum requirements for new and modified flight deck designs to incorporate NextGen displays such as ADS-B/CDTI, Data Communications, and Synthetic and Enhanced Vision Systems. Reduction in funding would also defer achievement of operational capabilities to apply these technologies in high density and low visibility environments by one year.

Detailed Justification for
A12.e NextGen – Weather Technology in the Cockpit

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen - Weather Technology in the Cockpit

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A12.e NextGen - Weather Technology in the Cockpit	$2,507,000	$8,000,000	$4,826,000	-$3,174,000

For FY 2013, $4,826,000 is requested for NextGen - Weather Technology in the Cockpit (WTIC). Major activities and accomplishments planned include:

- Development of Functional Requirements for integrating meteorological (MET) information into the cockpit based on the WTIC ConOps and User Needs studies.
- Perform feasibility study and initial benefits identification of exchanging weather radar between aircraft.
- Methodology for translating meteorological (MET) information into Weather Avoidance Fields and the integration of the translated information into the cockpit.
- Develop user needs and functional requirements for integrating and presenting observation data.
- Perform initial flight demonstrations with real time uplinked presentations of cloud tops and turbulence.
- Perform Human in the loop (HITL) verification of MET symbology set developed by SAE G-10.
- Support RTCA Special Committee 206 development of a MASPS.
- Complete research on Wind Diagnosis and Forecasting requirements to support TBO in the terminal area and FMS optimized profiles.

2. What Is This Program?

Weather-related goals of NextGen include reducing weather delays via increasing capacity and efficiency under adverse weather conditions, enhancing Air Traffic Management (ATM) and aircraft re-routing flexibility to avoid adverse weather, reducing the number of weather-related accidents and incidents, and reduction of emissions through lower fuel consumption resulting from optimized routing and rerouting during adverse weather. To support NextGen in realizing these goals, the overall objective of the NextGen - WTIC Program is to enable availability and enhance the quality and quantity of MET information available to the aircraft to enhance safety and efficiency in commercial, business, and general aviation operations.

The specific goals of the WTIC Program are:

- Reduce Pilot/Flight Crew/ATM workloads to support efforts to increase NAS capacity.
- Support NextGen and other near/mid/far term programs needs for the availability of enhanced MET information.
- Eliminate MET information gaps and meet user needs.
- Make more efficient use of existing data link bandwidth.
- Reduce ambiguity in transmitted MET information.

- Support increased efficiency via timelier decisions in adverse weather, and more optimum routes from enhanced wind and temperature information.
- Reduce the likelihood of recurrence of specific weather-related incidents including those reported in the Aviation Safety Reporting System (ASRS) as well as other safety reporting systems.

WTIC addresses the need to enable better weather decision making and use of MET information in the transformed NAS. This includes integrating MET information tailored for decision support tools and systems into NextGen operations. The project will research the best weather technology to bring MET information into the cockpit and MET information from the cockpit to the ground and cross linked to local aircraft. The project will define the necessary MET information and its presentation to safely and efficiently incorporate it into collaborative decision making relative to adverse weather decisions. It also establishes standards for a "common weather picture" to establish common situational awareness between pilots, controllers, air traffic managers, local aircraft, etc. The project will define Human Factors guidance for effective rendering of MET information to pilots, define required pilot training, and it will use RTCA SC206, SC214, SC223 and SAE G10 to further the project objectives. WTIC will also enhance the global harmonization of MET and Aeronautical Information (AIM) data links and provide recommended guidance for more efficient use of existing data link bandwidth. Through the efficient use of data links, the project will provide a reply/request and contract capability. These data link capabilities enable benefits of increased NAS efficiency and capacity via fewer flight diversions by reducing dependency on voice and paper MET information, timelier decisions in adverse weather, and more optimum routes from enhanced MET information in the cockpit.

Initial WTIC research evaluated the overarching NextGen ConOps and requirements for NextGen MET integration on the flight deck and it identified the current capabilities to meet NextGen requirements. WTIC is currently evaluating planned and funded development of new weather support capabilities and the gaps between NextGen requirements and these developing capabilities. Since WTIC requires data links to support the dissemination of MET information to users in various coverage environments, the program is researching required data link capability for bandwidth, security, quality of service, and reliability. Based on the results of WTIC research, the program will develop functional and performance requirements for cockpit integration of MET information, guidance on the rendering of MET information in the cockpit, and recommended data link architectures for uplinking, downlinking, and cross linking MET information.

In addition, the WTIC human factors (HF) research will enable the development of the human performance, technology design, and human-computer interaction requirements and standards to enable safe, efficient, and cost-effective operations and training. The HF research will attempt to identify shortcomings in current capabilities in order to focus weather technology advancements to optimize the safety and efficiency for Parts 91, 135, and 121 operators.

The information management and the HF research deliverables will enable the development of Air Circulars and Orders for NextGen training, symbology, and information standards; support the development of aircraft certification standards for Minimum Aviation Safety Performance Standards (MASPS), Minimum Operations Standards (MOPS), and Technical Standard Orders (TSO) to support development, operations, and procedures for weather technologies in the cockpit. In addition, the WTIC program research will support the development of the communications information management to include storage and retrieval requirements and standards to acquire MET information from commercial and government provided graphical and textual databases.

By 2015, WTIC will demonstrate that technology and automation, combined with policy, procedures, and regulatory oversight, enables NextGen to meet the weather-related goals listed at the beginning of this section. Demonstrations will show the technology and automation used in the cockpit provides pilots and aircrews with safe and efficient routes and re-routes for aircraft traversing areas impacted by adverse weather conditions.

The germane characteristics of the technology defined in the NextGen Concept of Operations (ConOps) are that it assists collaborative decision-making (pilot, controller, ATM, etc.), leverages both human and automation capabilities, and integrates weather data and information with other necessary operational information to provide decision support and increase situational awareness. In the near term, this technology will be implemented as machine-to-human interface requiring human analysis and processing of visual presentations. In the far term, it will migrate to automated processing via machine-to-machine interfaces between ground-based and aircraft systems. As a result, the NextGen ConOps differs dramatically from current operations regarding weather procedures.

The NextGen - WTIC Program works with FAA organizations, other government agencies, and industry groups to ensure its priorities and plans are consistent with user needs. This is accomplished through:

- Guidance from the Joint Planning and Development Office NextGen initiative through involvement in the Aircraft, Weather, and Integration Working Groups
- Inputs from the aviation community, including weather information providers, technology providers (e.g., avionics manufacturers, etc.), and simulator training centers (e.g., Flight Safety, etc.)
- The annual National Business Aviation Association conference, the Friends/Partners in Aviation Weather Forum, scheduled public user group meetings, and domestic and international aviation industry partners
- Subcommittees of the FAA Research, Engineering and Development Advisory Committee – representatives from industry, academia, and other government agencies annually review program activity, progress, and plans
- Various RTCA Special Committees, including SC-206, and SAE G-10 subcommittees

The WTIC program leverages research activities with members of other government agencies, academia, and the private sector through interagency agreements, university grants, and Memoranda of Agreement. Partnerships include:

- National Center for Atmospheric Research
- National Aeronautics and Space Administration Langley and Glenn Research Centers
- Public and private universities
- Center for General Aviation Research
- Initiatives with airlines, pilots, and manufacturers

In FY 2012, major activities and accomplishments planned include:

- Developed WTIC ConOps for Part 121 and 135, and GA aircraft.
- Developed capability to efficiently disseminate turbulence products to the flight deck.
- Evaluated the usefulness of an in-flight display of uplinked satellite-based product that outlines the 30kft and 40kft convective cloud top heights in a two-hour look-ahead display focused on the aircraft position and flight direction for Pacific Ocean transoceanic flights between California and Australia.
- Demonstrated and assessed the usefulness of the uplinking turbulence eddy dissipation rates (EDR) to the flight deck.
- Benefits analyses of in situ turbulence observations, downlinking turbulence data to enhance ground based models, and uplinking turbulence data to enhance cockpit situational awareness.
- Research and analysis of needs and use of portable devices and observation data.
- Assessed improvements in situational awareness of Multiple Radar Multiple Sensor (MRMS) application in cockpits and aircraft inputs to MRMS.
- Researched pilot decision making in the cockpit using probabilistic weather forecasts and demonstrations with convective weather products integrated into the laboratory simulator.
- Completed initial report of Part 121 User Needs Study to identify use of MET information in the cockpit today and planned use in the future.

- Supported RTCA SC206 to develop architecture and minimal aviation system performance standards for datalink weather products.
- Researched impact of weather on wake turbulence and wake dissipation.
- Simulated and validated data-linked bandwidth, quality of service, security, and latency standards requirements for disseminating graphical turbulence and icing products to the cockpit.

The NextGen - WTIC Program supports the DOT strategic goal of Economic Competitiveness by creating a competitive air transportation system which is responsive to customer needs through NAS on-time arrivals.

Research will enable the development of policy, standards, and guidance needed to safely implement weather technologies in the cockpit to provide shared situational awareness and shared responsibilities. The research goals are:

- By FY 2013, develop MET symbology set (SAE G-10).
- By FY 2013, identify human factors interfaces and automated prototype weather information integration modules for flight deck technologies (e.g., FMS, EFB, etc.).
- By FY2013, complete CALLBACKS and analysis of 100 weather-related incident reports in the Aviation Safety Reporting System (ASRS).
- By FY 2014, simulate and verify cockpit use of data-linked weather decision support tools, including probabilistic forecasts.
- By FY 2014, develop guidance standards for airmen training and evaluation criteria for the use of probabilistic forecast products and pilot decision making support tools.
- By FY 2014, demonstrate the ability to uplink wind information to the FMS.
- By FY 2015, developed recommended datalink architecture to support uplink, downlink, and cross link of MET information to provide common situational awareness and to support the MET information needs of related systems and NextGen activities.
- By FY 2015, flight demonstration to evaluate the integration of four dimension flight path information including data-linked meteorological information into cockpit decision-making and shared situational awareness among pilots and dispatchers supported by NextGen air and ground capabilities.
- By FY 2016, demonstrate capability to disseminate winds and other MET information from the 4D Weather Cube to the cockpit.
- BY FY 2017, identify guidelines, technology, and procedures for secure on-demand interactive NAS demand weather information services.
- By FY 2018, demonstrate dissemination of weather radar data over aircraft MET-network.

3. Why Is This Particular Program Necessary?

Weather has been identified as a causal factor for 70 percent of delays and 20 percent of accidents as cited in "The Mission Need Statement for Aviation Weather (#339)". Having access to more MET information in the cockpit does not necessarily translate into better pilot decision-making and performance. Although technologically advanced graphical weather information products have entered the GA market in the recent decade, the percentage of accidents that have an attributed cause due to weather or weather-related pilot error have remained fairly stable (NTSB, 2006, 2008, 2009). The WTIC program plans to research why the introduction of state-of-the-art weather information products has not dramatically improved the safety of GA operations concerning weather.

The WTIC Program research will enable the adoption of cockpit, ground, and communication technologies, practices, and procedures that will enhance situational awareness. WTIC is necessary to address the lack of MET information standardization since it results in potential safety concerns and a lack of common situational awareness. The lack of standardized MET information and standardized presentation of MET data results in susceptibility to misinterpretation of information and ambiguities.

WTIC is also necessary to research improvements to address a NTSB safety alert related to thunderstorm encounters. In this alert, the NTSB stated that investigations of recent GA aircraft weather-related accidents revealed that aircraft were in contact with ATM, pilots were either not advised or were misinformed about adverse weather conditions, and that the pilots had alternatives available that would have likely averted the accidents. The implication of this alert is that verbalizing a ground MET display to a pilot is difficult. A goal of WTIC is resolve this performance gap.

WTIC is necessary to reduce the use of paper by Part 121 aircraft since it printed text is not conducive to decision making in the cockpit. In addition, the printed text typically contains extraneous MET information and latencies that can make it difficult to interpret.

Other sources of MET information, such as FIS-B, are not suited for inflight pilot decision making due to latencies, a lack of resolution, and susceptibility to misinterpretation since the data presented is not temporally or spatially tailored to specific aircraft. In addition, FIS-B does not replace printed text or voice since it is not intended for primary use.

Finally, WTIC is necessary for global harmonization of AIS/MET datalinks. WTIC will perform research to resolve datalink limitations outside the NAS and incorporating the aircraft was a node in the MET network.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A reduction in the WTIC FY 2013 total funding will impact at least 14 NextGen Enterprise Architecture (EA) Operational Improvements (OIs) that are linked to four different NextGen Solution Sets. WTIC research is a key element to successfully implementing these 14 OIs, and potentially other OIs. If WTIC is not funded to the requested level, the program will have to reduce the scope of its goals and objectives resulting in incomplete or insufficient research inputs to the OIs supported by the program.

In addition, a reduction in WTIC FY 2013 funding will put at risk the benefits of already completed research to support the dissemination of safety critical inflight icing and graphical turbulence products since the required follow-on evaluations to develop the standards is substantial and would not be effective if partially funded.

One of the main goals of the WTIC program is to provide for a common MET situational awareness between the air and ground. A reduction in funding and the resulting reduction in program scope and goals could result in a divergence of MET situational awareness that may prove to be more costly in the future.

In many cases, WTIC research can not adequately provide required research on schedule to supported Solution Sets if the research is delayed or not fully funded. Many of the WTIC efforts include flight and laboratory demonstrations and proof of concepts that are not conducive to incremental or partial funding.

Since WTIC is a centralized program that researches capabilities to provide MET information to the cockpit, the inability of WTIC to successfully complete efforts on time could result in decentralized projects. A decentralization of the research could result in duplicative research efforts being conducted by the various supported Solution Sets to meet their schedule needs thus resulting in higher total costs to NextGen.

Detailed Justification for
A13.a Environment and Energy

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Environment and Energy

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A13.a Environment and Energy	$15,074,000	$15,074,000	$14,776,000	-$298,000

For FY 2013, $14,776,000 is requested for Environment and Energy. Major activities and accomplishments planned include:

Noise and Emissions Analyses and Interrelationships

- Evaluate and expand model architecture for noise, emissions and fuel burn modules interfaces.
- Evaluate and validate methodologies used in environmental analysis tools for noise exposure, and aviation emissions and their impact on air quality.
- Forecast future global aircraft emissions and noise.
- Expand environmental analysis capability of AEDT, APMT and EDS.
- Harmonize AEDT, APMT and EDS databases and integrate cost and socioeconomic data.
- Evaluate AEDT for its public release in 2014.
- Perform integrated noise and emissions impacts analysis.

Aircraft Noise

- Assess technological and scientific basis to support future ICAO aircraft stringent noise standards.
- Develop alternative, simplified aircraft noise certification test procedures and related implementation guidance materials.
- Assess land use practices and investigate mitigation strategies beyond 65 dB DNL.
- Develop noise modeling capability for all phases of aircraft operations.
- Develop protocols to acquire noise exposure data for noise effects field studies.
- Conduct pilot studies to develop relationships between noise exposure and health and welfare impacts.
- Investigate metrics for noise exposure from non-conventional open rotor and supersonic aircraft.
- Update noise research roadmap.

Aircraft Emissions

- Assess technological and scientific basis to support future ICAO aircraft and engine emissions standards.
- Develop alternative, simplified engine exhaust emissions certification test procedures and related implementation guidance materials.
- Develop measurement/sampling protocol and expand database for aircraft engine emissions.
- Validate modeling capability for dispersion of chemically reactive aircraft plume.

- Develop methodologies to quantify and assess the impact of aircraft emissions on climate.
- Assess air quality and health impacts due to full flight emissions.
- Use data directly measured from aircraft Hazardous Air Pollutants (HAPs) and PM emissions to replace, to the extent possible, approximation methods and factors used in modeling tools.

In FY 2013, the Energy and Environment Program will continue to focus on multiple fronts to support the Flight Plan goals of Greater Capacity and International Leadership. These include (1) development, harmonization of module and databases and integrated noise and emissions as well as cost-benefit analyses using aviation environmental suite of tools (AEDT, EDS and APMT); (2) advance science and develop metrics to characterize aviation noise and emissions at the source level, their dispersion as well as environmental, health and welfare impacts; and (3) update, simplify and harmonize procedures and technical guidance for aircraft noise and emissions certification of aircraft.

2. What Is This Program?

The program is developing and validating methodologies, models, metrics, and tools to characterize, assess and mitigate the effects of aircraft noise and aviation emissions in a manner that balances the interrelationships between emissions and noise and considers economic consequences. It is also developing computer models and impact criteria for use by civil aviation authorities in assessing proposed actions. Researchers are also developing a better science-based understanding and characterization of the impacts of aircraft noise and aviation emissions.

The Environment and Energy (E&E) Program helps achieve FAA's environmental compatibility goal and supports the FAA Flight Plan. The program also provides fundamental knowledge and tools to support the Next Generation Air Transportation System (NextGen) research and development plan. The efforts complement activities in aircraft technology, alternative fuels, and efficient operations based mitigation solutions, environmental operational assessments, and environmental management systems development under NextGen investments.

The program specifically supports the following outcomes:

- The Flight Plan Noise Exposure Performance Target to reduce the number of people exposed to significant noise by four percent compounded annually through FY 2014 from the calendar year 2005
- The Flight Plan Aviation Fuel Efficiency Performance Target to improve aviation fuel efficiency by one percent per year through FY 2014 to 12 percent, as measured by a 3-year moving average of the fuel burned per revenue mile flown, from the 3-year average for calendar years 2000-2002. FY 2013 Target is 11 percent.

Specific activities include:

- Conducting research and develop analytical tools to understand better the relationship between noise and emissions and different types of emissions, and to provide the cost-benefit analysis capability necessary for data-driven decision-making
- Leveraging a broad cross-section of stakeholders through the Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) Center of Excellence (COE) to foster breakthrough scientific, operations, policy, and work force advances to mitigate noise and emissions impacts
- Minimizing the impact of aircraft noise – actions include: advancing the state of science/knowledge concerning effects of aircraft noise and emissions; and assessing the need to refine noise and emissions impact criteria and metrics; and improving operational procedures and technical guidance for aircraft noise and emissions certification standards

The Flight Plan International targets to foster international environmental standards, recommended practices, and guidance material that are technically feasible and economically reasonable to provide a measurable environmental benefit while taking interdependencies between noise and emissions into account. Specific activities include:

- Working with the international aviation community to reduce aircraft noise and emissions
- Improving aircraft noise and engine exhaust emissions certification standards and operational procedures
- Promoting compatible land use
- Characterizing the benefits of abatement measures to reduce population impacted by aircraft noise and analyzing measures to improve fuel efficiency and reduce aviation emissions, and the potential to reduce health and climate impacts
- Assessing the interrelationships and tradeoffs between measures to reduce aircraft noise and engine exhaust emissions

The program also contributes to providing the foundation for the NextGen investments that help achieve and manage the NextGen goal to promote environmental stewardship by reducing significant community noise and air quality emissions impacts in absolute terms, limiting or reducing the impact of aviation greenhouse gas emissions on global climate, and balancing aviation's environmental impact with other societal objectives. Specific activities include:

- Developing fundamental knowledge to aid in better science-based understanding of impacts of aircraft noise and aviation emissions on air quality and climate change to enable the NextGen goal of sustained aviation growth by 2025, while reducing significant community noise and air quality emissions in absolute terms
- Achieving carbon neutral growth by 2020 relative to aviation CO2 emissions in year 2005 as the base year
- Developing tools to assess the ability of technologies for airframes, more efficient engines, advanced propulsion concepts, new fuels, new materials, market-based options, environmental standards and policies to reduce source noise and emissions

FAA works closely with other federal agencies (including NextGen Joint Planning and Development Office Environmental Working Group or JPDO/EWG), industry, academia, and international governments and organizations (e.g. ICAO/CAEP, International Civil Aviation Organization/Committee on Aviation Environmental Protection) to design research and development (R&D) efforts that can mitigate the environmental impact of aviation. This unified regulatory approach to research identifies and influences technologies, models, regulations, certification criteria, and policies that can improve our present and future global environment.

The E&E program activities are closely coordinated with support from industry and federal agencies. FAA signed a series of Memoranda of Agreement (MOA) with NASA and DOD to understand and mitigate aviation noise and emissions. FAA is also pursuing collaborative agreements with the Department of Energy and EPA to leverage resources to address aviation's environmental impact. A number of E&E projects are executed by a consortium of PARTNER (Partnership for AiR Transportation Noise and Emissions Reduction — is a leading aviation cooperative research organization, and an FAA/NASA/Transport Canada-sponsored Center of Excellence) universities. The Volpe National Transportation Systems Center continues to provide substantial technical assistance in the areas of aircraft noise and engine emissions measurement and assessment.

The E&E program supports the JPDO/EWG comprising FAA, NASA, EPA, DoD, DOC, Council on Environmental Quality, and OST, as well as industry, academia, local government, and community groups. The EWG is pursuing an intensive, balanced approach, emphasizing alignment across stakeholders in developing needed business and technology architectures and policy options and approaches, as well as other relevant tools, metrics, and products to address aviation's environmental impact. FAA is working closely with FICAN (Federal Interagency Committee on Aviation Noise) to better understand, predict and control the effects of aviation noise.

FICAN also offers a forum for partnership, as it comprises all federal agencies concerned with aviation noise.

In FY 2012, major activities and accomplishments planned include:

Noise and Emissions Analyses and Interrelationships

- Completed annual assessment of noise exposure and fuel burn.
- Developed integrated architecture for noise and emissions modules communications.
- Developed model for assessing global exposure to noise from transport aircraft.
- Validated methodologies used to assess aviation noise exposure and impacts as well as emissions and their impacts on air quality and climate change.
- Developed guidance document for estimating and reducing emissions from airport ground-support equipment.
- Continued integration and harmonization of databases across tools and code management protocols.
- Continued upgrades to and assessment of Environmental Design Space Tool (EDS), and Aviation Portfolio Management Tool (APMT) models and use these models for integrated noise and emissions analyses, cost-benefit analyses and to support the CAEP work program.
- Enhanced a preliminary planning version of Aviation Environmental Design Tool (AEDT) for integrated assessment of noise, emissions and fuel burn inventories at the local, regional, and global levels.
- Developed methodology for use in AEDT to analyze open rotor aircraft noise and tradeoffs.

Aircraft Noise

- Continued to update and/or develop, as well as publish procedures and technical guidance for noise certification of aircraft (transport category and subsonic jet airplanes that are both harmonized internationally and simplified.
- Assessed land use practices and investigate mitigation strategies beyond 65 dB DNL.
- Continued investigation of feasibility of more stringent international noise certification standards for transport category and subsonic jet airplanes.
- Designed protocols for pilot studies to develop relationships between noise exposure and health and welfare impacts.
- Advanced methodologies to model noise propagation and structural response for current and potential future unconventional aircraft configurations.
- Investigated metrics for noise exposure from non-conventional open rotor and supersonic aircraft.
- Advanced methodologies to incorporate potential health impacts of aircraft noise exposure within APMT.
- Assessed potential global benefits of using newly developed noise-reduction technologies and identify technology goals for long-term reduction of aircraft noise.
- Updated noise research roadmap.
- With the Aviation Emissions activity, conducted two COE-focused sessions at a national and an international conference.
- Published COE PARTNER research findings.

Aircraft Emissions

- Assessed technological and scientific basis to support future ICAO engine emission standards.
- Advanced science-developed metrics and quantified uncertainties in assessment of regional and global climate impacts of aviation.

- Advanced and exercised multiscale air quality analysis models for impacts of airport and full flight aircraft emissions.
- Evaluated and published sampling, measurement and analyses techniques and procedures for aircraft emissions testing and certification that are both harmonized and simplified.
- Developed measurement and sampling protocols and expanded databases for aviation emissions of Hazardous Air Pollutants (HAPs) and PM.
- Validated modeling capability for dispersion of chemically reactive aircraft plume.
- Applied methodologies to incorporate air quality and health impacts of aircraft emissions within APMT.
- Assessed potential global benefits of using newly developed emissions-reduction technologies, and identified technology goals for long-term reduction of aircraft engine emissions and fuel burn.
- With the Aircraft Noise activity, conducted two COE-focused sessions at a national and an international conference.
- Published COE PARTNER research findings.

The Environment and Energy Program supports the DOT strategic goal of Environmental Sustainability by reducing transportation related pollution and impact on eco systems through the mitigation of noise exposure.

The goals of the focused research endeavors are:

Noise and Emissions Analysis

- By FY 2013, evaluate and expand model architecture for noise, emissions and fuel burn modules interfaces.
- By FY 2013, evaluate and validate methodologies used in tools for noise exposure, and aviation emissions and their impact on air quality.
- By FY 2013, forecast future global aircraft emissions and noise.
- By FY 2013, expand environmental analysis capability of AEDT, APMT and EDS.
- By FY 2013, harmonize AEDT, APMT and EDS databases and integrate cost and socioeconomic data.
- By FY 2013, evaluate AEDT for its public release in 2014.
- By FY 2013, perform integrated noise and emissions impacts analysis.

Noise Characterization and Metrics

- By FY 2013, assess technological and scientific basis to support future ICAO aircraft stringent noise standards.
- By FY 2013, develop alternative, simplified aircraft noise certification test procedures and related implementation guidance materials.
- By FY 2013, assess land use practices and investigate mitigation strategies beyond 65 dB DNL.
- By FY 2013, develop noise modeling capability for all phases of aircraft operations.
- By FY 2013, develop protocols to acquire noise exposure data for noise effects field studies,
- By FY 2013, conduct pilot studies to develop relationships between noise exposure and health and welfare impacts.
- By FY 2013, investigate metrics for noise exposure from non-conventional open rotor and supersonic aircraft.
- By FY 2013, update noise research roadmap.

Emissions Characterization and Metrics

- By FY 2013, assess technological and scientific basis to support future ICAO aircraft and engine emissions standards.
- By FY 2013, develop alternative, simplified engine exhaust emissions certification test procedures and related implementation guidance materials.
- By FY 2013, develop measurement/sampling protocol and expand database for aircraft engine emissions.
- By FY 2013, validate modeling capability for dispersion of chemically reactive aircraft plume.
- By FY 2013, develop methodologies to quantify and assess the impact of aircraft emissions on climate.
- By FY 2013, assess air quality and health impacts due to full flight emissions.
- By FY 2013, use directly measured from aircraft Hazardous Air Pollutants (HAPs) and PM emissions data to replace, to the extent possible, approximation methods and factors used in modeling tools.
- By FY 2014, enhance analytical capabilities of AEDT, APMT and EDS for integrated environmental analyses from aircraft to global domain.
- By FY 2014, advance scientific understanding to characterize aircraft noise and emissions and associated risks.
- By FY 2014, Assess technological and scientific basis to support future ICAO aircraft and engine emissions standards.
- By FY 2014, Revise emissions certification test procedures and related implementation guidance materials.
- By FY 2014, initiate development of simulation-based environmental models.
- By FY 2015, advance capability for aviation noise; emissions; and fuel-burn-related, integrated-impact assessment.
- By FY 2015, initiate development of environmental models components to enable intermodal analyses.
- By FY 2015, demonstrate a first version of a simulation-based environmental model.
- By FY 2015, constrain uncertainties associated with aviation climate impacts, develop refined aviation climate impacts estimates and employ them for environmental cost-beneficial analyses.
- By FY 2015, advance multiscale air quality modeling capability for aviation health impacts and employ for environmental cost-benefit analyses.
- By FY 2015, advance characterization of aviation noise and related health and welfare impacts and employ for environmental cost-benefit analyses.
- By FY 2016, Advance scientific approaches and methodologies for improved integrated analysis of noise and emissions inventories and impacts.
- By FY 2017, enhance analytical capabilities of AEDT, APMT and EDS for integrated environmental analyses from aircraft level to global domain.
- By FY 2017, advance scientific understanding to characterize aircraft noise and emissions and associated environmental impacts and risks.
- By FY 2017, assess technological and scientific basis to support future ICAO aircraft and engine emissions standards.
- By FY 2017, revise emissions certification test procedures and related implementation guidance materials.

3. Why Is This Particular Program Necessary?

Despite the technological advancements achieved during the last forty years, aircraft noise still affects people living near airports, and aircraft emissions continue to be an issue, locally, regionally and globally. While energy efficiency and local environmental issues have traditionally been primary drivers of aeronautics innovation, the current and projected effects of aviation emissions on our global climate is a serious long-term environmental issue facing the aviation industry. Aside from their associated health and welfare impacts, aircraft noise and aviation emissions are a considerable challenge in terms of community acceptance of aviation activities and this challenge is anticipated to grow. Environmental impacts are often the number one cause of opposition to airport capacity expansion and airspace redesign. We must deal with these impacts to enable aviation to meet increased demand and operate with flexibility.

To deal with aviation climate impacts entails an understanding and quantifying the potential environmental impacts of aviation to help policymakers address environmental health and welfare impacts associated with aviation. This research will ensure identifying the right issues, measuring their impact, and designing appropriate measures to mitigate their effects. In the 1990s, this research effort was focused on noise regulatory issue, and later on emissions. However, these were treated as separate subjects. In trying to assess health and welfare impacts, optimize energy efficiency and develop environmental mitigation strategies, it has become evident there are important interrelationships and potential trade-offs. Taking an interdisciplinary approach to enhancing energy efficiency and minimizing aviation environmental impacts by developing data, analytical tools, and models that characterize and quantify the interdependencies between energy use, aircraft noise and various air pollutant emissions is a key element of the way forward for this research program. The goal is a more complete understanding of the complex interdependencies that exist among aircraft noise, fuel burn and emissions required for designing and regulating aircraft.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A reduction in funding to the Environment and Energy program would delay release of model capable of computing greenhouse gas emissions at airport level from six months to 18 months. This model is needed to address new Council on Environmental Quality (CEQ) for environmental assessments; absent this capability, projects to enhance capacity would be delayed. Budget reduction will also limit our understanding of source level aircraft noise and emissions as well as their impacts which will in turn compromise our ability to inform international standard settings for noise and emissions as well as development of environmental mitigation solutions.

Detailed Justification for
A13.b NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A13.b NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics	$20,060,000	$23,500,000	$19,861,000	-$3,639,000

For FY 2013, $19,861,000 is requested for NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics. Major activities and accomplishments planned include:

Technology Maturation

- Perform system level assessment of CLEEN aircraft technologies.
- Perform aircraft level noise and emissions reduction performance of CLEEN aircraft technologies.
- Identify technical issues impacting commercialization of CLEEN technologies.
- Perform detailed design review of system components and configurations.
- Perform validation testing and analysis to verify technology performance and environmental impacts predictions.

Alternative Turbine Fuels

- Conduct fuel characterization testing and environmental assessments of additional "drop-in" renewable alternative fuels.
- Conduct sustainability analysis of renewable fuels.
- Assess mechanisms for increasing commercial use of aviation alternative fuels.
- Initiate process for ASTM International approval of additional alternative fuel blends.

Metrics, Goals and Targets

- Refine and evaluate noise and emissions impacts metrics for use in NextGen environmental analysis.
- Reduce key uncertainties in climate impacts of aviation.
- Conduct evaluation of advanced analytical approaches for noise and emissions impacts assessment.
- Refine intermediate targets towards meeting NextGen environmental goals performance targets for Destination 2025 and perform gap analysis.

In FY 2013, the NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics Program will continue to advance system design, integration and testing of Continuous Lower Energy, Emissions and Noise (CLEEN) aircraft technologies for accelerated progress towards flight demonstration and system-wide assessments. For alternative fuels, activities focused on safety, performance, and environmental assessments for qualification of renewable alternative fuels. Activities were also initiated to assess production capacity and fleet infusion for alternative fuels. On the Metrics, Targets and Goals front, activities continued to refine and evaluate metrics for NextGen environmental impacts, advance capability for and assessment of environmental noise, air quality and climate impacts. This also included improved climate impacts assessment under second phase of ACCRI activities. The work also continued to refine estimates of environmental targets and assess gaps towards meeting NextGen environmental goals.

2. What Is This Program?

The program is protecting the environment by reducing significant aviation environmental impacts associated with noise, exhaust emissions, and increasing energy efficiency and availability to enable mobility and scalable capacity growth. Collaborating with industry, the program will advance and mature engine and airframe technologies to reduce aviation noise, air quality impacts, greenhouse gas emissions, and energy use. It will also provide data and methodologies to assess environmental sustainability including life-cycle environmental impact and support certification of alternative aviation fuels that could serve as drop-in replacements for today's petroleum-derived turbine engine fuels. This will lead to faster deployment of these fuels, and accompanying reductions in greenhouse gas and aviation emissions that impact air quality. Ultimately, the program will demonstrate advanced technologies and alternative fuels in integrated ground and flight demonstrations. The program is also helping to achieve NextGen goals by improving metrics to define and measure significant aviation environmental impacts. The program will improve the fundamental understanding of aviation environmental health and welfare and climate impacts, and translate impact into improved metrics that can be used to better assess and mitigate aviation's contribution. This program will identify the gaps in scientific knowledge to support NextGen; focus research in areas that will reduce key uncertainties to levels that allow action; and develop enhanced metrics to enable sound analyses. Ultimately, the program will enable the refinement of goals and targets to support the NextGen EMS to better manage and reduce aviation's environmental impacts to enable mobility and scalable capacity growth.

The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics Program helps achieve NextGen goals to increase mobility by reducing environmental impacts of aviation in absolute terms, including significant community noise, air quality and global climate change. The program is focused on reducing current levels of aircraft noise, air quality and greenhouse gas emissions, and energy use and advancing sustainable alternative aviation jet fuels.

The Program specifically supports the following outcomes:

Demonstrate aircraft and engine technologies that reduce noise and air quality and greenhouse gas emission at the source level, to a developmental level that will allow quicker industry uptake of these new environmental friendly technologies to produce a fleet that will operate more efficiently with less energy usage and permit expansion of airports and airspace capacity in a scalable manner consistent with the environmental goals of the NextGen plan.

Specific activities include developing and demonstrating:

- Certifiable aircraft technology that reduces aircraft fuel burn by 33 percent compared to current technology, reducing energy consumption and greenhouse gas (CO_2) emissions
- Certifiable engine technology that reduces landing-and-takeoff-cycle nitrogen-oxide emissions by 60 percent, without increasing other gaseous or particle emissions, over the International Civil Aviation Organization (ICAO) standard adopted at the sixth meeting of the ICAO Committee on Aviation Environmental Protection
- Certifiable aircraft technology that reduces noise levels by 32 decibels at each of the three certification points, relative to Stage 4 standards
- Determination of the extent to which new engine and aircraft technologies may be used to retrofit or re-engine aircraft so as to increase the level of penetration into the commercial fleet

Demonstrate alternative fuels for aviation to reduce emissions affecting air quality and greenhouse gas emissions and increase energy supply security for NextGen.

Specific activities include developing and demonstrating:

- The feasibility of the use of alternative fuels in aircraft systems, including favorable environmental qualification, successful demonstration and quantification of benefits and internationally agreed criteria to quantify relative carbon content
- Processing capability and technical data to support certification and assured safety of a drop-in replacement for petroleum-derived turbine engine fuels

Determine the appropriate enhancements of goals and metrics to manage NextGen aviation environmental impacts that are needed to support Environmental Management Systems (EMSs) and achieve environmental protection that enables sustained aviation growth.

Specific activities include:

- Evaluate, establish, and implement advanced metrics to better assess and control noise, air quality impacts, and greenhouse gas emissions that may influence climate impacts from anticipated NextGen commercial aircraft operations.
- Evaluate and refine required technology and operational goals and targets to mitigate the environmental impact of NextGen and support NextGen EMS implementation.

FAA works closely with other federal agencies (including NextGen Joint Planning and Development Office Environmental Working Group or JPDO/EWG and U.S. Global Change Research Program), industry, academia, and international governments, organizations (e.g. ICAO/CAEP, International Civil Aviation Organization/Committee on Aviation Environmental Protection) and coalitions (e.g. CAAFI, Commercial Aviation Alternative Fuels Initiative) to design research and development (R&D) efforts that can mitigate the environmental impact of aviation and explore alternative gas turbine fuels.

As does the Environment and Energy Research Program and other NextGen activities, the NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics Program relies on a series of Memoranda of Agreement to work closely with NASA and DoD. FAA is also pursuing collaborative agreements with the Department of Energy, and EPA to leverage resources to address aviation's environmental impact.
Through the JPDO, the program supports the EWG comprising FAA, NASA, EPA, DoD, DOC, Council on Environmental Quality, and OST, as well as industry, academia, local government, and community groups. The EWG is pursuing an intensive, balanced approach, emphasizing alignment across stakeholders in developing needed business and technology architectures, as well as other relevant tools, metrics, and products to address aviation's environmental impact.

In FY 2012, major activities and accomplishments planned include:

Noise reduction, emissions and fuel burn reduction technology maturation

- Fabricated advanced aircraft component level flight test hardware.
- Integrated advanced low NOx combustor on engine demonstrator.
- Began integration of flight management system with air traffic management system for flight simulations of operational and environmental benefits.
- Conducted component level engine rig tests.
- Completed preliminary design review of advanced engine configuration for demonstration.
- Conducted engine tests of advanced turbine blades and ceramic matrix composite turbine blade tracks.

Alternative Turbine Fuels

- Conducted fuel characterization testing of renewable alternative fuels.
- Conducted sustainability assessment of renewable alternative fuels.

- Conducted performance and environmental assessment of additional candidates for "drop-in" renewable alternative fuels.
- Assessed production capacity and impacts of commercial fleet infusion of aviation alternative fuels.
- Identified additional candidates for "drop-in" aviation alternative fuels.

Metrics, Goals and Targets

- Evaluated noise and emissions impacts metrics for use in Next Generation Air Transportation System (NextGen) environmental analysis.
- Performed integrated NextGen noise and emissions impacts analysis.
- Assessed climate impacts of aviation climate impacts and underlying uncertainties.
- Refined and assessed intermediate targets towards meeting NextGen environmental goals.

The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program supports DOT strategic goal of environmental sustainability by increasing the use of environmentally sustainable practices in the transportation sector. Those practices will improve capital projects that include environmental management systems, context sensitive solutions, or use a sustainable transportation project evaluation to manage the environmental impacts of construction and operations.

By FY 2017, complete design, fabrication and integration as well as system level analyses and testing of near-and mid-term CLEEN airframe and engine technologies to reduce noise, emissions, and fuel burn for civil subsonic jet aircraft; and initiate the second phase of CLEEN program.

Airframe and engine technologies supporting milestones:

- By FY 2013, perform system level tests and demonstrations of CLEEN aircraft technologies.
- By FY 2013, perform aircraft level noise and emissions assessments of CLEEN aircraft technologies.
- By FY 2013, identify technical issues impacting commercialization of CLEEN technologies.
- By FY 2013, perform detailed design review of system components and configurations.
- By FY 2013, perform validation testing and analysis to verify technology performance and environmental impacts predictions.
- By FY 2014, characterize and test aircraft technologies for noise reduction.
- BY FY 2014, perform ground tests for advanced engine configurations.
- By FY 2014, perform tests of advanced aircraft Flight Management System.
- By FY 2014, develop plans for demonstration and environmental assessment of additional aircraft technologies in a potential second phase of CLEEN.
- By FY 2015, perform tests and assessment for advanced engine and airframe configurations.
- By FY 2015, conduct a market survey of additional aircraft technologies for a second phase of CLEEN
- By FY 2016, develop and issue a solicitation for a second phase of CLEEN to demonstrate and assess additional aircraft technologies that reduce fuel burn, emissions and noise.
- By FY 2017, award cost share agreements with industry to demonstrate and assess additional aircraft technologies in a potential second phase to CLEEN
- By FY 2016, complete comprehensive assessment and research to support certification of drop-in and renewable alternative turbine engine fuels and develop implementation plan to foster implementation in the commercial fleet.

Alternative fuels supporting milestones:

- By FY 2013, conduct fuel characterization testing and environmental assessments of additional "drop-in" alternative fuels.
- By FY 2013, conduct sustainability analysis of renewable fuels.
- By FY 2013, assess mechanisms for increasing commercial use of aviation alternative fuels.
- By FY 2013, initiate process for ASTM International approval of additional alternative fuel blends.
- By FY 2014, conduct engine demonstrations for additional "drop-in" alternative fuels.
- By FY 2014, complete environmental assessment of additional "drop-in" renewable alternative fuels.
- By FY 2015, conduct flight test demonstrations for additional "drop-in" renewable alternative fuels.
- By FY 2015, secure ASTM International approval of additional "drop-in" renewable alternative fuels.
- By FY 2016, identify potential of non-drop-in fuels and develop plans for development and demonstration.
- By FY 2016, conduct initial feasibility study, including economic feasibility, environmental impacts, and assessment of potential for non-drop-in alternative aviation fuels.
- By FY 2017, initiate fuel characterization tests and assessments of a non-drop-in alternative aviation fuel.
- By FY 2017, investigate metrics, uncertainties on aviation emissions health and welfare and climate impact to facilitate NextGen EMS implementation.

Metrics supporting milestones:

- By F Y2013, refine and evaluate noise and emissions impacts metrics for use in NextGen environmental analysis.
- By FY 2013, reduce key uncertainties in climate impacts of aviation.
- By FY 2013, conduct evaluation of advanced analytical approaches for noise and emissions impacts assessment.
- By FY 2013, refine intermediate targets towards meeting NextGen environmental goals performance targets for Destination 2025 and perform gap analysis.
- By FY 2014, refine metrics that more accurately capture aviation emissions health and welfare and climate impact and goals to facilitate EMS implementation.
- By FY 2014, refine estimates of interim NextGen environmental targets and perform gap analyses.
- By FY 2014, complete second phase of ACCRI program with improved estimates of aviation climate impacts.
- By FY 2015, continue refined assessment of aviation environmental, health, and climate impacts.
- By FY 2015, complete an updated assessment of aviation environmental, health, and climate impacts.
- By FY 2015, refine estimates of interim NextGen environmental targets and perform gap analyses.
- By FY 2016, advance capabilities for integrated analysis for aviation noise and emissions impacts.
- By FY 2016, develop improved estimates for targets and assess scenarios towards meeting the NextGen environmental goals.
- By FY 2017, refine estimates of interim NextGen environmental targets and perform gap analyses.

3. Why Is This Particular Program Necessary?

Protecting the environment is at the heart of the NextGen plan. Ensuring energy availability and protecting the environment will be critical elements to enable the mobility (capacity and efficiency) our nation needs. The NextGen environmental strategy includes efforts to better understand the extent of the problem associated with aviation emissions and the development and fielding of new operational enhancements, aircraft and ATM technologies, alternative fuels, and policies to achieve near-term and long-term solutions. The NextGen Environment and Energy R&D program supports research to develop new aircraft technologies and sustainable fuels and to develop metrics to quantify NextGen's environmental impacts and inform performance targets.

The vast majority of improvements in environmental performance over the last three decades have come from enhancements in engine and airframe design. Although major contributors, improved technologies and air traffic management will not be enough to reduce aviation's carbon dioxide (CO_2) footprint. Sustainable alternative fuels with lower overall carbon foot prints are critical to reducing aviation's climate impact in order to enable mobility. The main focus of this R&D effort is the CLEEN program. The CLEEN program is focused on reducing current levels of aircraft noise, emissions that degrade air quality, GHG emissions, and energy use, and it advances sustainable alternative fuels for aviation use.

Embedded in energy and environmental issues are several scientific uncertainties concerning aviation energy issues and aviation environmental impacts, particularly on climate. There are large uncertainties in our present understanding of the magnitude of climate impacts due to aviation non-CO2 emissions. Understanding the relative impacts of different emission (including altitude emissions impacts on air quality) is vital for informing NextGen EMSs implementation. The ACCRI is an element of the R&D program focused on addressing these uncertainties. In addition, noise is the most immediately objectionable impact of aviation, and the impact demanding the most Federal resources (i.e., minimum AIP grant set aside of $300M annually). Research is outdated that underpins determinations of aircraft noise impacts, land use compatibility guidelines, and federally funded noise mitigation. New noise metrics research effort is needed to reflect public sensitivity and current air traffic conditions, guide mitigation funding and local land use planning near airports, and assure the U.S. response to aircraft noise keeps pace with NextGen needs and international efforts.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Any reduction in the requested budget will further slow our ability to mature aircraft technologies for reduction in noise, emissions and fuel burn, qualification of alternative fuels for commercial aviation as well as limit our efforts for analysis of environmental impacts and metrics including reduction in climate impacts uncertainties under ACCRI. Delay in advancing progress in these areas will further severely limit our ability to meet NextGen environmental goals, prepare for international negotiations and efforts for sustainable and secure supply of alternative sources of jet fuels. Finally, reduction in Environment and Energy specific NextGen R&D activities will cause delay in development of proven technology based environmental mitigation solutions which will result in billions of dollars of operational, human health, welfare and opportunity cost to government, industry and public. It will allow environmental concerns to become limiting factor and prevent us from full realization of expected NextGen benefits – which will eventually limit aviation growth. In other words, we will not be able to use full potential of ATM and NextGen capabilities without clean operating fleet that will allow environmental sustainability.

Detailed Justification for
A14.a System Planning and Resource Management

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – System Planning and Resource Management

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A14.a System Planning and Resource Management	$1,727,000	$1,717,000	$1,757,000	+$40,000

For FY 2013, $1,757,000 is requested for System Planning and Resource Management. Major activities and accomplishments planned include:

R,E&D Portfolio Development

- Prepare the FY 2015 R,E&D budget submission.
- Manage FAA's R,E&D portfolio to meet efficiency goals.
- Obtain Research Engineering, and Development Advisory Committee (REDAC) recommendations on planned R,E&D investments for FY 2015.
- Support the REDAC in its preparation of other reports, as requested by the FAA.
- Deliver the 2013 National Aviation Research Plan (NARP) to the Congress with the President's FY 2014 Budget.

Research Partnerships

- Coordinate R&D activities with internal and external partners.
- Conduct the 2013 U.S.A./Europe Air Traffic Management R&D Seminar on NextGen and Single European Sky Air Traffic Management Research (SESAR).

Performance Measurement

- Measure quality, timeliness, and value of international research collaboration.

FAA will continue supporting the work of the REDAC in its task to advise the Administrator on the R&D program. In particular, it will seek the counsel and guidance of the committee for the FY 2015 program, review the proposed FY 2015 program prior to submission of the budget requirements to the DOT, and seek the committee's guidance during the execution of the R&D program. The agency will publish, as required by Congress, the NARP and submit it to Congress concurrent with the FY 2013 President's Budget Request.

The program will review the President's R&D criteria, ensuring that the agency's R&D program remains viable and meets national priorities. It will also publish program activities and accomplishments, as well as foster external review of and encourage customer input to the R&D program.

The program will manage the FAA R&D portfolio, identify high value products being produced by the R&D program, and promote the use of these products globally to benefit the international market. In FY 2013, work will continue on measuring quality, timeliness, and value of collaboration, expanding upon work done in prior years.

2. What Is This Program?

This activity produces the National Aviation Research Plan (NARP), an annual strategic plan for FAA R&D; administers the congressionally mandated R,E&D Advisory Committee (REDAC); conducts external program coordination; fosters future research opportunities; and provides program advocacy and outreach.

The value of working with international partners to leverage research programs and studies to improve safety and promote seamless operations worldwide is an outcome for this program.

Ongoing activities will manage FAA's Research, Engineering and Development (R,E&D) portfolio, meet the President's criteria for R&D, increase program efficiency, and maintain management and operating costs.

The REDAC reviews FAA research commitments annually and provides guidance for future R,E&D investments. The members of this committee and its associated subcommittees are subject matter experts drawn from various associations, user groups, corporations, government agencies, universities, and research centers. Their combined presence in the REDAC fulfills a congressional requirement for FAA R&D to be mindful of aviation community and stakeholder input.

R&D partnerships include the Department of Transportation (DOT), the Joint Planning and Development Office (JPDO), NASA, other federal agencies, and EUROCONTROL.

In FY 2012, major activities and accomplishments planned include:

R,E&D Portfolio Development

- Prepared the FY 2014 R,E&D budget submission.
- Managed FAA's R,E&D portfolio to meet efficiency goals.
- Obtained Research Engineering, and Development Advisory Committee (REDAC) recommendations on planned R,E&D investments for FY 2014.
- Supported the REDAC in its preparation of other reports, as requested by the FAA.
- Delivered the 2012 National Aviation Research Plan (NARP) to the Congress with the President's FY 2013 Budget.

Research Partnerships

- Coordinated R&D activities with internal and external partners.
- Began preparations for the 2013 U.S.A./Europe Air Traffic Management R&D Seminar on NextGen and Single European Sky Air Traffic Management Research (SESAR).

Performance Measurement

- Measured quality, timeliness, and value of international research collaboration.

FAA continued supporting the work of the REDAC in its task to advise the Administrator on the R&D program. In particular, it sought the counsel and guidance of the committee for the FY 2015 program, reviewed the proposed FY 2015 program prior to submission of the budget requirements to the DOT, and sought the committee's guidance during the execution of the R&D program. The agency published, as required by Congress, the NARP and submitted it to Congress concurrent with the FY 2014 President's Budget Request.

The program reviewed the President's R&D criteria, ensuring that the agency's R&D program remains viable and meets national priorities. It also published program activities and accomplishments, as well as fostered external review of and encouraged customer input to the R&D program.

The program managed the FAA R&D portfolio, identified high value products being produced by the R&D program, and promoted the use of these products globally to benefit the international market. In FY 2013, this initiative continued measuring quality, timeliness, and value of collaboration, expanding upon work done in prior years.

The System Planning and Resource Management Program supports the DOT strategic goal of Organizational Excellence in maintaining cost control and audit on R&D budget portfolio.

The goals of the focused research endeavors are:

- In FY 2013, FAA will maintain an R,E&D management workforce of no more than 10 percent of the total R,E&D workforce and will sustain the System Planning and Resource Management budget at 2 percent or less of the total R,E&D budget.
- In FY 2013, publish the NARP, which documents the annual R&D budget portfolio, describes activities of the REDAC, and contains the FY 2013-2017 R&D plans.
- By FY 2016, determine the value of international research collaborations.

3. Why Is This Particular Program Necessary?

This program provides the support for the FAA to formulate their annual R,E&D portfolio and submit the mandatory plan for the FAA research and development to Congress each year.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the Research Engineering, and Development Advisory Committee (REDAC) reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Further funding decreases would have negligible impacts on these efforts.

Detailed Justification for
A14.b William J. Hughes Technical Center Laboratory Facility

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – William J. Hughes Technical Center Laboratory Facility

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A14.b William J. Hughes Technical Center Laboratory	$3,680,000	$3,777,000	$3,702,000	-$75,000

For FY 2013, $3,702,000 is requested for the William J. Hughes Technical Center (WJHTC) Laboratory Facility. Major activities and accomplishments planned include:

Simulation Facilities

- The Simulation Team will integrate the Target Generator Facility (TGF) with the AFTIL tower display.
- The Simulation Team will develop Rotorcraft and lighter than air models for the TGF.
- The Simulation Team will continue work with Aircraft Intent Description (AIDL), and trajectory prediction in support of TBO.

Flight Program's Airborne Laboratories

- The Flight Program will seek Final Investment Decision to replace two Convair Flight Test Aircraft.
- The Flight Program will complete Flight Testing of Un-Leaded Aviation Fuel in support of the Alternate Fuel Program.
- The Flight Program will design, develop and fabricate a generic Data Acquisition System to support future programs without such capabilities.

Concepts and Systems Integration – Human Factors

- Separation Management 2 – Human-in-the Loop (HITL) Simulation - After the completion of the first separation management experiment (SepMan1), we will continue development of concepts and prototypes within the separation management project. The Human Factors Field Team is creating prototypes of separation management functions that include variable separation standards, lateral offset, and support for nonsurveillance areas, integration of conflict probe functions on the radar console, and integration of automation functions across the radar and data positions.
- Data Communication Failure HitL Simulation – Test impact of data communication failure.
- Future Tracon Workstation/Tracon Data Communication HitL Simulation – Evaluation of NextGen concepts in the Tracon environment and using data communication.
- High Altitude Generic Airspace Project – Research into the generic airspace sector concept and what information the controller will need using En Route Information Display System.

2. What Is This Program?

R&D programs require specialized facilities to emulate and evaluate field conditions. Human factors projects require flexible, high-fidelity laboratories to perform full-mission, ground-to-air human-in-the-loop simulations. Researchers measure baseline human performance using existing air traffic control (ATC) configurations, and changes in performance when new systems or procedures are introduced in order to evaluate human factors issues. These laboratories are comprised of integrated cockpit and ATC workstation simulators, and the performance issues they delve into reflect the perspectives of the pilot and flight crew. Airborne and navigation projects require flying laboratories, aircraft utilized for research and development, which are specially instrumented and reconfigurable to support a variety of projects.

FAA sustains research facilities located at the WJHTC in support of its R&D program goals. These facilities consist of the Flight Program's Airborne Laboratories; Simulation Facilities, including the Target Generation Facility and the Cockpit Simulators; and the Concepts and Systems Integration Facilities Human Factors Laboratory.

The WJHTC facilities directly support agency projects and integrated product teams in the following areas:

- FAA's Air Traffic Organization (ATO) – The WJHTC laboratories support the ATO in the areas of capacity and air traffic management; communications, navigation, and surveillance; NextGen concept validation; weather; airport technology; aircraft safety; human factors; information security; and environment and energy.
- Communications, Navigation, and Surveillance – The Flight Program Team supports on-site flight tests of the GPS Local Area Augmentation System (GBAS) in Newark to aid in the development of the precision landing system.
- NextGen – The WJHTC laboratories support concept validation and system integration.
- Automated Dependent Surveillance-Broadcast (ADS-B) – Numerous flight test hours have been expended in support of field testing the new ITT system in Louisville, KY. Each test leads to improvements made to enhance the overall system.
- Terminal Instrumentation Procedures (TERPS) – Routine flight tests are ongoing in the development of Global Positioning System (GPS) Helicopter precision approaches to a heliport.
- Wide Area Augmentation System (WAAS) – The Flight Program Team has been working with the WAAS program, Bombardier Aircraft, Canadian Marconi, and Honeywell to design, test and certify a WAAS installation into a Bombardier Global 5000 aircraft.

In addition to FAA's research programs, WJHTC laboratories partnerships include:

- U.S. Air Force – The Flight Program Team has performed numerous test of the GPS signal security with the U.S. Air Force.
- National Transportation Safety Board – The Flight Program Team has, in the past, participated in the recreation of aircraft accidents for the purpose of collecting data in an attempt to determine the underlying cause.
- European Organization for the Safety of Air Navigation - The simulation team exchanges aircraft modeling data for use in TGF.
- Industry – Flight tests are on-going to help develop and deploy the ITT ADS-B system in Louisville, KY, the Gulf of Mexico and Philadelphia, PA, as well as, the work being done with Bombardier, Canadian Marconi, and Honeywell in the design, installation, and certification on GPS WAAS onboard a Bombardier Global 5000 aircraft.
- Industry - The Simulation team has partnered with Boeing to develop an Aircraft Intent Description Language (AIDL) which is a key component for NextGen 4D trajectory prediction..

Facilities supporting R&D Goals at FAA's WJHTC: The following laboratory facilities provide the reliable test bed infrastructure to support these R&D customers, program goals, and outputs for FAA:

Simulation Facilities – TGF and Cockpit Simulators

- Approach Procedures
- NextGen
- Airspace Design
- Operational Evolution Plan Concept Validation

- UAS
- ADS-B Concept Evaluation

Research & Development Flight Program – Airborne Laboratories

- Satellite Communications and Navigation Programs
- Separation Standards
- Ground-based Augmentation System – GBAS (LAAS)
- TERPS
- Safety
- Runway Incursion
- NextGen
- Satellite-based Augmentation System – SBAS (WAAS)
- ADS-B
- Common Automated Radar Terminal System

Concepts and System Integration Facilities – Human Factors Laboratory

- ATC Human Factors
- Airway Facilities Human Factors
- NextGen Concept Validation Studies
- Unmanned Aerial Systems
- ADS-B
- Data Communications (Data Comm)

In FY 2012, major activities and accomplishments planned include:

Simulation Facilities

- The Simulation Team achieved four fully functional cockpit simulators in the Cockpit Simulation Facility.
- The Simulation Team fully integrated Target Generator Facility (TGF) into the Next Generation Air Transportation System (NextGen) Integration and Evaluation Capability (NIEC) simulation environment.
- The Simulation Team supported FAA involvement in the Research Park located near the William J. Hughes Technical Center.

Flight Program's Airborne Laboratories

- The Flight Program installed a fully certified Future Air Navigation System (FANS) in support of the 4D Trajectory program.
- The Flight Program installed an Enhanced Vision System into the Bombardier Global 5000 aircraft in support of the Airport Lighting Program.
- The Flight Program continues to support NextGen through long term flight testing of ADS-B and related systems.
- The Flight Program will continue working with the program office and the US Air Force to support Unmanned Aerial Systems (UAS) tests.

Concepts and Systems Integration

- Supported 4DT profiles.
- Integrated Traffic Flow Management Auxiliary Platform into the NIEC.
- Developed a robust capability to create multi-dimensional scenarios.

FAA sustains research facilities located at the William J. Hughes Technical Center (WJHTC) in support of its R&D program goals. These facilities consist of the Flight Program's Airborne Laboratories; Simulation Facilities, including the Target Generation Facility and the Cockpit Simulators; and the Concepts and Systems Integration Facilities, including the Human Factors Laboratory and the NIEC.

- The FAA continued to modify, configure, and sustain these research facilities located at the WJHTC to support its R&D program goals.

The William J. Hughes Technical Center Laboratory Facility supports the Department of Transportation Strategic Goals of Safety, Economic Competitiveness, and Environmentally Sustainability. Safety is supported through integration of the Target Generator facility for runway incursion testing, which reduces transportation related injuries and fatalities; Economic Competitiveness by leading U.S. transportation interest in target markets around the world through full-mission demonstrations on NextGen technology integration; and Environmentally Sustainability through testing of transportation evaluation tools to manage the environmental impacts of construction and operations.

FAA will work to provide an integrated laboratory platform for the purpose of demonstrating operational procedures, defining human and system performance requirements, full-mission demonstrations integrating NextGen air and ground capabilities for pilot separation responsibility and controller efficiencies, and analysis, evaluation, and validation of R&D milestones.

3. Why Is This Particular Program Necessary?

This particular program sustains research facilities located at the William J. Hughes Technical Center (WJHTC) to support R&D program goals. These programs require specialized facilities to emulate and evaluate field conditions. The R&D programs require flexible, high-fidelity laboratories to perform full mission, ground-to-air, human-in-the-loop simulations. The R&D laboratories are comprised of a human factors laboratory, integrated cockpits and ATC workstation simulators, and flying laboratories consisting of aircraft specially instrumented and reconfigurable to support a variety of projects.

It is necessary to modify, upgrade, and sustain the R&D laboratory infrastructure and provide support services to support the R&D program goals.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A reduction of funding to this program will reduce the number of contractors available to support further modifications to the air traffic control simulation software which is vital to the human in the loop simulations done by the Concepts and Systems Integration – Human Factors team. Funding reductions will also impact contract support to the Target Generation Facility and the development of various air models for simulations.

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GRANTS-IN-AID FOR AIRPORTS
(LIQUIDATION OF CONTRACT AUTHORIZATION)
(LIMITATION ON OBLIGATIONS)
(AIRPORT AND AIRWAY TRUST FUND)

For liquidation of obligations incurred for grants-in-aid for airport planning and development, and noise compatibility planning and programs as authorized under subchapter I of chapter 471 and subchapter I of chapter 475 of title 49, United States Code, and under other law authorizing such obligations; for procurement, installation, and commissioning of runway incursion prevention devices and systems at airports of such title; for grants authorized under section 41743 of title 49, United States Code; and for inspection activities and administration of airport safety programs, including those related to airport operating certificates under section 44706 of title 49, United States Code, $3,400,000,000, to be derived from the Airport and Airway Trust Fund and to remain available until expended: Provided, That none of the funds under this heading shall be available for the planning or execution of programs the obligations for which are in excess of $3,350,000,000 in fiscal year 2013, notwithstanding section 47117(g) of title 49, United States Code: Provided further, That none of the funds under this heading shall be available for the replacement of baggage conveyor systems, reconfiguration of terminal baggage areas, or other airport improvements that are necessary to install bulk explosive detection systems: Provided further, That notwithstanding any other provision of law, of funds limited under this heading, not more than $103,000,000 shall be obligated for administration, not less than $15,000,000 shall be available for the Airport Cooperative Research Program, and not less than $29,300,000 shall be available for Airport Technology Research.

GRANTS-IN-AID FOR AIRPORTS
Program and Financing
(in millions of dollars)

Identification code: 69-8106-0-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Obligations by program activity:			
	Direct Program:			
0001	Grants-in-aid for airports	3,505	3,199	3,203
0002	Personnel and related expenses	93	101	103
0003	Airport technology research	22	29	29
0005	Small community air service	16	6	. . . .
0006	Airport Cooperative Research	15	15	15
0100	Total direct program	3651	3350	3350
0801	Reimbursable program	. . . .	1	1
0900	Total new obligations	3651	3351	3351
	Budgetary Resources:			
1000	Unobligated balance carried forward, start of year	4	12	177
1021	Recoveries of prior year unpaid obligations	144	. . . .	. . . .
1050	Unobligated balance (total)	148	12	177
	Budget Authority: Appropriations, discretionary:			
1101	Appropriation (special or trust fund)	3,550	3,435	3,400
1137	Appropriation applied to liquidate contract authority	-3,550	-3,435	-3,400
1160	Appropriation (total discretionary)	. . . .	. . . .	. . . .
	Contract authority, mandatory:			
1600	Contract authority(mandatory)	3,515	3,515	3,515
1640	Contract authority (total mandatory)	3,515	3,515	3,515
	Spending authority from offsetting coll., Discretionary:			
1700	Collected	. . . .	1	1
1750	Spending authority from offsetting coll., disc (total)	. . . .	1	1
1900	Total budget authority (gross)	3,515	3,516	3,516
1930	Total Budgetary Resources Available	3,663	3,528	3,693
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	12	177	342
	Change in obligated balances:			
	Obligated balance, state of year (net):			
3000	Unpaid obligations, brought forward, Oct 1 (gross)	4,933	5,224	4,724
3030	Obligations incurred, unexpired accounts	3,651	3,351	3,351
3040	Outlays (gross)	-3,216	-3,851	-3,766
3080	Recoveries of prior year unpaid obligations, unexpired	-144	. . . .	. . . .
	Obligated balance, end of year (net):			
3090	Unpaid obligations, end of year (gross)	5,224	4,724	4,309
3100	Obligated balance, end of year (net)	5,224	4,724	4,309
	Budget authority and outlays, net:			
	Discretionary:			
4000	Budget authority, gross	1	1	1
4010	Outlays from new discretionary authority	437	668	670
4011	Outlays from discretionary balances	2,779	3,183	3,096
4020	Outlays, gross (total)	3,216	3,851	3,766
	Offsets against gross budget authority and outlays:			
4033	Offsetting collections from non-federal sources	. . . .	-1	-1
4080	Outlays, net (discretionary)	3,216	3,850	3,765

	Mandatory			
4090	Budget authority, gross	3,515	3,515	3,515
4160	Budget authority, net (mandatory)	3,515	3,515	3,515
4180	Budget authority, net (total)	3,515	3,515	3,515
4190	Outlays, net (total)	3,216	3,850	3,765
	Memorandum (non-add) entries:			
5052	Obligated balance, SOY: contract authority	3,676	3,641	3,721
5053	Obligated balance, EOY: contract authority	3,641	3,721	3,836
5061	Limitation on obligations (Trust Funds)	3,515	3,350	3,350

Summary of Budget Authority and Outlays

(in millions of dollars)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
Enacted/requested:			
Budget Authority	3,515	3,515	3,515
Outlays	3,216	3,850	3,765
Legislative proposal, not subject to PAYGO:			
Budget Authority	....	....	-1,091
Outlays	....	....	-167
Total:			
Budget Authority	3,515	3,515	2,424
Outlays	3,216	3,850	3,598

Subchapter I of chapter 471, title 49, U.S. Code provides for airport improvement grants, including those emphasizing capacity development, safety and security needs; and chapter 475 of title 49 provides for grants for aircraft noise compatibility planning and programs.

Object Classification

(in millions of dollars)

Identification code: 69-8106-0-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Direct obligations:			
	Personnel compensation			
1111	Full-time permanent	59	66	68
1113	Other than full-time permanent	1	1	1
1115	Other personnel compensation	1	1	1
1119	Total personnel compensation	61	68	70
1121	Civilian personnel benefits	17	18	20
1210	Travel and transportation of persons	3	4	3
1232	Rental payments to others	1	1	1
1251	Advisory and assistance services	18	24	24
1252	Other services from non-fed sources	26	23	23
1260	Supplies and materials	1	1	1
1410	Equipment	2	2	2
1410	Grants, subsidies, and contributions	3,516	3,203	3,206
1940	Financial Transfers	6	6	0
1990	Subtotal, direct obligations	3,651	3,350	3,350
2990	Reimbursable obligations	....	1	1
9999	Total new obligations	3,651	3,351	3,351

Personnel Summary

Identification code: 69-8106-0-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
1001	Direct: Civilian full-time equivalent employment............	548	589	602
2001	Reimbursable: Civilian full-time equivalent employment..	1	1	1

GRANTS-IN-AID FOR AIRPORTS (AIRPORT AND AIRWAY TRUST FUND)
(Legislative proposal, not subject to PAYGO)

Contingent upon the enactment of reforms to chapter 471 of title 49, the obligation limitation for fiscal year 2013 shall be reduced by $926,000,000.

GRANTS-IN-AID FOR AIRPORTS
Program and Financing
(in millions of dollars)

Identification code: 69-8106-2-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Obligations by program activity:			
	Direct Program:			
0001	Grants-in-aid for airports	....	....	-926
0100	Total direct program	....	....	-926
0900	Total new obligations (object class 41.0)	....	....	-926
	Budgetary Resources:			
	Contract authority, mandatory			
1600	Contract authority	....	....	-1,091
1640	Contract authority, mandatory (total)	....	....	-1,091
1930	Total budgetary resources available	....	....	-1,091
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	....	....	-165
	Change in obligated balances:			
3030	Obligations incurred, unexpired accounts	....	....	-926
3040	Outlays (gross)	....	....	167
3090	Unpaid obligations, end of year (gross)	....	....	-759
	Budget authority and outlays, net:			
4010	Outlays from new discretionary authority	....	....	-167
4080	Outlays, net (discretionary)	....	....	-167
	Mandatory			
4090	Budget authority, gross	....	....	-1,091
4160	Budget authority, net (mandatory)	....	....	-1,091
4180	Budget authority, net (total)	....	....	-1,091
4190	Outlays, net (total)	....	....	-167
	Memorandum (non-add) entries:			
5053	Obligated balance, EOY: contract authority	....	....	-1,091
5061	Limitation on obligations (Trust Funds)	....	....	-926

The Budget proposes to lower funding for the ongoing airport grants program to $2.4 billion by eliminating guaranteed funding for large and medium hub airports. The Budget proposal to reduce the obligation limitation by $926 million is consistent with the recommendation of the President's National Commission on Fiscal Responsibility and Reform to eliminate grants to large and medium hub airports. To assist those airports that need the most help, the Administration proposes to focus Federal grants to support smaller commercial and general aviation airports that do not have access to additional revenue or other outside sources of capital. The Budget also proposes to allow large and medium hub airports to increase the non-Federal Passenger Facility Charge thereby, giving large and medium hub airports greater flexibility to generate their own revenue. Eligible airports in all size categories will be able to compete for an additional $2.0 billion in one-time funding that will be made available under the President's Immediate Transportation Investment proposal targeted at investment in roads, railways, and runways.

Object Classification
(in millions of dollars)

Identification code: 69-8106-2-7-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Direct obligations:			
	Personnel compensation			
1410	Grants, subsidies, and contributions	. . . .	. . . .	-926
9999	Total new obligations (object class 41.0).......................	. . . .	. . . .	-926

EXHIBIT III-1

GRANTS-IN-AID FOR AIRPORTS
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	FY 2011 ACTUAL	FY 2012 ENACTED[1]	FY 2013 REQUEST	CHANGE FY 2012-2013
Grants-in-Aid for Airports				
AATF	3,378,106	3,198,750	2,276,700	(922,050)
Personnel & Related Expenses	93,422	101,000	103,000	2,000
Airport Technology Research	22,472	29,250	29,300	50
Airport Cooperative Research	15,000	15,000	15,000	0
Small Community Air Service[2]	6,000	6,000	0	(6,000)
TOTAL	**3,515,000**	**3,350,000**	**2,424,000**	**-926,000**
FTEs				
Direct Funded	557	589	602	13
Reimbursable	2	1	1	0

Program and Performance Statement

This account provides funds for planning and developing a safe and efficient national airport system to satisfy the needs of the aviation interests of the United States, with due consideration for economics, environmental compatibility, local proprietary rights and safeguarding the public investment.

[1]Levels are based on obligation limitation per P.L. 112-55 and contingent upon sufficient contract authority provided in FY 2012.

EXHIBIT III-1a

GRANTS-IN-AID FOR AIRPORTS
SUMMARY ANALYSIS OF CHANGE FROM FY 2012 TO FY 2013
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

ITEM	Change from FY 2012 to FY 2013 ($000)	Change from FY 2012 to FY 2013 FTE
FY 2012 BASE	**3,350,000**	**590**
Annualization of FY 2012 FTE	1,985	13
Pay Inflation	352	
One More Compensatory Day	334	
SUBTOTAL, ADJUSTMENTS TO BASE	**2,671**	**13**
NEW OR EXPANDED PROGRAMS		
Contract Pay Raises	868	
Grants	(922,050)	
AIP Administrative Efficiencies	(1,412)	
Decrease to ACRP Contracts	(76)	
SCASDP	(6,000)	
SUBTOTAL, NEW OR EXPANDED PROGRAMS	**(928,671)**	
FY 2013 REQUEST	**2,424,000**	**603**

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Executive Summary: Grants-in-Aid for Airports

1. What Is The Request And What Will We Get For The Funds?

For Fiscal Year (FY) 2013, FAA requests $2.3 billion to fund the Grants-in-Aid for Airports program, also known as the Airport Improvement Program (AIP). The Budget focuses the traditional Federal grants to support smaller commercial and general aviation airports that do not have access to additional revenue or other outside sources of capital. At the same time, the budget proposes to increase the Passenger Facility Charge (PFC) limit from $4.50 to $7.00 and eliminates guaranteed funding for large and medium hub airports. Thereby, the Budget envisions giving the larger airports greater flexibility to generate their own revenue. The request is consistent with the recommendation of the President's National Commission on Fiscal Responsibility and Reform.

In addition, the budget assumes a one-time appropriation of $2.0 billion from the President's Immediate Transportation Investment in FY 2012. Most of this funding supports runway construction and other airport improvement projects aimed at increasing overall system efficiency in the future. Eligible airports in all size categories are able to compete for the additional $2.0 billion in one-time funding.

2. What Is The Program?

The AIP provides grants to local and state airport authorities to help ensure the safety, capacity, and efficiency of U.S. airports. Through the AIP, the agency funds a range of activities to assist in airport development, preservation of critical facilities, economic competitiveness, and environmental sustainability.

3. Why Is This Particular Program Necessary?

Through the AIP, the agency funds a range of activities to ensure the safety, security, capacity, and environmental mitigation of U.S. airports. The FAA identifies public-use airports for the national transportation system and the National Plan of Integrated Airport Systems (NPIAS). These public use airports support scheduled air carrier service at more than 500 commercial service airports. In addition to the scheduled passenger and cargo service, the airport system serves a diverse range of functions at approximately 2,829 non-primary airports that provide emergency medical, flight training, agricultural, and business/corporate activities. The proposed AIP funding level will provide sufficient funding for all high priority safety, security, preservation, capacity, and environmental projects.

4. How Do You Know The Program Works?

The FAA has a very high level of confidence in the effectiveness of the program. The investment of AIP funds in the National Airport System (NAS) improves the safety and enhances the capacity of the system. We work closely with airports and the state aeronautical agencies to monitor the condition of critical airfield infrastructure, and can draw direct connections between our efforts and improvements in safety and capacity.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The principal tool FAA uses to establish the Airports Capital Improvement Program is the 5-year development needs identified in the NPIAS. The latest NPIAS, which was published in September 2010, identified over $52 billion in capital needs over the 5-year period from 2011-2015. The FAA funds capital projects that support system safety, capacity, and environmental projects and the highest priority needs in the NPIAS.

At this level of AIP funding, in conjunction with an increase in the PFC limit, FAA would be able to fund capital needs that support system safety, capacity, and environmental projects. Should this not occur, the primary impact would be on AIP Discretionary funds—the funding category over which FAA has the greatest degree of control to address the highest priority system needs. Any reduction would impact FAA's ability to fund the highest priority needs in the NPIAS.

GRANTS-IN-AID FOR AIRPORTS

Grants-in-Aid for Airports (AATF)

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2012 Enacted	**3,198,750**	**0**	**0**
New or Expanded Programs			
1. Grants-in-Aid for Airports	(922,050)		
Increases/Decreases	**(922,050)**	**0**	**0**
FY 2013 Request	**2,276,700**	**0**	**0**

Detailed Justification for Grants-in-Aid for Airports

1. What Is The Request And What Will We Get For The Funds?

FY 2013 Grants-in-Aid for Airports Budget Request ($000)

Program / Component	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	Difference from FY 2012 Enacted
Grants-in-Aid for Airports, (AATF)	$3,378,106	$3,198,750	$2,276,700	($922,050)

For FY 2013, FAA requests $2.3 billion to fund the Grants-in-Aid for Airports program (AIP). This a decrease of $922 million (29 percent) below the FY 2012 enacted level.

The FY 2013 budget proposes to raise the Passenger Facility Charge (PFC) limit from $4.50 to $7.00 and eliminates guaranteed funding for large and medium hub airports. This request is consistent with the recommendation of the President's National Commission on Fiscal Responsibility and eliminates grants to large and medium hub airports. To assist those airports that need the most help, FAA proposes to focus federal grants to support smaller commercial and general aviation airports that do not have access to additional revenue or other outside sources of capital.

Small airport passenger and non-primary entitlements will be maintained at levels consistent with formulas in effect under current law when funding is above $3.2 billion. The FAA also proposes to increase the PFC limit from $4.50 to $7.00 per enplanement for all airports eligible to impose PFCs, thereby giving large and medium hub airports greater flexibility to generate their own revenue.

The budget assumes in FY 2012 a one-time appropriation of $2.0 billion in mandatory General Fund resources for airport improvement funding proposed in the President's Immediate Transportation Investment. Most of this funding will be used for runway construction and other airport improvement projects aimed at increasing overall system efficiency in the future. Eligible airports in all size categories are able to compete for the additional $2.0 billion in one-time funding. One-time mandatory resources will be used, in part, to fund commitments made under Letters of Intent (LOI) issued prior to FY 2012, Runway Safety Area (RSA) improvements, noise mitigation for impacted communities, and other high priority projects designated by the Secretary.

The request allows the agency to continue supporting the following key initiatives:

- Improve RSAs that do not conform to FAA standards;
- Reduce the risk of runway incursions by reconfiguring taxiways, perimeter service roads and other facilities;
- Preserve or enhance the safety of critical airfield and other airport infrastructure at airports nationwide;
- Preserve or enhance airfield capacity and efficiency at airports nationwide;
- Mitigate the environmental impacts of aviation including noise mitigation, land use compatibility planning and air quality improvements; and
- Continue to support airport security improvements where applicable.

The FAA continues to award AIP grants that enable airports to conform to our RSA standards. The agency's long-term goal is to eliminate airport conditions that contribute to accidents and enhance the margin of operating safety by improving RSAs. Since FY 2000, FAA has improved 512 RSAs, and by the beginning of FY 2013, 93 percent of practicable improvements will be completed. We are also working closely with FAA units administering the Facilities & Equipment (F&E) budget to relocate FAA-owned Navigational Aid Systems (NAVAIDS) from RSAs or making them frangible. By the end of FY 2012, FAA will correct FAA-owned NAVAIDs within RSA at 749 of the total 1,102 existing certificated runways (74 percent). In FY 2013, FAA expects to complete 370 RSA NAVAIDS improvement projects. (Note: Each RSA may have several NAVAID improvement projects).

We have a special emphasis to direct AIP investments to reduce accidents in Alaska for general aviation and all Part 135 operations[1]. AIP funding will be directed, where practical, to continue improving access-deficient airports to provide 24 hour Visual Flight Rules (VFR) access at a minimum. There are 63 airports in Alaska that have been designated as access-deficient. Of those 63 airports, 23 have been provided 24-hour visual flight rules access.

AIP will continue to support funding capacity and efficiency enhancements throughout the system, including the full range of commercial service (primary) airports and smaller (nonprimary) airports nationwide. AIP will accomplish this by providing financial and technical support to regional and metropolitan system plans, airport master plans and environmental reviews, and by directing funding toward the construction and preservation of runways, runway extensions, and airfield reconfigurations. We will also strive to increase the safety, security, and capacity of the global civil aerospace system in an environmentally sound manner.

AIP funds will continue supporting environmental mitigation measures including noise mitigation and emission reduction through:

- Residential and school sound insulation programs;
- Property acquisition;
- Land use compatibility planning; and
- Air quality improvement projects as part of the Voluntary Airport Low Emission (VALE) program.

Additional environmentally sustainable AIP activities include acquisition of vehicles and equipment that help reduce emissions including:

- Alternate fuel buses;
- Ground power systems that reduce the need for aircraft to use auxiliary power units; and
- Hydrant fuel distribution systems that reduce or eliminate the need for fuel tank trucks.

In FY 2013, the Office of Airports (ARP) will continue to implement environmental streamlining provisions for capacity enhancement projects at congested airports, as specified by Congress in the Vision 100-Century of the Aviation Reauthorization Act. Commissioning of new commercial service runways is dependent on the timely completion of environmental reviews.

Funding will be used to mitigate significant aviation noise impacts through the purchase and relocate residences and businesses, soundproof residential homes or buildings used for educational or medical purposes, and purchase and install noise barriers or monitors.

Security projects required by statute or regulation carry a high priority for AIP funding. Projects providing for the security of passengers and other persons in the terminal, as well as the terminal buildings themselves, are treated equally with projects to secure aircraft and the aircraft operations area. ARP will continue to work with both airport owners and Transportation Security Administration (TSA) representatives in identifying airport security requirements and discussing appropriate funding sources. The most common type of security project supported by AIP funding is the installation of access control equipment. This includes perimeter fencing, security gates, security lighting, and cameras.

Funding in FY 2013 will support the following key outputs and outcomes:

- Improved RSAs increase safety on runways;
- Reconfigured taxiways, perimeter service roads and other facilities reduce the risk of runway incursions;

[1] Part 139 Airports are regulated by federal airport certification regulation [Title 14, Code of Federal Regulations (CFR), Part 139]. This regulation establishes certification requirements for airports that serve scheduled and unscheduled air carrier aircraft with more than 30 seats; Serve scheduled air carrier operations in aircraft with more than 9 seats but less than 31 seats; and FAA Administrator requires to have a certificate.

- Reconstructed and rehabilitated runways, taxiways and aprons will preserve the nation's critical aviation infrastructure; and
- Air quality improvement and noise mitigation projects reduce air and noise pollution.

2. What Is This Program?

The Grants-in-Aid for Airports program primarily supports Department of Transportation's (DOT) State-of-Good Repair goal, contributing toward the outcome of increased proportion of infrastructure assets in good condition. We also support DOT's Safety goal through our efforts to "reduce transportation-related injuries and fatalities." We additionally support DOT's Economic Competitiveness goal, with resources dedicated to two outcomes: "Maximum economic returns on transportation policies" and "A competitive air transportation system responsive to consumer needs." This program also significantly contributes toward DOT's Environmental Sustainability goal, contributing toward the reduction of transportation-related pollution and impacts on ecosystems.

<u>State of Good Repair</u>
The Airport Improvement Program provides grants to local and state airport authorities to maintain critical facilities, including runways, taxiways, aircraft parking areas (aprons) as well as many other airport facilities, systems and equipment. For example, AIP provides funds to ensure that no less than 93 percent of runways at more than 3,300 airports included in the NPIAS are maintained in excellent, good or fair condition.

<u>Safety</u>
The AIP provides grants to local and state airport authorities to help ensure the safety, capacity and efficiency of U.S. airports. Through the AIP, the agency funds a range of activities to assist in airport development, preservation of critical facilities, economic competitiveness, and environmental sustainability.

We also support the DOT Safety goal by providing funding for safety-related development at airports that benefit both commercial service and general aviation operations. For example, AIP provides funds to airports to reduce runway incursions caused by vehicle/pedestrian deviations, to accelerate improvements to runway safety areas that do not meet current standards, supports research in airport technology to develop improvements in airport marking and lighting, airport rescue and fire fighting, and mitigation of wildlife hazards near airports.

<u>Economic Competitiveness</u>
The AIP supports the DOT Economic Competitiveness through the following outcomes:

- Maximum economic returns on transportation policies and investments;
- A competitive air transportation system responsive to consumer needs.

By funding airport infrastructure projects that provide access to the National Aviation System in order to maintain a competitive air transportation system responsive to consumer needs, AIP contributes to economic competitiveness. For example, the AIP directs funding investments toward capacity development projects at airports ranging from the largest and most congested airline hubs serving some of the largest metropolitan areas to smaller urban areas and down to airports that enable critical access for emergency medical services to isolated communities.

<u>Environmental Sustainability</u>
The AIP supports the DOT Environmental Sustainability goal, "Reduced transportation-related pollution and impacts on ecosystems" outcome by funding projects and programs that help reduce transportation-related impacts on air quality, water quality, noise, and other impacts on ecosystems. For example, the AIP supports projects to reduce ozone emissions in EPA-designated nonattainment areas; supports airport greening initiatives and developing sustainability best practices; implements Environmental Management Systems to ensure that FAA operations protect the environment and meet statutory and regulatory environmental requirements; and reduces the number of people exposed to significant noise.

Anticipated accomplishments for the AIP grant program in 2013 include:

- Improve 36 nonstandard RSAs;
- Fund infrastructure development projects to meet airport safety and design standards;
- Ensure that 93 percent of runways at more than 3,200 airports in the NPIAS (excluding Large and Medium hubs) are maintained in excellent, good or fair condition (the Large and Medium hub airports would be expected to use PFCs and other resources to maintain their state of good repair);
- Continue progress on reducing runway incursions by 10 percent from the FY 2008 baseline within 5 years;
- Fund all approved Runway Safety Action Team (RSAT) recommendations identified in the Airports Capital Improvement Program (ACIP);
- Fund capacity projects identified in the ACIP;
- Fund continued support of the Military Airport Program;
- Fund noise mitigation to benefit at least 12,500 residents within Day-Night average sound level (DNL) 65dB (decibels) or higher-impacted contours;
- Fund VALE program initiatives to improve air quality by helping airports reduce emissions from mobile and stationary ground sources; and
- Prepare Airport Layout Plan (ALP) Updates for all Part 139 certified and/or towered airports in Airports Geographical Information System format as an electronic ALP.

3. Why Is This Particular Program Necessary?

The aviation system plays a critical role in the success, strength, and growth of the U.S. economy. Approximately 590,000 active pilots, 232,000 general aviation aircraft, and 4,520 air carrier jets rely upon the U.S. airport system. The economic impacts of the air traffic control system are well-documented in FAA's report on "The Economic Impact of Civil Aviation on the US Economy," published in December, 2009. It states that, in 2007, aviation accounted for 12 million jobs, $1.3 trillion toward the gross domestic product output, and 5.6 percent of gross domestic product. Continued growth in this industry will be predicated in part on a modernized air traffic control system.

Airport infrastructures, particularly airfield facilities, are exposed to constant heavy use and harsh environmental conditions. Runways, taxiways, and aprons are designed to withstand the heavy equipment that operates on them, but even so these facilities require frequent maintenance and rehabilitation in order to remain in good working condition. Runways and taxiways have to be kept clear of snow, ice, and ponding water that can jeopardize aircraft directional control or braking action. Chemicals and plowing, as well as freeze-thaw cycles, all take a toll on runways, taxiways, and other paved areas. The smallest bit of broken asphalt or concrete can represent a major safety hazard to aircraft accelerating on takeoff or maintaining directional control after landing.

The vast majority of public-use airports in the United States are owned and operated by municipal, county or state government agencies, or by independent public authorities. They are required to follow strict rules in establishing rates and charges for the airlines and other users in order to recover their operating and maintenance costs.

Through AIP, the agency funds a range of activities to ensure the safety and capacity of U.S. airports. The FAA identifies public-use airports that are important to the national transportation system, including those airports in the federal plan known as the NPIAS. These public use airports support scheduled air carrier service at approximately 500 airports (known as commercial service airports). In addition to the scheduled passenger and cargo service, the airport system serves a diverse range of functions at approximately 2,829 general aviation airports. These uses include emergency medical, flight training, agricultural, and business/corporate activity. The proposed AIP funding level will provide sufficient funding for all high priority safety and capacity projects.

The 65 Large and Medium hub airports account for about 89 percent of all passenger enplanements. Much of the delay to air traffic can be traced to inadequate capacity or efficiency at some of these airports. With the critical support of AIP, constructing new or extended runways, taxiways, and airfield reconfiguration continues to be an important part of FAA's NextGen Implementation Plan. Arrival and departure rates at the nation's busiest airports are constrained by the limited number of runways that can be in active use simultaneously. Since FY 2000, 16 new runways, 2 runway extension, and 1 airfield reconfiguration have opened with another airfield reconfiguration two-thirds completed, allowing approximately 2 million more annual operations.

AIP supports vital technical and financial assistance for planning, environmental analysis, and construction/rehabilitation of runways, taxiways, and aprons as well as other measures to expand and make more efficient use of airports. The AIP funding plan will reflect a special emphasis to increase capacity and improve the airport arrival efficiency rate. AIP funding of the following airport projects contributes to these projects:

- Construct, rehabilitate or overlay existing runways, taxiways, and aprons;
- Extend runways, taxiways, and aprons;
- Construct/improve terminal buildings;
- Acquire and install visual approach aids;
- Acquire and install Instrument Landing Systems (ILS);
- Acquire and install weather-reporting equipment;
- Bring pavement and other facilities up to design standards; and
- Construct new airports/heliport.

4. How Do You Know The Program Works?

The FAA works closely with commercial service airports and with state aeronautical agencies to monitor the physical condition of airport infrastructure, particularly the critical airfield facilities. This gives FAA real-time information about capital funding needs and priorities, the effectiveness of funded projects, and the utilization of the airports. One of the core performance objectives of AIP is to maintain at least 93 percent of the runways at NPIAS airports in good, fair or excellent condition. The FAA's funding decisions consider a number of factors including the physical condition of airport facilities as well as historical, current and projected activity levels. The FAA also reports annually to Congress on how the funds have been used and the benefits of those investments in terms of increased safety, capacity, efficiency, and environmental compatibility.

The investment of AIP funds in the National Airport System has direct benefits, improving the safety and capacity of the system. The AIP program also assists airports to become more environmentally friendly and reduces the impact of airport activities on its communities.

<u>Safety</u>
We have several metrics that show the AIP investment is improving or maintaining safety. In FY 2011, the number of total runway incursions decreased slightly from 966 in FY 2010 to 954 in FY 2011. Serious runway incursions (category A and B) remained low. There were 6 Category A or B incursions in FY 2010, and 7 in FY 2011.

The reduction in serious runway incursions is partially attributed to improvement of airport markings, such as the enhanced taxiway centerline marking, end-around taxiways, and improvements in surface geometry. The investment in improving RSAs and installing Engineered Materials Arresting Systems (EMAS) arresting systems has also shown to be effective. EMAS has already recorded seven successful overrun arrestments with minimal or no damage to the aircraft. The latest arrestment came at Key West International, Florida in November 2011 when an overrunning Cessna Citation was safely arrested.

Since FY 2000, FAA has improved 512 RSAs, and by 2012, 88 percent of practicable improvements will be completed. The installation of EMAS is an example of the effectiveness of this investment. Since installing EMAS on 63 runway ends where it was not practical to achieve standard physical runway safety areas, seven aircraft have departed the runway surface and were stopped by the EMAS, avoiding significant damage and loss of life.

<u>Economic Competitiveness</u>
Since FY 2000, 23 airfield projects have opened at 20 Large and Medium hub airports. These include 16 new runways, 3 taxiways, 2 runway extensions, 1 airfield reconfiguration, and 1 airfield reconfiguration two-thirds completed. The projects have provided these airports with the potential to accommodate about 2

million more annual operations and decrease average delay per operation at these airports by about 5 minutes.

Environmental Sustainability
Funds have assisted airports to become more environmentally friendly. AIP funds assist airports owners to improve land use compatibility near airports through the acquisition of non-compatible residences and sound insulation of residences, schools, and hospitals. Since 2005, over 105,000 people have benefited by their relocation from a noise impacted area or through sound attenuation programs designed to reduce the noise exposure on residences, schools, or hospitals.

The VALE Program addresses air quality by helping airports reduce emissions from all mobile and stationary ground sources. The FAA has funded 52 VALE projects through the AIP program since 2005. A total of $108 million has been invested in VALE clean airport technology. Over the long-run, VALE initiatives will reduce ozone forming pollutants (Nitrous Oxides and Volatile Organic Compounds) at airports by 8,010 tons. The smog-reducing benefits of VALE projects are equivalent to removing over 17,640 cars and trucks from the road each year for the next decade.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Every other year, FAA is required to develop a five-year prospective analysis of capital needs and submit it to Congress as part of the NPIAS. The capital projects included in the NPIAS consistently exceed the annual available funding for the AIP. Projects are routinely broken into smaller phases or deferred to a future year until funding can be identified. The latest NPIAS, published in September 2010, identified over $52 billion in capital needs over the 5-year period from 2011-2015. The FY 2013 request of $2.3 billion would fulfill less than 5 percent of these identified capital needs.

At the requested level of AIP funding, in conjunction with an increase in the PFC limit from $4.50 to $7.00,FAA would be able to fund capital needs that support system safety, capacity, and environmental projects. Should this not occur, the primary impact would be on AIP Discretionary funds—the funding category over which FAA has the greatest degree of control to address the highest priority system needs. Any reduction would impact FAA's ability to fund the highest priority needs in the NPIAS.

Explanation of Funding Changes for Grants-in-Aid for Airports

	Dollars ($000)	FTE
Grants-in-aid for Airports (Net change from FY 2012 Enacted)	**(922,050)**	**0**
Overview: For FY 2013, the Associate Administrator for Airports requests $2,276,000, to meet the mission of planning and developing a safe and efficient national airport system. This represents a decrease of $922,050 from the FY 2012 enacted level.		
Discretionary increases / decreases		
Grants-in-Aid for Airports The $2.278 billion requested for AIP will enable FAA to meet all national priorities for safety, security and capacity, across all size airports. This request proposes to lower funding for the ongoing airport grants program to $2.4 billion by eliminating guaranteed funding for large and medium hub airports. To assist those airports that need the most help, the Budget focuses federal grants to support smaller commercial and general aviation airports that do not have access to additional revenue or other outside sources of capital. The Budget also proposes to increase the Passenger Facility Charge (PFC) limit from $4.50 to $7.00 per enplanement for all airports eligible to impose PFCs thereby, giving large and medium hub airports greater flexibility to generate their own revenue.	(922,050)	

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GRANTS-IN-AID FOR AIRPORTS

Personnel and Related Expenses

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2012 Enacted	**101,000**	**577**	**564.0**
Unavoidable Adjustments			
1. Annualized FTEs	1,911		13.0
2. Pay Inflation	313		
3. One More Compensatory Day	321		
Total Unavoidable Adjustments	**2,544**	**0**	**13.0**
New or Expanded Programs			
1. Contract Pay Raises	868		
2. Administrative Efficiencies	(1,412)		
Total Discretionary Increases	**-544**	**0**	**0.0**
FY 2013 Request	**103,000**	**577**	**577.0**

Detailed Justification for Personnel and Related Expenses

1. What Is The Request And What Will We Get For The Funds?

FY 2013 Personnel and Related Expenses Budget Request ($000)

Program / Component	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	Difference from FY 2012 Enacted
Personnel and Related Expenses	$93,422	$101,000	$103,000	$2,000

For FY 2013, the Associate Administrator for Airports requests $103 million, 577 positions and 577 FTEs to cover the administrative expenses for the Office of Airports, an increase of $2.0 million over the FY 2012 enacted level. The request allows ARP to fulfill its mission of leadership in planning and developing a safe and efficient national airport system to satisfy the needs of the aviation interests of the United States, with consideration for economics, environmental compatibility, local proprietary rights, and safeguarding the public investment.

2. What Is The Program?

ARP provides leadership in planning and developing a safe and efficient national airport system to satisfy the needs of the aviation interests of the United States, with consideration for economics, environmental compatibility, local proprietary rights, and safeguarding the public investment.

This program supports DOT's State-of-Good Repair goal (*Increased proportion of infrastructure assets in good condition*); Safety goal (*Reduction in transportation related injuries and fatalities*), Economic Competitiveness goal (*Maximum economic returns on transportation policies and investments* and *Competitiveness air transportation system responsive to consumer needs)*; and Environmental Sustainability goal (*Reduced transportation related pollution and impacts on ecosystem*).

ARP is responsible for the regulatory oversight and inspection of certificated commercial service airports. In FY 2013, we will continue emphasizing efforts to reduce runway incursions caused by vehicle/pedestrian deviations. This will require ensuring airports maintain effective driver training programs as well as implementing approved RSAT recommendations. We also have a special emphasis program to accelerate improvements to runway safety areas that do not meet current standards. Another significant initiative is implementation of SMS at airports to harmonize with International Civil Aviation Organization (ICAO) standards. Further, AIP provides priority consideration for funding safety-related development for airports that benefit both commercial service and general aviation operations.

ARP will continue to support capacity and efficiency enhancements throughout the system, including the full range of commercial service (primary) airports and smaller, nonprimary airports nationwide, by providing financial and technical support to regional and metropolitan system plans, airport master plans and environmental reviews, and by directing AIP funding toward the construction and preservation of runways, runway extensions, and airfield reconfigurations. ARP expects to issue approximately 2,950 new AIP grants to airport sponsors and continues to administer the AIP to ensure the timely and efficient use of federal funds. We will also strive to increase the safety, security, and capacity of the global civil aerospace system in an environmentally sound manner.

Anticipated 2013 accomplishments include:

- Administer the AIP by issuing new grants and continuing to administer existing grants at airports nationwide in support of safety, capacity, efficiency and environmental objectives;
- Publish 12 Advisory Circulars (AC) updates;
- Improve 36 Runway Safety Areas (RSAs);
- Continue implementation of Airport SMS;
- Continue implementation of Airport Geographical Information System (AGIS);
- Manage and execute Part 139 Airport Safety Certification program;
- Meet Part 16 compliance schedules;

- Integrate SMS into FAA airport planning and environmental processes and guidance;
- Support the President's initiative for E-Government by participating and providing resources to the Grants.gov and DOT grants portal initiative;
- Establish and implement ARP performance target for administering AIP based on identified Best Practices and Program Review; and
- Maximize the return on AIP investments by increasing the disbursement rate for AIP grants.

3. Why Is This Particular Program Necessary?

ARP is responsible for all airport program matters pertaining to standards for airport design, construction, maintenance, operations, safety, and data, including ensuring adequacy of the substantive aspects of FAA rulemaking actions relating to the certification of airports. We also provide national airport planning and environmental requirements, airport grants, property transfers, PFCs, and ensure adequacy of the substantive aspects of FAA rulemaking actions relating to these programs. ARP ensures compliance with federal airport grant and surplus property obligations, economic regulatory oversight, and executive direction and oversight of regional activities. This office serves as the first level decision maker for adjudication of complaints filed against airports under 14 C.F.R Part 16. Additionally, this office has oversight of strategic management goals for field operations in coordination with headquarter policies and guidance.

4. How Do You Know The Program Works?

ARP has established a number of measures to monitor and optimize performance and efficiency. We make extensive use of customized labor reporting codes in order to track how much time we spend on each of our technical programs and administrative responsibilities. Then we combine that labor data with other direct and indirect costs compared against key output measures in order to analyze our organizational efficiency. We periodically review our progress against efficiency goals, and we review the metrics and target levels to ensure that we are continuing to evaluate our own efficiency.

In addition, ARP actively monitors the actual outcomes of our various program areas. For example, we consistently see a strong correlation between our efforts related to runway safety and a reduction in runway incursions caused by vehicle or pedestrian deviations. As another example, we can draw a direct connection between the efforts of our personnel and the condition of critical airfield infrastructure (runways and taxiways).

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The FY 2013 requested funding amount is required to continue supporting the establishment and maintenance of high safety standards for U.S. airports. High standards reduce risks and contribute directly to a reduction in fatal accidents.

The number of airports receiving grants increased 214 percent from fiscal year 2000 to 2008. Staffing for field offices remained the same throughout that period and to accommodate, field operations have relied upon airport sponsors to complete grant documentation and maintain compliance with grant assurances. Compliance audits, user complaints, and sponsor action increasingly unearth problems leading to corrective action which may take years to complete and create additional work for both sponsors and FAA staff.

Explanation of Funding Changes for Personnel & Related Expenses

	Dollars ($000)	FTE
Personnel and Related Expenses (Net change from FY 2012 Enacted)	**2,000**	**12.5**
Overview: For FY 2013, the Associate Administrator for Airports requests $103,000,000, 577 positions and 577 FTEs to meet its mission of providing leadership in planning and developing a safe and efficient national airport system to satisfy the needs of the aviation interests of the United States, with consideration for economics, environmental compatibility, local proprietary rights, and safeguarding the public investment. Covering the administrative expenses for the Office of Airports, this request represents an increase of $2,000,000 from the FY 2012 enacted level.		
Unavoidable Adjustments		
Annualized FTEs: This represents the net annualized costs of FY 2012 new hires and attrition.	1,911	12.5
Pay Inflation: The increase is needed to provide a 0.5 percent pay adjustment.	313	
Additional Compensation Day This increase is needed to provide for one additional Compensable day in FY 2013.	321	
Discretionary Increases/Decreases		
Contract Pay Raise Costs associated with the National Air Traffic Controllers Association (NATCA) Multi-Unit pay article that was awarded by an arbitrator in January 2011 and will run through December 31, 2014. The contract covers about 1700 employees across 6 FAA offices (AVS, ATO, ARC, ARP, AGC, and ABA) and includes aircraft certification employees, computer specialists, program analysts, budget analysts and other professionals. In FY 2012, the only incremental cost is a lump-sum bonus equal to 1.5 percent of base pay, which will be paid in October 2011. In FY 2013 and FY 2014, the primary cost driver is a guaranteed basic pay raise of 3.2 percent in January 2013 and 3.75 percent in January.	868	
Administrative Efficiencies In FY 2013, travel, advisory services and printing will be reduced $1.4 million from the FY 2012 enacted level.	(1,412)	

GRANTS-IN-AID FOR AIRPORTS

Airport Technology Research

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2012 Enacted	**29,250**	**23**	**23.0**
Unavoidable Adjustments			
1. Pay Inflation	38		
2. One More Compensatory Day	12		
Total Unavoidable Adjustments	**50**	**0**	**0.0**
FY 2013 Request	**29,300**	**23**	**23.0**

Detailed Justification for Airport Technology Research

1. What Is The Request And What Will We Get For The Funds?

FY 2013 Airport Technology Research Budget Request ($000)

Program / Component	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	Difference from FY 2012 Enacted
Airport Technology Research	$22,472	$29,250	$29,300	$50

For FY 2013, the Associate Administrator for Airports request $29.3 million, 23 positions and 23 FTE to fund the Airport Technology Research program. The request will fund research in the areas of airport pavement, airport marking and lighting, airport rescue and firefighting, airport planning and design, wildlife hazard mitigation, runway surface technology, and visual guidance. The results of this research are used in updating Advisory Circulars, manuals, and technical specifications that airports rely on when expending Airport Improvement Program (AIP) grant funds. We will also continue the program to conduct noise measurements across airport communities and concurrent public surveys and sleep disturbance studies to collect data that will be used to guide national aviation noise policy, determinations of community impacts from aircraft noise, federal land use compatibility guidelines around airports, and noise mitigation funding.

The table below summarizes the research activities funded by this request.

FY 2013 ATR Research Projects ($000)

Research Project	FY 2012 Enacted	FY 2013 Request	Increase/ Decrease
Advanced Airport Pavement Design	300	300	0
Pavement Design & Evaluation Methodology	1,000	2,018	1018
National Airport Dynamic Tests	3,000	3,027	27
Airport Pavement Test Vehicle	500	2,107	1607
Field Instrumentation & Testing	750	636	(114)
Improved Paving Materials and Lab	2,000	1,716	(284)
Non-Destructive Pavement Testing	1,500	1,892	392
Center of Excellence	250	250	0
Airport Planning	500	500	0
Airport Design	700	700	0
Operation of New Large Aircraft (NLA)	700	700	0
Composite Materials Firefighting	500	500	0
Airport Wildlife Hazards Abatement	2,550	2,550	0
Airport visual guidance/runway incursions reduction	3,900	3,029	(871)
Aircraft Safety Technologies	2,280	1,026	(1254)
Aircraft Braking friction	2,250	2,220	(30)
Aircraft Noise Annoyance Data and Sleep Disturbance Around Airports	1,500	1,009	(491)
Surface Operations	300	300	0
Rescue and Fire Fighting	700	700	0
Subtotal—Contracts	**25,180**	**25,180**	**0**
In-House (FTEs)	4,070	4,120	50
TOTAL	**29,250**	**29,300**	**50**

The FY 2013 request includes decreases and increases in several research areas that reflect completion of several projects, continuation of an existing project and two major new initiatives. Major changes are detailed below.

DECREASES:

Decrease of $114,000 Field Instrumentation: We have completed the pavement instrumentations at several airports and do not anticipate any new starts in FY 2013. These projects were initiated to study long-term pavement behavior in the field under different climates operational conditions.

Decrease of $284,000 Materials and Testing Laboratory: The Materials Testing Lab should be well outfitted by FY 2012, therefore there is a reduction of funding requested; The Alkaline Silica Reactivity Affected Concrete Slabs project will be nearing completion and should only have report writing and minor monitoring of slabs; The Asphalt Mix Design of for Gyratory Compactor project will be nearing completion and should be in the final report writing phase; The reflective cracking tests will be continuing but the construction of the test apparatus will be complete, and the initial learning curve associated with the first few reconstruction cycles will have been overcome, anticipating a more efficient process for reconstructions; The Effects of Sub-base Quality for Flexible Pavements project will be complete and therefore will no longer be funded; Testing Support for ERDC IA will be reduced as their involvement with the Asphalt Mix Design of for Gyratory Compactor project will be completed.

Decrease of $491,000 Airport Sleep and Noise Data: FY 2013 funding will be sufficient to meet objectives of this effort. In FY 2012, we initiated a new effort to investigate the effects of aircraft noise near representative U.S. airports. Community annoyance, impacts on schools and other noise sensitive institutions, and land uses due to aircraft noise have historically driven public opposition to airport development and changes in flight procedures near airports. Measuring subjective reactions through social surveys is accepted as the most direct method for determining how people in a community respond to noise. The seminal work by Schultz published in 1978 developed a correlation (exposure-response relationship) between transportation noise exposure levels in terms of the day-night average noise level DNL and the percent of the population highly annoyed by that transportation noise from social surveys. Schultz' work was re-affirmed by the federal Interagency Commission on Noise (FICON) in 1992. Currently available data shows that people react more adversely to aircraft noise than to noise from other transportation modes (e.g., highway, rail). Research that is specific to the aircraft noise dose-response relationship has largely been done in European and Asian countries[2]. The most recent U.S. data have been acquired in conjunction with lawsuits against airports, which may not be reflective of normal situations. It is, therefore, unlikely that an aircraft noise exposure-response relationship based on current available data is sufficiently representative of current U.S. conditions. In summary, the U.S. is depending upon increasingly outdated research as the basis of federal determinations of aircraft noise impacts on residential communities and noise sensitive institutions, federal land use compatibility guidelines, and federally-funded noise mitigation.

Another prominent public concern has been sleep disturbance from nocturnal aircraft noise. Developing a relationship between the degree of sleep disturbance and the level of nocturnal noise exposure is a prerequisite for identifying and protecting communities from adverse noise effects. There is currently no widely accepted exposure-response relationship for sleep disturbance.

Establishing up-to-date exposure-response relationships for community annoyance and sleep disturbance in the U.S. requires an extensive data acquisition campaign covering a wide variety of airport types and geographic locations. The results of this work will be used to guide national aviation noise policy, determinations of community noise impacts, land use guidelines around airports, and mitigation funding.

This new program is a follow on effort to related research conducted under the Airport Cooperative Research Program. Specifically, the new effort will conduct social surveys to measure subjective reactions to aircraft noise, collect sleep disturbance data, and characterize community noise exposure across a broad spectrum of airports having different service missions, and at locations covering a broad range of aircraft noise exposure and responses.

Decrease of $871,000 in Visual Guidance/Incursions Reduction Program:

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[2] *"An Updated Catalog of 628 Social Surveys of Residents' Reaction to Environmental Noise (1943-2008)", http://www.faa.gov/about/office_org/headquarters_offices/aep/research/science_integrated_modeling/*

The reduction of $871,000 in funding request in FY 2013 from FY 2012 level is predicated on completion of all critical Vertical Flight Visual Guidance projects required to update the Heliport Design Advisory Circular.

Decrease of $2,044,000 in Airport Safety Technology Projects: This reduction in funding is due to completion of Visual Guidance Test Bed in FY 2012, and completion of the Radiant Heating Project in FY 2012.

INCREASES:

Increase funding for an existing project: We are requesting an additional $1,607,000 over the FY 2012 base for the Airport Pavement Test Vehicle (APTV). The APTV was procured for $ 2.4 million in FY 2011. The APTV was acquired to conduct performance tests on pavement surface layers as a function of high tire pressure and high wheel loads under high temperatures; it is easier and economical to insulate and heat the test pavement under the APTV. The National Airport Pavement Test Facility (NAPTF), where we conduct performance testing to evaluate the effects of landing gear configurations, is an indoor facility and there are limitations on achievable high pavement temperatures. The trend in aircraft industry is to produce aircraft with extended range capability, which results in high gross weight and high tire inflation pressures. This makes it imperative to study the effects of high tire pressures on the HMA surface and also develop HMA mix design procedures to produce mixes that can withstand these anticipated high tire pressures. Full-scale tests at high surface temperatures are very crucial for the success of these projects. The requested funding will be invested in three areas: construction of the housing for the APTV, construction of the test pavements, and acquisition of instrumentation and data collection system.

The major portion ($1,369,000) of this increase is for the construction of the building to house APTV ($609,000), and the construction of test pavements ($760,000) to meet research objectives in greener / sustainable pavement technology as outlined and prioritized by FAA RE&D sub-committee.

The building is needed to protect the test sections from the rain/snow/ice and sun and to provide a controlled environment for meaningful testing. The building will be a steel frame tensioned fabric structure 300-feet long by 150-feet wide.

Six test pavements (each 245-foot long by 20-feet wide) will be constructed using greener/sustainable pavement technologies such as warm mix asphalt (WMA), asphalt overlays of PCC, Stone Matrix Asphalt (SMA), Recycled Asphalt Pavement (RAP), Polymer Modified Bitumen (PMB), and geosynthetics.

The remaining funding ($ 238,000) will be used for acquiring sensors and gages, data acquisition system, spare parts for APTV, pavement testing, developing database, processing and analyzing data, APTV operation, and for APTV maintenance.

We expect much smaller funding requests to maintain the APTV in the years beyond FY 2013.

New Initiative # 1: Heated Pavements
We are requesting $1,018,000 in FY 2013 (under Aircraft Safety Technologies) for a new initiative for research on heated pavements. This effort was initiated on a smaller scale in FY2010. Events of this winter have brought this initiative in a sharper focus. Severe weather of the past winters (December 2010 thru February 2011) resulted in significant flight delays and cancellations around the country. One current study (based on an article in Wall Street Journal) placed the cost to an airline at $7,000 per cancelled flight. Almost 20,000 flights were cancelled in one week (based on a news article) alone when snow blanketed hub airports across the country. While some of the cancelled flights resulted from the inability to actually fly in bad weather conditions, it is probably realistic to assume that at least half of the cancelled flights were a result of snow removal operations at airports costing airlines $70 million in lost revenue. Actual costs to airline passengers are much more difficult to quantify. Recent studies at University of California, Berkeley have estimated this number at approximately twice the cost to airlines. So the total cost to passengers for the week in question equates to a loss of $140 million to passengers for the week. When combined, the total cost is $210 million for the week. These costs are substantial and warrant further investigation into heated pavements.

The premise of this initiative is that if runway surfaces can be efficiently and economically heated, the buildup of snow can be avoided, thereby eliminating the need for snow removal operations. The most promising current methods of heating pavement take advantage of "green energy" to reduce operational costs and carbon footprint. Ideally, a pavement heating system should have a dual use to offset the cost of the system while in standby mode during times of the year when pavement temperatures are above freezing. For example, geothermal heat exchangers can be used to heat fluids for pavement de-icing when needed around apron areas while also providing nearby airport facilities with low cost heating and cooling for the remainder of the year. Solar panels will be able to produce electrical energy throughout the year and not only when needed to heat pavements. On-site power generation through the use of gas turbines, micro turbines, or fuel cells could produce the electricity required for a heated pavement installation without the need for major infrastructure investments. Nano-technology also holds some promising potential for applications into heated pavements. New materials to conduct electricity at lower costs may become available through research. Likewise better insulation and thermal conducting materials included into the pavements could greatly reduce the energy required to operate a heated pavement.

We have already started research in this area in FY 2010 and to continue through FY 2012: In 2010 we provided funding for two projects to begin research into heated pavements. One project at the Greater Binghamton Airport is exploring hydronic heating by designing and installing piping under a portion of concrete apron. Another project at the University of Arkansas is using solar energy along with battery banks to heat an electrically conductive pavement. Our FY 2012 funding will be used to fund the construction of the geothermal wells, pump house and equipment necessary to complete the apron project at the Greater Binghamton Airport as well as provide support funding to analyze the efficiency of the system.

The FY 2013 funding request of $1,018,000 is needed to conduct advanced research in heated pavements in the following areas:

- **Study Heated Pavement Applications at Airports.** A new study is needed to identify which U.S. airports and what specific locations at the airport would most benefit from heated pavement installations. The study must incorporate the total cost of a heated pavement installation including system operational and maintenance costs as compared to the total benefits expected from reductions in snow plowing equipment, materials, labor, and plow maintenance. In order to provide a realistic comparison, the actual true savings must also account for airline losses and passenger delay costs. Cost: $358,000
- **Advanced Materials for Heated Pavements.** Fund research into advanced materials; materials developed through nanotechnology for the purpose of improving the insulating capacity of a pavement layer located directly below heating elements or improving the heat conductance of the pavement heating elements. Cost: $408,000
- **Advanced Construction Techniques for Heated Pavement.** Study how to best automate construction of large scale heated pavements. Significant problems that must be answered include material selection, joint interfaces, new equipment necessary for installation of heating elements, time factors for installation, and location of ancillary equipment at the airport. Cost: $252,000

<u>New Initiative # 2: Design of Pavements for 40-year Life:</u>
In FY 2013 we are requesting $1,018,000 (under Pavement Design and Evaluation Methodology) for initiating a new project as a core activity doubling the expected life of runway pavements at large hub airports from the current standard of 20 years to 40 years.

The current 20-year design life for all airport pavements is specified in FAA Advisory Circular 150/5320-6E. Surveys and anecdotal evidence show that designs meeting current standards already provide service life in excess of 20 years. AC 150/5320-6E (Appendix 1) also recommends using an analysis period for life cycle cost analysis (LCCA) of 20 years, while a technical report from the Airfield Asphalt Pavement Technology Program (AAPTP) entitled "Lifecycle Cost Analysis" (Jan. 2011) characterizes this period as "too short" and specifically recommends increasing it to 40 years. Extending the standard pavement life would result in lower life cycle costs overall, due to:

- The relatively small marginal cost increase for initial construction would be more than offset by amortizing the cost over 40 years rather than 20 years.
- Lower present value of construction-related closures and delays.
- Lower present value of environmental costs associated with major construction activities.

In order to accomplish the required extension of pavement life, a 4-year coordinated R&D effort will be needed, including:

- Modify the existing pavement design program "FAARFIELD" to accommodate the new pavement life standard.
- Better modeling of pavement remaining life. Current procedures are best at predicting performance deterioration once significant structural distress is manifest. For a 40-year life, this may not occur for decades after opening, so an improved estimate of used fatigue life is needed.
- Quantify the reliability of design procedures for flexible and rigid pavements based on field survey data, including available FAA pavement management data from PAVEAIR databases.
- Revise standard PCN reporting procedures (COMFAA) to accommodate the expected 40-year life.

Funding in FY 2013 will support the following key outputs and outcomes:

- Evaluate the performance of current generation Auto Brake Systems with Antiskid (ASBS) in decelerating large commercial airplanes on contaminated runways. The product of the evaluation will be a Math Simulation Model capable of predicting landing distances for decelerating and stopping large commercial airplanes on contaminated runways;
- Continue investigating the effects of aircraft noise near representative U.S. airports. Community annoyance, impacts on schools and other noise sensitive institutions, and land uses due to aircraft noise have historically driven public opposition to airport development and changes in flight procedures near airports;
- Conduct research to study the effects of high tire pressures on the pavement surface using the Airport Pavement Test Vehicle and also develop pavement mix design procedures to produce mixes that can withstand these anticipated high tire pressures;
- New technology and techniques that can improve airport lighting and marking to help reduce surface accidents and runway incursions while improving capacity;
- Improved aircraft rescue and firefighting to address double decked aircraft carrying up to 800 passengers;
- Modify the habitats of increasing numbers of wildlife on or near airports;
- Study the emerging technologies for detecting and deterring hazardous wildlife species on or near airport;
- Continue full-scale live fire testing of cargo aircraft to provide better guidance to airport fire fighters on the unique characteristics of cargo aircraft fires;
- Continue to evaluate green technologies in airfield pavements;
- Certification of the Materials Testing Laboratory at the National Airport Pavement Test Facility;
- Integration of FAA suite of software programs into one web application; and
- Upgrade of FAA PAVEAIR to include Life Cycle Cost Analysis.

2. What Is The Program?

Safety

The research conducted within the Airport Safety Technology Research Program directly supports FAA's Advisory Circular system, which is the principal means by which FAA communicates with the nation's airport planners, designers, operators, and equipment manufacturers. These Advisory Circulars commonly referred to as an AC, present the standards used in the design, construction, installation, maintenance, and operation of airports and airport equipment. Additionally, the AC provides current advice on airport operational and safety topics. To date, the research conducted within the Airport Safety Technology Research Program has provided the necessary technical data to support hundreds of ACs that have been published on a wide range of technical subjects. These technical subjects include airport design standards, visual guidance aids such as lighting marking, or navigational aids, airport rescue and firefighting equipment and procedures, pavement surface conditions, wildlife mitigation and detection, airport capacity enhancements, pavement friction, and snow and ice mitigation. Some examples of the research include:

- **Foreign Object Debris** (FOD) Detection research efforts will be conducted to evaluate new detection technologies, conduct a FOD characterization study, and also develop a national FOD database that can be used to track safety issues related to FOD.

- **Taxiway Deviation** research efforts will be conducted to better understand the behavior of larger design group aircraft on smaller airport design group airports, in support of the projected increase in levels of travel at smaller airports as part of the NextGen program.
- **Cargo Aircraft Interior Fire Suppression** research program will develop better tactical guidance for ARFF departments responding to interior fire emergencies on cargo aircraft. This will be accomplished through full-scale, live fire testing of various Unit Load Devices (ULDs) types and configurations in aircraft main deck and lower deck holds.
- **Advanced Composite Material Cutting** is a project to determine the effectiveness of the fire service rescue saw and a variety of available blades on traditional and new commercial aircraft skin materials. With this shift toward advanced material structures over traditional aluminum structures the tools firefighters use must be evaluated to ensure they will continue to be as effective as they are now.
- **New Airfield Lighting Infrastructure** is an effort focused on identifying an efficient and standardized airfield lighting infrastructure that supports the operation of new light sources including Light Emitting Diodes (LEDs). The new system architecture will provide potential resolutions to issues that have arisen with the implementation of the LED fixtures in the current airfield lighting infrastructure.
- **Low Cost Surface Surveillance Framework** is a research effort initiated to assess the efficacy of using localized surveillance sensors to provide real-time situational awareness of aircraft and vehicle movements in the non-movement area at airports without the use of Surface Movement Radars (SMR). This effort is focused on how these systems can be employed to enhance operational capability and safety.

Wildlife habitat management research results are published in a widely distributed manual. The FAA's wildlife strike database and website provides information about wildlife habitat management and hazardous species control and serves as a repository of incidents and accidents involving wildlife strikes around the nation. The FAA continues to evaluate emerging and adapted technologies, to detect and deter birds and provide timely alerts to airport personnel regarding hazardous bird activity. Research will continue to develop improved FOD detection and management techniques. Ongoing research is also conducted in aircraft rescue and firefighting technology leading to more efficient fire fighting techniques for post crash fire protection of both the conventional aluminum constructed aircraft as well as newer advanced composite material construction.

Past research also led to the development of EMAS that have been installed at more than 40 airports and have safely stopped overrunning aircraft in at least five separate instances.

<u>State of Good Repair</u>

The pavement research leads to updates in pavement design and constructions standards and improvements in pavement maintenance techniques that keep airport runways and taxiways in good or better condition.

The research conducted is producing significant benefits in increased safety and potential cost savings. In support of capacity, the research results from the National Airport Pavement Test Facility (NAPTF) are providing technical data needed to validate new design standards and to assure compatibility between aircraft and airport runways worldwide. The cooperative research and development agreement and collaboration with international research organizations has led to the creation of many innovative, FAA-developed software programs that have changed the way airport pavements are designed and evaluated. Some examples include:

- **FAARFIELD**, or FAA Rigid and Flexible Iterative Elastic Layer Design, provides a simpler way for airport designers to determine the needed thickness of airport pavements. It also helps meet the standards for different airplanes, and models the thicknesses needed to handle the mix of aircraft traffic. It has the potential to save FAA and airport authorities tens of millions of dollars in airport pavement redesign efforts;
- **ProFAA**, a runway profile data analysis software program, is an innovative method that allows users to calculate roughness and simulate aircraft response to obtain a better understanding of overall pavement life and aircraft fatigue;

- **COMFAA** computes Aircraft Classification Numbers following the internationally mandated ICAO standard. A library of common aircraft types is provided and the user can also define arbitrary gear configurations. The program is valuable for computing the Pavement Classification Number (PCN) for any mix of aircraft traffic, which an airport may currently or in the future experience; and
- **BAKFAA** is a program designed to be used with falling-weight deflectometer (FWD) equipment as part of a pavement evaluation program. BAKFAA reads the data from a variety of FWD devices and returns back calculated layer properties. The computational engine in BAKFAA is LEAF (Layered Elastic Analysis – FAA). LEAF is built into FAARFIELD, but can also be downloaded and run separately under BAKFAA. The FAA has made the Visual BasicTM source code for BAKFAA and LEAF available for programmers to run LEAF from their own applications.
- **FAA PAVEAIR** is a web-based airport pavement management system that provides users with historic current information about airport pavement construction, maintenance and management. The program offers users a planning tool capable of modeling airport pavement surface degradation due to external effects such as traffic and the environment. The program can be used with other FAA pavement applications, such as BAKFAA and COMFAA, to give users input to determine repair scheduling and strategies. It has been developed for installation and use on a stand-alone personal computer, a private network, an intranet and the internet. An implementation of the internet version of FAA PAVEAIR is hosted and supported on a server at the William J. Hughes Technical Center and is accessible from the FAA PAVEAIR website.
- **High Tire Pressure Testing (HTPT)** - NAPTF has completed three cycles of testing the effects of tire pressure on asphalt pavement in conjunction with the Airport Technology group of Boeing Commercial Airplanes. The full scale tests determined that by increasing tire pressure from 210 psi (1.45 MPa) to 245 psi (1.66 MPa) had an insignificant effect on the amount of rutting caused by trafficking at two different wheel loads on two different asphalt mixes but increasing wheel load caused a significant increase in rutting on asphalt pavements. This testing is helping to support a revised tire pressure classification for ICAO standards.

<u>Environmental Sustainability</u>
In FY 2013, FAA will continue to investigate the effects of aircraft noise near representative U.S. airports. The results of this work will be used to guide national aviation noise policy, determinations of community noise impacts, land use guidelines around airports, and mitigation funding.

Anticipated 2013 accomplishments include:

- Complete evaluation to characterize FOD found on airports;
- Initiate collection of taxiway deviation data at a design group I airport;
- Initiate research program on cargo aircraft interior fire suppression to include full-scale live fire testing;
- Complete Advanced Composite Material Cutting study;
- Conduct evaluation of proposed new lighting infrastructure utilizing Visual Guidance test bed;
- Conduct demonstration of baseline Low Cost Surface Surveillance Framework project;
- Continue analyzing full-scale data from the NAPTF;
- Continue improvements upon and update the pavement design procedures (FAARFIELD) based on full scale data from NAPTF and airport instrumentation sites;
- Continue conducting technical workshops of all FAA analysis tools (PROFAA, FAARFIELD, BAKFAA, LEDFAA and FAA PAVEAIR);
- Continue development of increasing pavement design life from 20 to 40 years for large hub airports;
- Conduct full-scale tests on reflective cracking of flexible pavement at the NAPTF;
- Conduct testing of Alkali-Silica Reactive (ASR) concrete pavement under full-scale loading;
- Complete development of a web-based application for FAA APVEAIR as a suite of FAA analysis tools (PROFAA, FAARFIELD, BAKFAA, LEDFAA);
- Analyze data collected from pavement instrumentation at assorted Airports throughout the Unites States;
- Start full scale testing of "green" paving materials with Accelerated Pavement Test (APT) machine; and
- Determine Runway Roughness Index Scale for Pavement Evaluation and Ride quality Evaluation.

3. Why Is This Particular Program Necessary?

The Airport Technology Research Program is essential as it leads to improvements in airport safety and marking, airport design, airport lighting, aircraft rescue and firefighting, mitigation of wildlife hazards and improvements in pavement design and construction. The new technology developed from the research such as the EMAS and the penetrating firefighting nozzles have been implemented and are improving airport safety. EMAS technology alone has safely arrested 6 overrunning aircraft with no fatalities or injuries.

4. How Do You Know The Program Works?

The Airport Technology Research Program is reviewed every six months by FAA's Research, Engineering and Development Committee's (REDAC) Subcommittee on Airports. The Subcommittee has members from airports, aircraft manufacturers, Airline Pilots Association (ALPA) and airport associations. The Subcommittee is briefed on both ongoing research and planned research and offers recommendations to ensure the research program is responsive to the needs of FAA and the airport community.

Each research project is sponsored by a Headquarters engineer that prepares the research requirements, reviews the research plan, and approves the completed deliverables. The success of the research is reflected in our ability to issue updated and new program guidance. For example, the results of the research into the capability of FOD radar resulted in publication of a FOD radar specification that airports can use to competitively procure FOD radars with AIP grant funds.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The funds are requested to continue the ongoing research and the new research activities programmed for FY 2013. A reduction in funding would mean decreased contract support and would defer some project activities.

Explanation of Funding Changes for Airport Technology Research (ATR)

	Dollars ($000)	FTE
Airport Technology Research (Net change from FY 2012 Enacted)	**50**	**0.0**
Overview: For FY 2013, the Associate Administrator for Airports requests $29.9 million, 25 positions and 25 FTE to conduct research in the areas of airport pavement, airport marking and lighting, airport rescue and firefighting, airport planning and design, wildlife hazard mitigation, runway surface technology, and visual guidance. The results of this research are used in updating Advisory Circulars, manuals, and technical specifications that airports rely on when expending Airport Improvement Program (AIP) grant funds.		
Unavoidable Adjustments		
Pay Inflation: The increase is needed to provide a 0.5 percent pay adjustment.	38	
Additional Compensation Day This increase is needed to provide for one additional Compensable day in FY 2013.	12	

GRANTS-IN-AID FOR AIRPORTS

Airport Cooperative Research

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2012 Enacted	**15,000**	**2**	**1.5**
Unavoidable Adjustments			
1. Annualized FTE	74		0.5
2. Pay Inflation	1		
4. One More Compensatory Day	1		
Total Unavoidable Adjustments	**76**	**0**	**0.5**
New or Expanded Programs			
1. Decrease in contracts	(76)		
Total Discretionary Increases	**(76)**	**0**	**0.0**
FY 2013 Request	**15,000**	**2**	**2.0**

Detailed Justification for Airport Cooperative Research Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 Airport Cooperative Research Program ($000)

Program / Component	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	Difference from FY 2012 Enacted
Airport Cooperative Research Program	$15,000	$15,000	$15,000	$0

For FY 2013, FAA requests $15 million, 2 positions and 2 FTE. Pay Inflation will be absorbed within the requested level.

Funding in FY 2013 will support the following key outputs and outcomes:

- ACRP will select approximately 30 research topics to fund in FY 2013. Research reports will be for research studies that develop handbooks and best practices and other research that will provide information for airport owners, operators, and consultants in the areas of airport safety, airport management and financing, airport environmental and sustainability, airport planning.

2. What Is The Program?

This program supports DOT's Safety goal (*Reduction in transportation-related injuries and fatalities)*, Economic Competitiveness goal (*Maximum economic returns on transportation policies and investments*), and Environmental Sustainability goal (*Reduced transportation related pollution and impact on ecosystems*).

ACRP was authorized by section 712 of Vision 100 – Century of Aviation Reauthorization Act. The Secretary of Transportation signed a Memorandum of Agreement among DOT, FAA, and National Academy of Sciences to implement the ACRP. The Secretary also appointed the 13 members of the board of governors of the ACRP. The Transportation Research Board (TRB) of the National Academy administers the program. The ACRP board of governors has met every six months to review progress and select additional topics to fund. Over 100 submitted topics will be reviewed at the July 2010 meeting and the most promising topics selected for subsequent contract award. The Board of Governors selects the highest rated topics, subject to the funds available, to proceed to contract solicitation and award. The TRB appoints expert technical panels for each selected project. The technical panels convert the topics into requests for proposals to select contractors to perform the research. The panels also monitor each project to ensure it stays on track and meets project deliverables.

ACRP conducts research studies that provide information to airports in the form of handbooks and best practices among other research on issues of interest to airports in the areas of safety, airport management, airport financing, airport sustainability, and airport planning. Recent ACRP reports published included such studies as:

- Common Airport Pavement Maintenance Practices;
- Guidebook for Developing and Managing Airport Contracts;
- Guidebook of Practices for Improving Environmental Performance at Small Airports;
- Planning for Offsite Airport Terminals;
- Resource Guide to Airport Performance Indicators; and
- Impact of Jet Fuel Price Uncertainty on Airport Planning and Development.

Anticipated FY 2013 accomplishments include:

- ACRP awards contracts for the topics selected for funding in FY 2012;
- ACRP Board of Governors will meet to select projects to fund in 2014; and
- TRB will appoint project technical panels for new projects selected in FY 2013.

3. Why Is This Particular Program Necessary?

The Airport Cooperative Research Program was established by Congress to conduct research on issues common to airports but that is not being done under other federal research programs and is not capable of being done by individual airports. The research is selected from topics submitted by airports and the aviation community. The Board of Governors consists of airport executives, airport associations, and federal agencies that ensure the projects selected will benefit airports and will not duplicate ongoing federal research.

4. How Do You Know The Program Works?

We know the program works by the interest of the airport community that submits over 100 topics for research each year. We also track the ACRP performance by the number of research studies underway and the number of reports published. We have also initiated a dissemination project to improve the methods used to make the published reports available to airports and consultants using electronic methods and web based availability, and to develop statistics on the number of requests for ACRP reports.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The airport community and the airport associations have been strong supporters of ACRP. Congress approved increasing ACRP in FY 2009 by $5 million to a total of $15 million with the additional money being focused on airport environmental research.

Each year ACRP receives approximately 150 suggested topics for research. Each study costs on average about $300,000. Reducing funds below the $15 million request will result in fewer studies.

Explanation of Funding Changes for Airport Cooperative Research Program (ACRP)

	Dollars ($000)	FTE
Airport Cooperative Research Program (Net change from FY 2012 Enacted)	**0**	**0.5**
Overview: For FY 2013, we maintain the Airport Cooperative Research Program at the FY 2012 enacted level of $15,000,000. There is a discretionary reduction in contracts to offset the annualized FTE and pay inflation.		
Unavoidable Adjustments		
Annualized FTEs: This represents the net annualized costs of FY 2012 new hires and attrition.	74	0.5
Pay Inflation: The increase is needed to provide a 0.5 percent pay adjustment.	1	
Additional Compensation Day This increase is needed to provide for one additional Compensable day in FY 2013.	1	
Discretionary increases/decreases		
ACRP Discretionary Decrease in contracts There is a discretionary reduction in contracts to offset inflationary costs and an FY 2012 new hire.	(76)	

Grants-in-Aid to Airports Planned Distribution
$000

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request
Formula Grants			
Primary Airports	788,654	806,872	580,301
Cargo Service Airports	118,234	111,956	0
Alaska	21,345	21,345	21,345
States (General Aviation)	675,621	639,750	445,322
Carryover (from Formula Grants)	585,445	622,473	572,777
Subtotal, Formula Grants	2,189,299	2,202,396	1,619,745
Discretionary Grants			
Discretionary Set-Aside: Noise Compatibility	247,702	177,513	250,000
Discretionary Set-Aside: Reliever	4,671	3,347	0
Discretionary Set-Aside: Military Airport Program	28,309	20,287	0
Discretionary Set-Aside: Small/NonHub/GA Advanced	0	0	0
C/S/S/N (Capacity/Safety/Security/Noise)	320,278	229,524	0
Discretionary -- AATF	106,759	76,512	406,955
Subtotal, Discretionary Grants	707,719	507,183	656,955
Small Airport Fund [1]	481,088	489,171	0
Total Grants	**3,378,106**	**3,198,750**	**2,276,700**

[1] Reorganized AIP program eliminates funding to Small Airport Fund.

Passenger Facility Charge (PFC) Approved Locations
As of January 1, 2012
(Whole Dollars)
PFC APPROVED LOCATIONS

Associated City	State	Airport Name	LOC ID	Hub size	Level	Total Approved	Duration	Start Date	Estimated Exp Date
Birmingham	AL	Birmingham - Shuttlesworth International	BHM	S	$3.00	$24,548,436	6y3m	8/1/1997	11/1/2003
Birmingham	AL	Birmingham - Shuttlesworth International	BHM	S	$3.00	$15,646,592	4y10m	12/1/2003	10/1/2008
Birmingham	AL	Birmingham - Shuttlesworth International	BHM	S	$4.50	$168,449,328	22Y4M	10/1/2008	2/1/2031
Dothan	AL	Dothan Regional	DHN	N	$3.00	$5,515,948	3y6m	2/1/1998	8/1/2001
Dothan	AL	Dothan Regional	DHN	N	$4.50	**	19y4m	8/1/2001	12/1/2020
Huntsville	AL	Huntsville International - Carl T. Jones Field	HSV	S	$3.00	$15,237,907	12y3m	6/1/1992	9/1/2004
Huntsville	AL	Huntsville International - Carl T. Jones Field	HSV	S	$4.50	$43,885,368	17y8m	9/1/2004	5/1/2022
Mobile	AL	Mobile Regional	MOB	N	$3.00	$4,715,747	6y7m	12/1/1997	7/1/2004
Mobile	AL	Mobile Regional	MOB	N	$3.00	$7,705,042	10y3m	3/1/2005	6/1/2015
Montgomery	AL	Montgomery Regional (Dannelly Field)	MGM	N	$4.50	$28,599,933	21y8m	5/1/2005	1/1/2027
Muscle Shoals	AL	Northwest Alabama Regional	MSL	CS	$3.00	$267,600	11y4m	6/1/1992	10/1/2003
Muscle Shoals	AL	Northwest Alabama Regional	MSL	CS	$3.00	$54,730	4y5m	12/1/2004	4/1/2009
Muscle Shoals	AL	Northwest Alabama Regional	MSL	CS	$4.50	$261,425	6y	4/1/2009	4/1/2015
Anchorage	AK	Ted Stevens Anchorage International	ANC	M	$3.00	$91,243,173	26y2m	10/1/2000	12/1/2026
Fairbanks	AK	Fairbanks International	FAI	S	$3.00	$5,196,252	3y6m	10/1/2000	4/1/2004
Fairbanks	AK	Fairbanks International	FAI	S	$4.50	**	2y6m	4/1/2004	10/1/2006
Fairbanks	AK	Fairbanks International	FAI	S	$4.50	$33,217,000	20y	10/1/2006	10/1/2026
Juneau	AK	Juneau International	JNU	N	$3.00	$1,552,249	2y4m	10/1/1998	2/1/2001
Juneau	AK	Juneau International	JNU	N	$4.50	$15,211,781	15y9m	8/1/2001	5/1/2017
Ketchikan	AK	Ketchikan International	KTN	N	$3.00	$6,644,400	2y6m	2/1/1999	8/1/2001
Ketchikan	AK	Ketchikan International	KTN	N	$4.50	**	16y8m	8/1/2001	4/1/2018
Sitka	AK	Sitka Rocky Gutierrez	SIT	N	$4.50	$1,375,000	7y	7/1/2007	7/1/2014
Pago Pago	AS	Pago Pago International	PPG	N	$3.00	$950,000	4y11m	7/1/1995	6/1/2000
Pago Pago	AS	Pago Pago International	PPG	N	$4.50	$765,000	4y	9/1/2001	9/1/2005
Pago Pago	AS	Pago Pago International	PPG	N	$4.50	$5,848,954	14y6m	6/1/2006	12/1/2020
Bullhead City	AZ	Laughlin/Bullhead International	IFP	N	$2.00	$904,132	4y5m	5/1/2008	10/1/2012
Flagstaff	AZ	Flagstaff Pulliam	FLG	N	$3.00	$2,932,317	16y11m	12/1/1992	2/1/2015
Mesa	AZ	Phoenix-Mesa Gateway	IWA/AZA	S	$4.50	$38,141,055	8Y8M	11/1/2008	7/1/2017
Peach Springs	AZ	Grand Canyon West	1G4/PGS	N	$3.00	$308,210	2y	9/1/2004	9/1/2006
Peach Springs	AZ	Grand Canyon West	1G4/PGS	N	$3.00	$9,614,736	15y7m	6/1/2008	1/1/2024
Phoenix	AZ	Phoenix Sky Harbor International	PHX	L	$3.00	$241,106,516	6y	4/1/1996	4/1/2002
Phoenix	AZ	Phoenix Sky Harbor International	PHX	L	$4.50	$2,491,171,800	26y4m	7/1/2002	11/1/2028
Tucson	AZ	Tucson International	TUS	M	$3.00	$100,461,860	8y8m	2/1/1998	10/1/2006
Tucson	AZ	Tucson International	TUS	M	$4.50	**	6y6m	10/1/2006	4/1/2013
Tucson	AZ	Tucson International	TUS	M	$4.50	$44,194,512	4y5m	4/1/2013	9/1/2017
Yuma	AZ	Yuma MCAS/Yuma International	NYL/YUM	N	$3.00	$2,390,423	12y10m	12/1/1993	10/1/2005

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Yuma	AZ	Yuma MCAS/Yuma International	NYL/YUM	N	$4.50	**	1y6m	10/1/2005	4/1/2007
Yuma	AZ	Yuma MCAS/Yuma International	NYL/YUM	N	$4.50	$2,707,035	10y8m	11/1/2007	7/1/2018
Bentonville	AR	Northwest Arkansas Regional	XNA	S	$3.00	$125,025,221	2y4m	12/1/1998	4/1/2001
Bentonville	AR	Northwest Arkansas Regional	XNA	S	$4.50	**	39y2m	4/1/2001	6/1/2040
Fayetteville	AR	Drake Field	FYV		$3.00	$2,221,887	5y	1/1/1996	1/1/2001
Fort Smith	AR	Fort Smith Regional	FSM	N	$3.00	$4,011,641	13y6m	8/1/1994	2/1/2008
Fort Smith	AR	Fort Smith Regional	FSM	N	$4.50	**	1y1m	2/1/2008	3/1/2009
Fort Smith	AR	Fort Smith Regional	FSM	N	$4.50	$1,250,500	4y1m	3/1/2009	4/1/2013
Little Rock	AR	Adams Field	LIT	S	$3.00	$24,383,919	6y4m	5/1/1995	9/1/2001
Little Rock	AR	Adams Field	LIT	S	$4.50	$63,339,747	11y11m	9/1/2001	8/1/2013
Texarkana	AR	Texarkana Regional-Webb Field	TXK	N	$3.00	$649,532	6y7m	2/1/1995	9/1/2001
Texarkana	AR	Texarkana Regional-Webb Field	TXK	N	$4.50	$258,861	3y6m	9/1/2001	3/1/2005
Texarkana	AR	Texarkana Regional-Webb Field	TXK	N	$4.50	$1,414,137	10y2m	7/1/2008	9/1/2018
Arcata/Eureka	CA	Arcata	ACV	N	$3.00	$169,564	1y1m	2/1/1993	3/1/1994
Arcata/Eureka	CA	Arcata	ACV	N	$3.00	$767,300	3y	11/1/1994	11/1/1997
Arcata/Eureka	CA	Arcata	ACV	N	$3.00	$1,084,184	5y2m	4/1/1998	6/1/2003
Arcata/Eureka	CA	Arcata	ACV	N	$4.50	$673,862	1y9m	6/1/2003	3/1/2005
Arcata/Eureka	CA	Arcata	ACV	N	$4.50	$392,265	3m	7/1/2005	10/1/2005
Arcata/Eureka	CA	Arcata	ACV	N	$4.50	*	4m	12/1/2005	4/1/2006
Arcata/Eureka	CA	Arcata	ACV	N	$4.50	$2,437,950	5y4m	4/1/2006	8/1/2011
Arcata/Eureka	CA	Arcata	ACV	N	$4.50	$1,568,328	4y10m	10/1/2011	8/1/2016
Bakersfield	CA	Meadows Field	BFL	N	$3.00	$1,562,876	6y11m	6/1/1995	5/1/2002
Bakersfield	CA	Meadows Field	BFL	N	$4.50	$9,086,000	12y8m	5/1/2002	1/1/2015
Burbank	CA	Bob Hope	BUR	M	$3.00	$107,029,194	8y7m	9/1/1994	4/1/2003
Burbank	CA	Bob Hope	BUR	M	$4.50	**	4y9m	4/1/2003	1/1/2008
Burbank	CA	Bob Hope	BUR	M	$4.50	$97,588,421	8y3m	1/1/2008	4/1/2016
Burbank	CA	Bob Hope	BUR	M	$3.00	$19,931,292	2y7m	4/1/2016	11/1/2018
Burbank	CA	Bob Hope	BUR	M	$4.50	$3,917,000	5m	11/1/2018	4/1/2019
Carlsbad	CA	McCellan-Palomar	CRQ/CLD	N	$4.50	$4,947,065	34y1m	1/1/2009	2/1/2043
Chico	CA	Chico Municipal	CIC	N	$3.00	$211,117	4y9m	12/1/1993	9/1/1998
Chico	CA	Chico Municipal	CIC	N	$3.00	$19,822	1y8m	6/1/1999	2/1/2001
Chico	CA	Chico Municipal	CIC	N	$3.00	$468,782	8y1m	11/1/2001	12/1/2009
Chico	CA	Chico Municipal	CIC	N	$4.50	$590,000	5y	12/1/2010	12/1/2015
Crescent City	CA	Jack McNamara Field	CEC	N	$3.00	$58,330	1y9m	9/1/1998	6/1/2000
Crescent City	CA	Jack McNamara Field	CEC	N	$3.00	$223,807	2y5m	1/1/2001	6/1/2003
Crescent City	CA	Jack McNamara Field	CEC	N	$4.50	**	3y10m	6/1/2003	4/1/2007
Crescent City	CA	Jack McNamara Field	CEC	N	$4.50	$393,228	11y3m	4/1/2007	7/1/2018
Fresno	CA	Fresno Yosemite International	FAT	S	$3.00	$55,936,482	8y	12/1/1996	12/1/2004
Fresno	CA	Fresno Yosemite International	FAT	S	$4.50	**	15y1m	12/1/2004	1/1/2020
Imperial	CA	Imperial County	IPL	CS	$4.50	$892,781	9y	4/1/2003	4/1/2012
Inyokern	CA	Inyokern	IYK	N	$3.00	$395,852	10y	3/1/1993	3/1/2003
Inyokern	CA	Inyokern	IYK	N	$3.00	$51,000	6m	4/1/2004	10/1/2004
Inyokern	CA	Inyokern	IYK	N	$4.50	$89,999	2y5m	9/1/2006	2/1/2009

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Inyokern	CA	Inyokern	IYK	N	$4.50	$502,105	10y	3/1/2009	3/1/2019
Long Beach	CA	Long Beach/Daugherty Field	LGB	S	$3.00	$69,493,089	4y9m	8/1/2003	5/1/2008
Long Beach	CA	Long Beach/Daugherty Field	LGB	S	$4.50	**	7y6m	5/1/2008	11/1/2015
Long Beach	CA	Long Beach/Daugherty Field	LGB	S	$4.50	$97,377,700	14y8m	11/1/2015	7/1/2030
Los Angeles	CA	Los Angeles International	LAX	L	$3.00	$166,593,784	2y6m	7/1/1993	1/1/1996
Los Angeles	CA	Los Angeles International	LAX	L	$3.00	$700,000,000	5y5m	2/1/1998	7/1/2003
Los Angeles	CA	Los Angeles International	LAX	L	$4.50	**	2y5m	7/1/2003	12/1/2005
Los Angeles	CA	Los Angeles International	LAX	L	$4.50	$1,637,779,968	13y3m	12/1/2005	3/1/2019
Los Angeles	CA	Los Angeles International	LAX	L	$3.00	$29,107,609	3m	3/1/2019	6/1/2019
Mammoth Lakes	CA	Mammoth Yosemite	MMH	N	$3.00	$0	10y	9/1/1995	9/1/2005
Mammoth Lakes	CA	Mammoth Yosemite	MMH	N	$4.50	$399,917	16y2m	11/1/2009	11/1/2025
Modesto	CA	Modesto City County-Harry Sham Field	MOD	N	$3.00	$400,757	10y7m	8/1/1994	3/1/2005
Modesto	CA	Modesto City County-Harry Sham Field	MOD	N	$4.50	$395,134	7y4m	8/1/2008	12/1/2015
Monterey	CA	Monterey Peninsula	MRY	N	$3.00	$5,607,775	9y6m	1/1/1994	7/1/2003
Monterey	CA	Monterey Peninsula	MRY	N	$4.50	$2,155,077	2y9m	7/1/2003	4/1/2006
Monterey	CA	Monterey Peninsula	MRY	N	$4.50	$5,119,248	6y7m	5/1/2006	12/1/2012
Oakland	CA	Metropolitan Oakland International	OAK	M	$3.00	$52,621,337	6y9m	9/1/1992	6/1/1999
Oakland	CA	Metropolitan Oakland International	OAK	M	$3.00	$49,772,681	3y8m	9/1/1999	5/1/2003
Oakland	CA	Metropolitan Oakland International	OAK	M	$4.50	**	4m	5/1/2003	9/1/2003
Oakland	CA	Metropolitan Oakland International	OAK	M	$4.50	$496,506,257	17y7m	9/1/2003	4/1/2021
Oakland	CA	Metropolitan Oakland International	OAK	M	$3.00	$70,259,000	2y1m	4/1/2021	5/1/2023
Ontario	CA	Ontario International	ONT	M	$3.00	$27,333,931	3y5m	7/1/1993	12/1/1996
Ontario	CA	Ontario International	ONT	M	$3.00	$118,454,000	9y4m	7/1/1998	11/1/2007
Ontario	CA	Ontario International	ONT	M	$4.50	$96,648,998	5y5m	11/1/2007	4/1/2013
Oxnard	CA	Oxnard	OXR	CS	$4.50	$872,000	9y2m	1/1/2002	3/1/2011
Palm Springs	CA	Palm Springs International	PSP	S	$3.00	$88,415,656	9y4m	9/1/1992	1/1/2002
Palm Springs	CA	Palm Springs International	PSP	S	$4.50	**	27y6m	1/1/2002	7/1/2029
Redding	CA	Redding Municipal	RDD	N	$3.00	$1,009,264	5y	4/1/1997	4/1/2002
Redding	CA	Redding Municipal	RDD	N	$4.50	**	8m	4/1/2002	12/1/2002
Redding	CA	Redding Municipal	RDD	N	$4.50	$1,124,987	4y4m	12/1/2002	4/1/2007
Redding	CA	Redding Municipal	RDD	N	$4.50	$1,362,398	7y1m	8/1/2007	9/1/2014
Sacramento	CA	Sacramento International	SMF	M	$3.00	$112,695,020	8y9m	4/1/1993	1/1/2002
Sacramento	CA	Sacramento International	SMF	M	$4.50	**	1y1m	1/1/2002	2/1/2003
Sacramento	CA	Sacramento International	SMF	M	$3.00	$175,064,757	6m	2/1/2003	9/1/2003
Sacramento	CA	Sacramento International	SMF	M	$4.50	**	7y10m	9/1/2003	7/1/2011
Sacramento	CA	Sacramento International	SMF	M	$4.50	$676,588,317	23y4m	7/1/2011	11/1/2034
San Diego	CA	San Diego International	SAN	L	$3.00	$149,301,528	7y10m	10/1/1995	8/1/2003
San Diego	CA	San Diego International	SAN	L	$4.50	$1,332,661,422	33y2m	8/1/2003	10/1/2036
San Francisco	CA	San Francisco International	SFO	L	$4.50	$833,142,518	15y3m	10/1/2001	1/1/2017
San Jose	CA	Norman Y. Mineta San Jose International	SJC	M	$3.00	$157,837,626	8y7m	9/1/1992	4/1/2001

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San Jose	CA	Norman Y. Mineta San Jose International	SJC	M	$4.50	**	10m	4/1/2001	2/1/2002
San Jose	CA	Norman Y. Mineta San Jose International	SJC	M	$4.50	$880,690,247	27y3m	2/1/2002	5/1/2029
San Luis Obispo	CA	San Luis County Regional	SBP	N	$3.00	$615,677	2y	2/1/1993	2/1/1995
San Luis Obispo	CA	San Luis County Regional	SBP	N	$3.00	$7,432,277	7y3m	6/1/1995	9/1/2002
San Luis Obispo	CA	San Luis County Regional	SBP	N	$4.50	**	8y9m	9/1/2002	6/1/2011
San Luis Obispo	CA	San Luis County Regional	SBP	N	$3.00	$1,057,676	3y	6/1/2011	6/1/2014
San Luis Obispo	CA	San Luis County Regional	SBP	N	$4.50	$3,758,461	3y7m	6/1/2014	1/1/2018
Santa Ana	CA	John Wayne Airport -Orange County	SNA	M	$4.50	$321,351,002	15y6m	7/1/2006	1/1/2022
Santa Barbara	CA	Santa Barbara Municipal	SBA	S	$3.00	$8,746,624	4y10m	1/1/1998	11/1/2003
Santa Barbara	CA	Santa Barbara Municipal	SBA	S	$4.50	**	1y6m	11/1/2003	5/1/2005
Santa Barbara	CA	Santa Barbara Municipal	SBA	S	$4.50	$27,641,741	34y2m	5/1/2005	7/1/2039
Santa Maria	CA	Santa Maria Public/Capt G Allan Hancock Field	SMX	N	$4.50	$5,380,346	21y	10/1/2007	10/1/2028
Santa Rosa	CA	Charles M. Schultz - Sonoma County	STS	N	$3.00	$711,232	7y11m	5/1/1993	4/1/2001
Santa Rosa	CA	Charles M. Schultz - Sonoma County	STS	N	$4.50	**	4y	4/1/2001	4/1/2005
Santa Rosa	CA	Charles M. Schultz - Sonoma County	STS	N	$4.50	$1,594,049	4y11m	5/1/2008	4/1/2013
South Lake Tahoe	CA	Lake Tahoe	TVL		$3.00	$928,747	14y7m	8/1/1992	3/1/2007
Stockton	CA	Stockton Metropolitan	SCK	N	$4.50	$322,665	2y6m	2/1/2007	8/1/2009
Stockton	CA	Stockton Metropolitan	SCK	N	$4.50	$790,760	3y	9/1/2009	9/1/2012
Alamosa	CO	San Luis Valley Regional/Bergman Field	ALS	CS	$3.00	$288,836	27y2m	3/1/1997	5/1/2024
Aspen	CO	Aspen-Pitkin County/Sardy Field	ASE	N	$3.00	$3,869,200	7y10m	7/1/1995	5/1/2003
Aspen	CO	Aspen-Pitkin County/Sardy Field	ASE	N	$4.50	$713,146	1y3m	5/1/2003	8/1/2004
Aspen	CO	Aspen-Pitkin County/Sardy Field	ASE	N	$4.50	$6,005,116	7y7m	1/1/2005	8/1/2012
Colorado Springs	CO	City of Colorado Springs Municipal	COS	S	$3.00	$71,093,257	22y1m	3/1/1993	4/1/2015
Cortez	CO	Cortez Municipal	CEZ	CS	$3.00	$200,078	8y4m	11/1/1999	3/1/2008
Cortez	CO	Cortez Municipal	CEZ	CS	$4.50	$339,072	8y	3/1/2008	3/1/2016
Denver	CO	Denver International	DEN	L	$3.00	$3,137,099,200	8y9m	7/1/1992	4/1/2001
Denver	CO	Denver International	DEN	L	$4.50	**	25y9m	4/1/2001	1/1/2026
Denver	CO	Denver International	DEN	L	$4.50	$80,386,000	3y1m	1/1/2026	2/1/2029
Durango	CO	Durango-La Plata County	DRO	N	$3.00	$534,282	2y6m	2/1/1995	8/1/1997
Durango	CO	Durango-La Plata County	DRO	N	$3.00	$1,289,455	5y6m	9/1/1997	3/1/2003
Durango	CO	Durango-La Plata County	DRO	N	$4.50	$3,130,691	5y10m	6/1/2005	4/1/2011
Durango	CO	Durango-La Plata County	DRO	N	$4.50	$953,500	9m	11/1/2011	8/1/2012
Eagle	CO	Eagle County Regional	EGE	N	$3.00	$8,855,961	7y7m	9/1/1993	4/1/2001
Eagle	CO	Eagle County Regional	EGE	N	$4.50	**	8y2m	4/1/2001	6/1/2009
Eagle	CO	Eagle County Regional	EGE	N	$3.00	$300,000	1m	6/1/2009	7/1/2009
Eagle	CO	Eagle County Regional	EGE	N	$4.50	$13,713,255	15y	7/1/2009	7/1/2024
Fort Collins-Loveland	CO	Fort Collins-Loveland Municipal	FNL	N	$3.00	$307,046	5y7m	10/1/1993	5/1/1999
Fort Collins-Loveland	CO	Fort Collins-Loveland Municipal	FNL	N	$4.50	$1,175,884	7y4m	8/1/2004	12/1/2011
Fort Collins-	CO	Fort Collins-Loveland Municipal	FNL	N	$4.50	$804,048	3y1m	2/1/2012	3/1/2015

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Loveland									
Grand Junction	CO	Grand Junction Regional	GJT	N	$3.00	$4,879,574	13y5m	4/1/1993	9/1/2006
Grand Junction	CO	Grand Junction Regional	GJT	N	$4.50	$15,857,760	17y4m	9/1/2006	1/1/2024
Gunnison	CO	Gunnison-Crested Butte Regional	GUC	N	$3.00	$1,089,036	7y5m	11/1/1993	4/1/2001
Gunnison	CO	Gunnison-Crested Butte Regional	GUC	N	$4.50	$2,568,969	18y	4/1/2001	4/1/2019
Hayden	CO	Yampa Valley	HDN	N	$3.00	$2,190,009	7y8m	11/1/1993	7/1/2001
Hayden	CO	Yampa Valley	HDN	N	$4.50	**	7m	7/1/2001	2/1/2002
Hayden	CO	Yampa Valley	HDN	N	$4.50	$6,115,140	13y7m	2/1/2002	9/1/2015
Montrose	CO	Montrose Regional	MTJ	N	$3.00	$1,422,535	9y9m	11/1/1993	8/1/2003
Montrose	CO	Montrose Regional	MTJ	N	$4.50	$821,694	2y10m	8/1/2003	6/1/2006
Montrose	CO	Montrose Regional	MTJ	N	$4.50	$1,386,487	4y	8/1/2006	8/1/2010
Montrose	CO	Montrose Regional	MTJ	N	$4.50	$2,046,975	5y1m	11/1/2010	12/1/2015
Pueblo	CO	Pueblo Memorial	PUB	N	$3.00	$395,322	21y1m	11/1/1993	12/1/2014
Steamboat Springs	CO	Steamboat Springs/Bob Adams	SBS		$3.00	$159,576	4y2m	4/1/1993	6/1/1997
Telluride	CO	Telluride Regional	TEX	CS	$3.00	$778,287	9y2m	2/1/1993	4/1/2002
Telluride	CO	Telluride Regional	TEX	CS	$4.50	$6,268,750	16y9m	4/1/2002	1/1/2019
New Haven	CT	Tweed-New Haven	HVN	N	$3.00	$983,636	4y4m	12/1/1993	4/1/1998
New Haven	CT	Tweed-New Haven	HVN	N	$4.50	$567,286	3y9m	10/1/2001	7/1/2005
New Haven	CT	Tweed-New Haven	HVN	N	$4.50	$1,462,380	7y7m	5/1/2006	12/1/2013
Windsor Locks	CT	Bradley International	BDL	M	$3.00	$8,607,831	2y2m	10/1/1993	12/1/1995
Windsor Locks	CT	Bradley International	BDL	M	$3.00	$3,263,971	6m	7/1/1996	1/1/1997
Windsor Locks	CT	Bradley International	BDL	M	$3.00	$27,749,445	2y11m	9/1/1997	8/1/2000
Windsor Locks	CT	Bradley International	BDL	M	$4.50	$257,534,407	18y10m	5/1/2001	3/1/2020
Windsor Locks	CT	Bradley International	BDL	M	$3.00	$4,152,000	4m	3/1/2020	7/1/2020
Windsor Locks	CT	Bradley International	BDL	M	$4.50	$19,403,032	1y5m	7/1/2020	12/1/2021
Daytona Beach	FL	Daytona Beach International	DAB	N	$3.00	$29,469,817	8y1m	7/1/1993	8/1/2001
Daytona Beach	FL	Daytona Beach International	DAB	N	$3.00	*	3y8m	2/1/2002	11/1/2005
Daytona Beach	FL	Daytona Beach International	DAB	N	$4.50	**	14y4m	11/1/2005	3/1/2020
Fort Lauderdale	FL	Fort Lauderdale/Hollywood International	FLL	L	$3.00	$228,064,335	10y10m	1/1/1995	10/1/2005
Fort Lauderdale	FL	Fort Lauderdale/Hollywood International	FLL	L	$4.50	$1,646,236,643	24y11m	10/1/2005	9/1/2030
Fort Myers	FL	Southwest Florida International	RSW	M	$3.00	$109,252,734	11y	11/1/1992	11/1/2003
Fort Myers	FL	Southwest Florida International	RSW	M	$4.50	**	2y10m	11/1/2003	9/1/2006
Fort Myers	FL	Southwest Florida International	RSW	M	$4.50	$187,201,829	11y8m	9/1/2006	5/1/2018
Gainsville	FL	Gainsville Regional	GNV	N	$3.00	$484,900	1y7m	7/1/2000	2/1/2002
Gainsville	FL	Gainsville Regional	GNV	N	$4.50	$5,668,584	10y6m	1/1/2003	7/1/2013
Jacksonville	FL	Jacksonville International	JAX	M	$3.00	$39,343,583	9y1m	4/1/1994	5/1/2003
Jacksonville	FL	Jacksonville International	JAX	M	$4.50	$310,577,713	21y6m	5/1/2003	11/1/2024
Key West	FL	Key West International	EYW	N	$3.00	$1,922,283	3y5m	3/1/1993	8/1/1996
Key West	FL	Key West International	EYW	N	$3.00	$3,634,125	5y7m	12/1/1997	6/1/2003
Key West	FL	Key West International	EYW	N	$4.50	$745,867	2y1m	6/1/2003	7/1/2005
Key West	FL	Key West International	EYW	N	$4.50	$13,523,000	11y3m	10/1/2005	1/1/2017

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Marathon	FL	Marathon	MTH		$3.00	$390,001	5y3m	3/1/1993	6/1/1998
Melbourne	FL	Melbourne International	MLB	N	$3.00	$11,080,917	12y7m	5/1/1997	12/1/2009
Melbourne	FL	Melbourne International	MLB	N	$4.50	**	9y3m	12/1/2009	3/1/2019
Miami	FL	Miami International	MIA	L	$3.00	$176,730,162	7y2m	11/1/1994	1/1/2002
Miami	FL	Miami International	MIA	L	$4.50	**	1y2m	1/1/2002	3/1/2003
Miami	FL	Miami International	MIA	L	$4.50	$2,420,400,341	34y7m	3/1/2003	10/1/2037
Naples	FL	Naples Municipal	APF		$3.00	$899,685	6y	2/1/1995	2/1/2001
Naples	FL	Naples Municipal	APF		$3.00	$91,651	2y3m	2/1/2002	5/1/2004
Orlando	FL	Orlando International	MCO	L	$3.00	$538,040,022	14y2m	2/1/1993	4/1/2007
Orlando	FL	Orlando International	MCO	L	$4.50	$1,168,294,479	12y8m	4/1/2007	12/1/2019
Orlando	FL	Orlando International	MCO	L	$3.00	$304,070,400	6y6m	12/1/2019	6/1/2026
Orlando	FL	Orlando Sandford International	SFB	S	$1.00	$1,192,352	2y9m	3/1/2001	12/1/2003
Orlando	FL	Orlando Sandford International	SFB	S	$2.00	$13,312,090	7y9m	12/1/2003	9/1/2011
Orlando	FL	Orlando Sandford International	SFB	S	$4.00	**	1y3m	9/1/2011	12/1/2012
Panama City	FL	Panama City - Bay County International	PFN	N	$3.00	$6,732,080	10y3m	2/1/1994	5/1/2004
Panama City	FL	Panama City - Bay County International	PFN	N	$4.50	**	4y8m	5/1/2004	1/1/2009
Panama City	FL	Panama City - Bay County International	PFN	N	$4.50	$39,251,783	1y4m	1/1/2009	5/1/2010
Panama City	FL	Northwest Florida Beaches International	ECP	N	$4.50	**	28y11m	5/1/2010	4/1/2039
Pensacola	FL	Penscola Gulf Coast Regional	PNS	S	$3.00	$24,954,478	9y10m	2/1/1993	12/1/2002
Pensacola	FL	Penscola Gulf Coast Regional	PNS	S	$4.50	**	4y9m	12/1/2002	9/1/2007
Pensacola	FL	Penscola Gulf Coast Regional	PNS	S	$4.50	$119,534,914	23y1m	9/1/2007	10/1/2031
Sarasota	FL	Sarasota/Bradenton International	SRQ	S	$3.00	$75,384,399	9y8m	9/1/1992	5/1/2002
Sarasota	FL	Sarasota/Bradenton International	SRQ	S	$4.50	**	19y9m	5/1/2002	2/1/2022
St Petersburg	FL	St Petersburg-Clearwater International	PIE	S	$3.00	$3,811,738	1y6m	5/1/2005	11/1/2006
St Petersburg	FL	St Petersburg-Clearwater International	PIE	S	$4.50	**	2y3m	11/1/2006	2/1/2009
St Petersburg	FL	St Petersburg-Clearwater International	PIE	S	$4.50	$6,628,510	3Y9M	2/1/2009	11/1/2012
Tallahassee	FL	Tallahassee Regional	TLH	N	$3.00	$11,219,936	9y8m	2/1/1993	10/1/2002
Tallahassee	FL	Tallahassee Regional	TLH	N	$4.50	$36,852,800	13y3m	10/1/2002	1/1/2016
Tampa	FL	Tampa International	TPA	L	$3.00	$170,777,120	8y8m	10/1/1993	6/1/2002
Tampa	FL	Tampa International	TPA	L	$4.50	$625,065,074	14y11m	6/1/2002	5/1/2017
Valparaiso	FL	Eglin AFB	VPS	N	$3.00	$34,407,710	1y5m	1/1/2001	6/1/2002
Valparaiso	FL	Eglin AFB	VPS	N	$4.50	**	16y2m	6/1/2002	8/1/2018
Valparaiso	FL	Eglin AFB	VPS	N	$4.50	$13,330,797	6y9m	8/1/2018	5/1/2025
West Palm Beach	FL	Palm Beach International	PBI	M	$3.00	$122,322,594	14y3m	4/1/1994	7/1/2008
West Palm Beach	FL	Palm Beach International	PBI	M	$4.50	$22,283,317	1y9m	7/1/2008	4/1/2010
West Palm Beach	FL	Palm Beach International	PBI	M	$4.50	$44,778,178	3y1m	4/1/2010	5/1/2013
Albany	GA	Southwest Georgia Regional	ABY	N	$3.00	$348,383	2y9m	9/1/1995	6/1/1998
Albany	GA	Southwest Georgia Regional	ABY	N	$3.00	$539,645	3y8m	6/1/1999	2/1/2003
Albany	GA	Southwest Georgia Regional	ABY	N	$4.50	**	6m	2/1/2003	8/1/2003
Albany	GA	Southwest Georgia Regional	ABY	N	$4.50	$457,111	4y6m	8/1/2003	2/1/2008
Albany	GA	Southwest Georgia Regional	ABY	N	$4.50	$665,281	4y7m	7/1/2008	2/1/2013

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Athens	GA	Athens/Ben Epps	AHN	C S	$3.00	$165,615	4y5m	8/1/1997	1/1/2002
Atlanta	GA	Hartsfield-Jackson Atlanta International	ATL	L	$3.00	$1,463,359,982	3y11m	5/1/1997	4/1/2001
Atlanta	GA	Hartsfield-Jackson Atlanta International	ATL	L	$4.50	**	7y6m	4/1/2001	10/1/2008
Atlanta	GA	Hartsfield-Jackson Atlanta International	ATL	L	$4.50	$2,533,657,127	15y6m	10/1/2008	4/1/2024
Augusta	GA	Augusta Regional @ Bush Field	AGS	N	$3.00	$27,636,360	1y10m	9/1/1999	7/1/2001
Augusta	GA	Augusta Regional @ Bush Field	AGS	N	$4.50	**	23y1m	7/1/2001	8/1/2024
Augusta	GA	Augusta Regional @ Bush Field	AGS	N	$4.50	$4,098,034	3y3m	8/1/2024	11/1/2027
Brunswick	GA	Brunswick Golden Isles	BQK	N	$3.00	$813,170	2y6m	5/1/2001	11/1/2003
Brunswick	GA	Brunswick Golden Isles	BQK	N	$4.50	**	5y6m	11/1/2003	5/1/2009
Brunswick	GA	Brunswick Golden Isles	BQK	N	$4.50	$860,268	7y11m	5/1/2009	4/1/2017
Columbus	GA	Columbus Metropolitan	CSG	N	$3.00	$530,103	1y9m	12/1/1993	9/1/1995
Columbus	GA	Columbus Metropolitan	CSG	N	$3.00	$876,138	2y10m	8/1/2000	6/1/2003
Columbus	GA	Columbus Metropolitan	CSG	N	$4.50	**	3y5m	6/1/2003	11/1/2006
Columbus	GA	Columbus Metropolitan	CSG	N	$4.50	$1,032,681	2y2m	2/1/2010	4/1/2012
Macon	GA	Middle Georgia Regional	MCN		$4.50	$1,052,392	9y2m	3/1/2002	5/1/2011
Savannah	GA	Savannah/ Hilton Head International	SAV	S	$3.00	$48,179,908	8y9m	7/1/1992	4/1/2001
Savannah	GA	Savannah/ Hilton Head International	SAV	S	$4.50	**	8y10m	4/1/2001	2/1/2010
Savannah	GA	Savannah/ Hilton Head International	SAV	S	$3.00	$977,956	3m	2/1/2010	5/1/2010
Savannah	GA	Savannah/ Hilton Head International	SAV	S	$4.50	$17,933,743	5y11m	5/1/2010	4/1/2016
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	$369,077	6y7m	3/1/1993	10/1/1999
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	$230,300	1y2m	4/1/2000	6/1/2001
Valdosta	GA	Valdosta Regional	VLD	N	$4.50	**	3m	6/1/2001	9/1/2001
Valdosta	GA	Valdosta Regional	VLD	N	$4.50	$438,675	3y	9/1/2001	9/1/2004
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	$67,858	3m	2/1/2006	5/1/2006
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	$12,140	2m	11/1/2006	1/1/2007
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	$94,727	11m	8/1/2009	7/1/2010
Valdosta	GA	Valdosta Regional	VLD	N	$4.50	$472,800	1y4m	6/1/2011	10/1/2012
Agana	GU	Guam International	GUM	S	$3.00	$258,370,758	9y9m	2/1/1993	11/1/2002
Agana	GU	Guam International	GUM	S	$4.50	**	22y4m	11/1/2002	3/1/2025
Hilo	HI	Hilo International	ITO	S	$3.00	$548,196	1y7m	2/1/2007	11/1/2008
Hilo	HI	Hilo International	ITO	S	$4.50	**	1y2m	11/1/2008	1/1/2010
Honolulu	HI	Honolulu International	HNL	L	$3.00	$87,641,419	4y1m	10/1/2004	11/1/2008
Honolulu	HI	Honolulu International	HNL	L	$4.50	**	1y2m	11/1/2008	1/1/2010
Honolulu	HI	Honolulu International	HNL	L	$4.50	$105,909,130	4y1m	1/1/2010	2/1/2014
Kahului	HI	Kahului	OGG	M	$3.00	$19,664,231	4y1m	10/1/2004	11/1/2008
Kahului	HI	Kahului	OGG	M	$4.50	**	1y2m	11/1/2008	1/1/2010
Kahului	HI	Kahului	OGG	M	$4.50	$24,663,770	4y1m	1/1/2010	2/1/2014
Kailua/Kona	HI	Kona International @ Keohole	KOA	S	$3.00	$6,929,851	4y1m	10/1/2004	11/1/2008
Kailua/Kona	HI	Kona International @ Keohole	KOA	S	$4.50	**	1y2m	11/1/2008	1/1/2010
Kailua/Kona	HI	Kona International @ Keohole	KOA	S	$4.50	$7,254,050	4y1m	1/1/2010	2/1/2014
Lihue	HI	Lihue	LIH	S	$3.00	$3,987,100	4y1m	10/1/2004	11/1/2008
Lihue	HI	Lihue	LIH	S	$4.50	**	1y2m	11/1/2008	1/1/2010

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Lihue	HI	Lihue	LIH	S	$4.50	$7,254,050	4y1m	1/1/2010	2/1/2014
Boise	ID	Boise Air Terminal/ Gowen Field	BOI	S	$3.00	$20,191,058	7y	8/1/1994	8/1/2001
Boise	ID	Boise Air Terminal/ Gowen Field	BOI	S	$4.50	$102,262,147	18y	8/1/2001	8/1/2019
Hailey	ID	Friedman Memorial	SUN	N	$3.00	$188,000	1y1m	9/1/1993	10/1/1994
Hailey	ID	Friedman Memorial	SUN	N	$3.00	$1,721,835	10y3m	3/1/1995	6/1/2005
Hailey	ID	Friedman Memorial	SUN	N	$4.50	$1,959,103	8y7m	6/1/2005	1/1/2014
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$3.00	$1,473,899	5y	1/1/1993	1/1/1998
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$3.00	$836,239	2y8m	2/1/1998	10/1/2000
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$3.00	$8,950,000	6m	10/1/2000	4/1/2001
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$4.50	**	19y3m	4/1/2001	7/1/2020
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$4.50	$1,658,299	3y3m	7/1/2020	10/1/2023
Lewiston	ID	Lewiston-Nez Perce County	LWS	N	$3.00	$2,478,343	7y	5/1/1994	5/1/2001
Lewiston	ID	Lewiston-Nez Perce County	LWS	N	$4.50	**	5y5m	5/1/2001	10/1/2006
Lewiston	ID	Lewiston-Nez Perce County	LWS	N	$4.50	$1,678,251	6y2m	10/1/2006	12/1/2012
Pocatello	ID	Pocatello Regional	PIH	N	$3.00	$814,719	6y8m	9/1/1994	5/1/2001
Pocatello	ID	Pocatello Regional	PIH	N	$4.50	**	5m	5/1/2001	10/1/2001
Pocatello	ID	Pocatello Regional	PIH	N	$4.50	$1,723,443	15y2m	10/1/2001	12/1/2016
Twin Falls	ID	Joslin Field - Magic Valley Regional	TWF	N	$3.00	$1,628,107	8y7m	11/1/1992	6/1/2001
Twin Falls	ID	Joslin Field - Magic Valley Regional	TWF	N	$4.50	**	6y	6/1/2001	6/1/2007
Twin Falls	ID	Joslin Field - Magic Valley Regional	TWF	N	$4.50	$560,416	5y3m	7/1/2007	10/1/2012
Belleville	IL	Scott AFB/Midamerica	BLV		$3.00	$7,000,000	41y4m	11/1/2005	3/1/2047
Bloomington	IL	Central Illinois Regional Airport at Bloomington-Normal	BMI	N	$3.00	$28,084,564	6y5m	11/1/1994	4/1/2001
Bloomington	IL	Central Illinois Regional Airport at Bloomington-Normal	BMI	N	$4.50	**	16y6m	4/1/2001	10/1/2017
Bloomington	IL	Central Illinois Regional Airport at Bloomington-Normal	BMI	N	$4.50	$1,161,019	7m	10/1/2017	6/1/2018
Champaign/Urbana	IL	University of Illinois-Willard	CMI	N	$3.00	$2,464,310	8y2m	12/1/1995	2/1/2004
Champaign/Urbana	IL	University of Illinois-Willard	CMI	N	$4.50	$3,494,265	8y10m	10/1/2005	8/1/2014
Chicago	IL	Chicago Midway International	MDW	L	$3.00	$690,891,936	13y4m	9/1/1993	1/1/2007
Chicago	IL	Chicago Midway International	MDW	L	$4.50	**	5y11m	1/1/2007	11/1/2012
Chicago	IL	Chicago Midway International	MDW	L	$4.50	$1,720,370,920	41y	11/1/2012	11/1/2053
Chicago	IL	Chicago O'Hare International	ORD	L	$3.00	$1,158,485,219	7y7m	9/1/1993	4/1/2001
Chicago	IL	Chicago O'Hare International	ORD	L	$4.50	**	4y10m	4/1/2001	2/1/2006
Chicago	IL	Chicago O'Hare International	ORD	L	$4.50	$5,374,634,766	32y9m	2/1/2006	11/1/2038
Decatur	IL	Decatur	DEC		$4.50	$732,628	12y9m	6/1/2006	3/1/2019
Marion	IL	Williamson County Regional	MWA	CS	$4.50	$509,499	10y6m	9/1/2005	3/1/2016
Moline	IL	Quad City International	MLI	S	$3.00	$29,523,476	7y11m	12/1/1994	1/1/2002
Moline	IL	Quad City International	MLI	S	$4.50	**	14y6m	1/1/2002	7/1/2016
Moline	IL	Quad City International	MLI	S	$4.50	$26,132,335	21y	7/1/2016	7/1/2037
Peoria	IL	General Downing - Peoria International	PIA	N	$3.00	$8,145,036	6y7m	12/1/1994	7/1/2001
Peoria	IL	General Downing - Peoria International	PIA	N	$4.50	**	5y7m	7/1/2001	2/1/2007
Peoria	IL	General Downing - Peoria International	PIA	N	$4.50	$1,476,770	1y6m	2/1/2007	8/1/2008

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Peoria	IL	General Downing - Peoria International	PIA	N	$4.50	$7,550,000	6y3m	11/1/2008	2/1/2015
Quincy	IL	Quincy Regional-Baldwin Field	UIN	CS	$3.00	$115,517	2y9m	10/1/1994	7/1/1997
Quincy	IL	Quincy Regional-Baldwin Field	UIN	CS	$3.00	$298,153	7y7m	11/1/1997	6/1/2005
Quincy	IL	Quincy Regional-Baldwin Field	UIN	CS	$3.00	*	2y2m	11/1/2005	1/1/2008
Quincy	IL	Quincy Regional-Baldwin Field	UIN	CS	$4.50	$635,573	11y2m	1/1/2008	3/1/2019
Rockford	IL	Chicago/ Rockford International	RFD	N	$3.00	$385,681	4y	10/1/1992	10/1/1996
Rockford	IL	Chicago/ Rockford International	RFD	N	$3.00	$7,066,659	10y1m	5/1/1997	6/1/2007
Rockford	IL	Chicago/ Rockford International	RFD	N	$4.50	**	6y11m	6/1/2007	5/1/2014
Springfield	IL	Abraham Lincoln Capital	SPI	N	$3.00	$4,922,593	9y11m	6/1/1992	5/1/2002
Springfield	IL	Abraham Lincoln Capital	SPI	N	$4.50	**	5y5m	5/1/2002	10/1/2005
Springfield	IL	Abraham Lincoln Capital	SPI	N	$4.50	$2,295,457	10y9m	10/1/2005	7/1/2016
Evansville	IN	Evansville Regional	EVV	N	$4.50	$1,270,789	1y3m	8/1/2007	11/1/2008
Evansville	IN	Evansville Regional	EVV	N	$4.50	$3,983,706	4y2m	12/1/2008	2/1/2013
Fort Wayne	IN	Fort Wayne International	FWA	N	$3.00	$26,563,457	12y5m	7/1/1993	12/1/2005
Fort Wayne	IN	Fort Wayne International	FWA	N	$4.50	**	10y10m	12/1/2005	10/1/2016
Fort Wayne	IN	Fort Wayne International	FWA	N	$4.50	$2,045,000	1y5m	10/1/2016	3/1/2018
Indianapolis	IN	Indianapolis International	IND	M	$3.00	$80,825,898	7y7m	9/1/1993	4/1/2001
Indianapolis	IN	Indianapolis International	IND	M	$4.50	**	6m	4/1/2001	10/1/2001
Indianapolis	IN	Indianapolis International	IND	M	$4.50	$444,022,707	20y10m	10/1/2001	9/1/2022
Indianapolis	IN	Indianapolis International	IND	M	$3.00	$59,000	1m	9/1/2022	10/1/2022
South Bend	IN	South Bend Regional	SBN	N	$3.00	$34,172,802	16y8m	11/1/1994	7/1/2011
South Bend	IN	South Bend Regional	SBN	N	$4.50	**	9y6m	7/1/2011	1/1/2021
South Bend	IN	South Bend Regional	SBN	N	$4.50	$6,000,000	8y6m	1/1/2021	7/1/2029
Burlington	IA	Southeast Iowa Regional	BRL	CS	$3.00	$521,304	4y2m	7/1/1997	9/1/2001
Burlington	IA	Southeast Iowa Regional	BRL	CS	$4.50	**	19y5m	9/1/2001	2/1/2021
Cedar Rapids	IA	The Eastern Iowa	CID	S	$3.00	$11,716,385	7y5m	1/1/1995	6/1/2002
Cedar Rapids	IA	The Eastern Iowa	CID	S	$4.50	**	1y9m	6/1/2002	3/1/2004
Cedar Rapids	IA	The Eastern Iowa	CID	S	$4.50	$23,341,050	12y7m	5/1/2004	12/1/2016
Des Moines	IA	Des Moines International	DSM	S	$3.00	$17,953,852	7y5m	3/1/1994	8/1/2001
Des Moines	IA	Des Moines International	DSM	S	$4.50	**	9m	8/1/2001	5/1/2002
Des Moines	IA	Des Moines International	DSM	S	$4.50	$56,253,562	17y5m	5/1/2002	10/1/2019
Dubuque	IA	Dubuque Regional	DBQ	N	$3.00	$1,106,761	8y4m	1/1/1993	5/1/2001
Dubuque	IA	Dubuque Regional	DBQ	N	$4.50	$6,461,405	31y9m	5/1/2001	2/1/2033
Fort Dodge	IA	Fort Dodge Regional	FOD	CS	$3.00	$169,331	6y6m	3/1/1995	9/1/2001
Fort Dodge	IA	Fort Dodge Regional	FOD	CS	$4.50	$315,570	9y3m	1/1/2002	4/1/2011
Mason City	IA	Mason City Municipal	MCW	N	$3.00	$302,090	5y9m	2/1/1996	10/1/2001
Mason City	IA	Mason City Municipal	MCW	N	$4.50	**	1y6y	10/1/2001	4/1/2003
Mason City	IA	Mason City Municipal	MCW	N	$4.50	$1,076,723	14y4m	8/1/2003	12/1/2017
Sioux City	IA	Sioux Gateway/Col. Bud Day Field	SUX	N	$3.00	$204,465	1y	6/1/1993	6/1/1994
Sioux City	IA	Sioux Gateway/Col. Bud Day Field	SUX	N	$3.00	$2,505,560	7y1m	2/1/1995	3/1/2002
Sioux City	IA	Sioux Gateway/Col. Bud Day Field	SUX	N	$4.50	**	1y10m	3/1/2002	1/1/2004

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Sioux City	IA	Sioux Gateway/Col. Bud Day Field	SUX	N	$4.50	$969,350	8y6m	11/1/2004	5/1/2013
Spencer	IA	Spencer Municipal	SPW		$3.00	$77,638	10y6m	9/1/1995	3/1/2006
Waterloo	IA	Waterloo Regional	ALO	N	$3.00	$628,088	4y	6/1/1994	6/1/1998
Waterloo	IA	Waterloo Regional	ALO	N	$3.00	$784,036	1y10m	9/1/1999	7/1/2001
Waterloo	IA	Waterloo Regional	ALO	N	$4.50	**	1y10m	7/1/2001	5/1/2003
Waterloo	IA	Waterloo Regional	ALO	N	$4.50	$1,256,332	9y7m	5/1/2003	12/1/2012
Manhattan	KS	Manhattan Regional	MHK	N	$3.00	$401,978	3y5m	10/1/1998	3/1/2002
Manhattan	KS	Manhattan Regional	MHK	N	$4.50	**	6y4m	3/1/2002	7/1/2008
Manhattan	KS	Manhattan Regional	MHK	N	$4.50	$601,007	9y11m	7/1/2008	6/1/2018
Topeka	KS	Forbes Field	FOE	N	$4.50	$823,720	15y7m	8/1/2007	3/1/2023
Wichita	KS	Wichita Mid-Continent	ICT	S	$3.00	$25,595,809	10y6m	12/1/1994	5/1/2005
Wichita	KS	Wichita Mid-Continent	ICT	S	$4.50	**	2y1m	5/1/2005	6/1/2007
Wichita	KS	Wichita Mid-Continent	ICT	S	$4.50	$7,548,050	2y2m	7/1/2007	9/1/2009
Wichita	KS	Wichita Mid-Continent	ICT	S	$4.50	$166,384,422	35y5m	11/1/2010	4/1/2046
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$3.00	$155,087,555	6y2m	6/1/1994	8/1/2000
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$3.00	$74,129,829	2y1m	7/1/2001	8/1/2003
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$4.50	$212,737,000	5y9m	8/1/2003	5/1/2009
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$3.00	$98,253,000	6y7m	5/1/2009	12/1/2015
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$4.50	$32,958,000	2y2m	12/1/2015	2/1/2018
Lexington	KY	Blue Grass	LEX	S	$3.00	$11,900,969	7y7m	11/1/1993	6/1/2001
Lexington	KY	Blue Grass	LEX	S	$4.50	**	2y	6/1/2001	6/1/2003
Lexington	KY	Blue Grass	LEX	S	$3.00	$500,557	4m	8/1/2003	12/1/2003
Lexington	KY	Blue Grass	LEX	S	$4.50	$87,804,742	34y2m	12/1/2003	2/1/2038
Louisville	KY	Louisville International - Standiford Field	SDF	S	$3.00	$90,600,000	8y10m	5/1/1997	3/1/2006
Louisville	KY	Louisville International - Standiford Field	SDF	S	$4.50	**	7m	3/1/2006	10/1/2006
Louisville	KY	Louisville International - Standiford Field	SDF	S	$3.00	**	1y11m	10/1/2006	9/1/2008
Louisville	KY	Louisville International - Standiford Field	SDF	S	$4.50	**	1m	9/1/2008	10/1/2008
Louisville	KY	Louisville International - Standiford Field	SDF	S	$3.00	**	2y2m	10/1/2008	12/1/2010
Louisville	KY	Louisville International - Standiford Field	SDF	S	$4.50	**	3y	12/1/2010	12/1/2013
Louisville	KY	Louisville International - Standiford Field	SDF	S	$4.50	$19,970,137	2y11m	12/1/2013	11/1/2016
Paducah	KY	Barkley Regional	PAH	N	$3.00	$1,696,178	20y	3/1/1994	3/1/2014
Alexandria	LA	Alexandria International	AEX	N	$3.00	$10,284,927	2y8m	5/1/1999	1/1/2002
Alexandria	LA	Alexandria International	AEX	N	$4.50	**	20y11m	1/1/2002	12/1/2022
Baton Rouge	LA	Baton Rouge Metropolitan, Ryan Field	BTR	S	$3.00	$37,469,799	12y10m	12/1/1992	10/1/2005
Baton Rouge	LA	Baton Rouge Metropolitan, Ryan Field	BTR	S	$4.50	**	9y10m	10/1/2005	8/1/2015
Baton Rouge	LA	Baton Rouge Metropolitan, Ryan Field	BTR	S	$4.50	$43,889,437	15y11m	8/1/2015	7/1/2031
Lafayette	LA	Lafayette Regional	LFT	N	$3.00	$1,083,024	3y	9/1/1995	9/1/1998
Lafayette	LA	Lafayette Regional	LFT	N	$3.00	$2,273,692	1y	4/1/2001	4/1/2002
Lafayette	LA	Lafayette Regional	LFT	N	$4.50	**	2y8m	4/1/2002	1/1/2005
Lafayette	LA	Lafayette Regional	LFT	N	$4.50	$3,433,629	2y11m	5/1/2005	4/1/2008

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Lafayette	LA	Lafayette Regional	LFT	N	$4.50	$5,736,733	6y9m	8/1/2008	5/1/2015
Lake Charles	LA	Lake Charles Regional	LCH	N	$3.00	$1,877,234	4y2m	3/1/2001	5/1/2005
Lake Charles	LA	Lake Charles Regional	LCH	N	$4.50	**	6y4m	5/1/2005	9/1/2011
Lake Charles	LA	Lake Charles Regional	LCH	N	$4.50	$1,070,000	4y	9/1/2011	9/1/2015
Monroe	LA	Monroe Regional	MLU	N	$4.50	$1,359,504	4y5m	4/1/2003	9/1/2007
Monroe	LA	Monroe Regional	MLU	N	$4.50	$16,400,000	25y7m	11/1/2008	6/1/2036
New Orleans	LA	Louis Armstrong New Orleans International	MSY	M	$3.00	$133,503,363	8y10m	6/1/1993	4/1/2002
New Orleans	LA	Louis Armstrong New Orleans International	MSY	M	$4.50	**	1y4m	4/1/2002	8/1/2003
New Orleans	LA	Louis Armstrong New Orleans International	MSY	M	$4.50	$431,317,387	23y4m	8/1/2003	12/1/2026
Shreveport	LA	Shreveport Regional	SHV	N	$3.00	$29,841,353	8y9m	2/1/1994	11/1/2002
Shreveport	LA	Shreveport Regional	SHV	N	$4.50	**	11y10m	11/1/2002	9/1/2014
Bangor	ME	Bangor International	BGR	N	$3.00	$8,961,006	15y3m	6/1/1995	9/1/2010
Bangor	ME	Bangor International	BGR	N	$4.50	$1,998,100	1y5m	12/1/2010	5/1/2012
Portland	ME	Portland International Jetport	PWM	S	$3.00	$33,601,082	15y	2/1/1994	2/1/2009
Portland	ME	Portland International Jetport	PWM	S	$4.50	**	1y9m	2/1/2009	11/1/2010
Portland	ME	Portland International Jetport	PWM	S	$4.50	$132,206,104	29y5m	11/1/2010	4/1/2040
Presque Isle	ME	Northern Maine Regional Airport at Presque Isle	PQI	N	$4.50	$245,853	4y9m	9/1/2004	6/1/2009
Presque Isle	ME	Northern Maine Regional Airport at Presque Isle	PQI	N	$4.50	$353,298	7y5m	8/1/2010	1/1/2018
Rockland	ME	Knox County Regional	RKD	CS	$4.50	$167,250	4y6m	1/1/2012	7/1/2016
Baltimore	MD	Baltimore/Washington International Thurgood Marshal	BWI	L	$3.00	$189,381,695	9y8m	10/1/1992	6/1/2002
Baltimore	MD	Baltimore/Washington International Thurgood Marshal	BWI	L	$4.50	**	5m	6/1/2002	11/1/2002
Baltimore	MD	Baltimore/Washington International Thurgood Marshal	BWI	L	$4.50	$721,395,097	16y11m	11/1/2002	10/1/2019
Cumberland	MD	Greater Cumberland Reg	CBE		$3.00	$144,345	5y	7/1/1994	7/1/1999
Cumberland	MD	Greater Cumberland Reg	CBE		$3.00	*	6y8m	10/1/1999	6/1/2006
Hagerstown	MD	Hagerstown Regional-Richard A Henson Field	HGR	N	$3.00	$308,817	2y7m	8/1/1999	3/1/2002
Hagerstown	MD	Hagerstown Regional-Richard A Henson Field	HGR	N	$4.50	**	1y10m	3/1/2002	1/1/2004
Hagerstown	MD	Hagerstown Regional-Richard A Henson Field	HGR	N	$4.50	$108,124	3y7m	1/1/2004	8/1/2007
Salisbury	MD	Salisbury-Ocean City Wicomico Regional	SBY	N	$3.00	$1,446,184	6y1m	2/1/2002	3/1/2008
Salisbury	MD	Salisbury-Ocean City Wicomico Regional	SBY	N	$4.50	**	4y3m	3/1/2008	6/1/2012
Salisbury	MD	Salisbury-Ocean City Wicomico Regional	SBY	N	$4.50	$783,269	3y	6/1/2012	6/1/2015
Boston	MA	General Edward Lawrence Logan International	BOS	L	$3.00	$702,015,217	11y11m	11/1/1993	10/1/2005
Boston	MA	General Edward Lawrence Logan International	BOS	L	$4.50	**	5y4m	10/1/2005	2/1/2011
Boston	MA	General Edward Lawrence Logan International	BOS	L	$4.50	$682,025,941	12y4m	2/1/2011	6/1/2023
Hyannis	MA	Barnstable Municipal-Boardman/Polando Field	HYA	N	$2.00	$2,573,600	13y7m	3/1/2011	10/1/2024
Worcester	MA	Worcester Regional	ORH		$3.00	$614,336	5y	10/1/1992	10/1/1997
Worcester	MA	Worcester Regional	ORH		$3.00	$1,021,417	13y3m	9/1/1999	12/1/2011
Alpena	MI	Alpena County Regional	APN	CS	$3.00	$268,480	4y4m	8/1/2001	12/1/2005
Alpena	MI	Alpena County Regional	APN	CS	$4.50	**	2y8m	12/1/2005	8/1/2008

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Alpena	MI	Alpena County Regional	APN	CS	$4.50	$193,959	4y5m	8/1/2008	1/1/2013
Detroit	MI	Detroit City	DET		$3.00	$240,053	4y2m	1/1/2000	3/1/2004
Detroit	MI	Detroit Metropolitan Wayne County	DTW	L	$3.00	$2,198,215,360	8y9m	1/1/1993	10/1/2001
Detroit	MI	Detroit Metropolitan Wayne County	DTW	L	$4.50	**	24y7m	10/1/2001	5/1/2026
Detroit	MI	Detroit Metropolitan Wayne County	DTW	L	$4.50	$966,117,476	8y3m	5/1/2026	8/1/2034
Escanaba	MI	Delta County	ESC	CS	$3.00	$164,496	5y2m	2/1/1993	11/1/1997
Escanaba	MI	Delta County	ESC	CS	$3.00	$182,700	1y11m	8/1/1998	7/1/2000
Escanaba	MI	Delta County	ESC	CS	$3.00	$114,900	2y5m	10/1/2001	3/1/2004
Escanaba	MI	Delta County	ESC	CS	$4.50	$40,000	1y10m	3/1/2004	1/1/2006
Escanaba	MI	Delta County	ESC	CS	$4.50	$322,158	6y9m	4/1/2006	1/1/2013
Flint	MI	Bishop International	FNT	S	$3.00	$31,865,870	8y1m	9/1/1993	10/1/2001
Flint	MI	Bishop International	FNT	S	$4.50	**	16y3m	10/1/2001	1/1/2018
Grand Rapids	MI	Gerald R. Ford International	GRR	S	$3.00	$94,359,802	12y11m	12/1/1992	11/1/2005
Grand Rapids	MI	Gerald R. Ford International	GRR	S	$4.50	**	10y11m	11/1/2005	10/1/2016
Grand Rapids	MI	Gerald R. Ford International	GRR	S	$4.50	$7,654,985	3y4m	10/1/2016	2/1/2020
Hancock	MI	Houghton County Memorial	CMX	N	$3.00	$164,920	2y8m	7/1/1993	3/1/1996
Hancock	MI	Houghton County Memorial	CMX	N	$3.00	$149,326	3y	7/1/1996	7/1/1999
Hancock	MI	Houghton County Memorial	CMX	N	$3.00	$387,250	5y9m	10/1/1999	7/1/2005
Hancock	MI	Houghton County Memorial	CMX	N	$4.50	**	3m	7/1/2005	10/1/2005
Hancock	MI	Houghton County Memorial	CMX	N	$4.50	$711,793	7y4m	10/1/2005	2/1/2013
Iron Mountain Kingsford	MI	Ford	IMT	CS	$3.00	$176,029	8y9m	9/1/1995	6/1/2004
Ironwood	MI	Gogebic-Iron County	IWD		$3.00	$90,531	13y2m	8/1/1993	10/1/2006
Ironwood	MI	Gogebic-Iron County	IWD		$4.50	$128,549	18y8m	6/1/2007	2/1/2026
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$3.00	$1,089,716	3y2m	4/1/1997	6/1/2000
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$3.00	$5,312,429	4y	1/1/2001	1/1/2005
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$4.50	**	1y7m	1/1/2005	8/1/2006
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$4.50	$1,279,785	1y6m	10/1/2006	4/1/2008
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$4.50	$14,821,076	16y	9/1/2008	9/1/2024
Lansing	MI	Capital Region International	LAN	N	$3.00	$9,380,340	8y9m	10/1/1993	7/1/2002
Lansing	MI	Capital Region International	LAN	N	$4.50	**	1y4m	7/1/2002	11/1/2003
Lansing	MI	Capital Region International	LAN	N	$4.50	$21,115,759	10y	11/1/2003	11/1/2013
Manistee	MI	Manistee County-Blacker	MBL	CS	$4.50	$388,986	32y5m	6/1/2008	11/1/2040
Marquette	MI	Marquette County	MQT	N	$3.00	$62,225	4y	12/1/1992	12/1/1996
Marquette	MI	Sawyer International	SAW/MQT	N	$3.00	$1,077,540	4y3m	4/1/1998	7/1/2002
Marquette	MI	Sawyer International	SAW/MQT	N	$4.50	**	6m	7/1/2002	1/1/2003
Marquette	MI	Sawyer International	SAW/MQT	N	$4.50	$773,078	3y8m	1/1/2003	9/1/2006
Marquette	MI	Sawyer International	SAW/MQT	N	$4.50	$150,711	1y7m	10/1/2006	5/1/2008
Marquette	MI	Sawyer International	SAW/MQT	N	$4.50	$852,250	3y	8/1/2008	8/1/2011

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Muskegon	MI	Muskegon County	MKG	N	$3.00	$5,013,088	10y1m	5/1/1994	5/1/2004
Muskegon	MI	Muskegon County	MKG	N	$4.50	**	16y6m	5/1/2004	11/1/2020
Pellston	MI	Pellston Regional Airport of Emmet County	PLN	N	$3.00	$159,752	4y6m	3/1/1993	9/1/1997
Pellston	MI	Pellston Regional Airport of Emmet County	PLN	N	$3.00	$916,433	13y7m	12/1/1997	7/1/2011
Pellston	MI	Pellston Regional Airport of Emmet County	PLN	N	$4.50	$415,974	3y3m	7/1/2011	10/1/2014
Saginaw	MI	MBS International	MBS	N	$3.00	$6,119,950	10y5m	2/1/1997	7/1/2007
Saginaw	MI	MBS International	MBS	N	$4.50	**	9m	7/1/2007	4/1/2008
Saginaw	MI	MBS International	MBS	N	$4.50	$13,233,477	21y5m	4/1/2008	9/1/2029
Sault Ste. Marie	MI	Chippewa County International	CIU	N	$4.50	$1,087,463	17y8m	11/1/2005	7/1/2023
Traverse City	MI	Cherry Capital	TVC	N	$3.00	$3,637,041	5y	1/1/1997	1/1/2002
Traverse City	MI	Cherry Capital	TVC	N	$4.50	**	1y9m	1/1/2002	10/1/2003
Traverse City	MI	Cherry Capital	TVC	N	$4.50	$6,441,642	7y2m	10/1/2003	12/1/2010
Traverse City	MI	Cherry Capital	TVC	N	$4.50	$2,452,975	3y	2/1/2011	2/1/2014
Bemidji	MN	Bemidji Regional	BJI	N	$3.00	$362,099	5y3m	11/1/1996	2/1/2002
Bemidji	MN	Bemidji Regional	BJI	N	$4.50	$401,336	3y6m	2/1/2002	8/1/2005
Bemidji	MN	Bemidji Regional	BJI	N	$4.50	$790,324	7y7m	6/1/2006	1/1/2014
Brainerd	MN	Brainerd Lakes Regional	BRD	N	$3.00	$313,455	7y11m	8/1/1993	7/1/2001
Brainerd	MN	Brainerd Lakes Regional	BRD	N	$4.50	$1,833,556	32y1m	7/1/2001	8/1/2033
Duluth	MN	Duluth International	DLH	N	$3.00	$2,341,795	7y6m	10/1/1994	4/1/2002
Duluth	MN	Duluth International	DLH	N	$4.50	$1,278,964	2y7m	4/1/2002	11/1/2004
Duluth	MN	Duluth International	DLH	N	$4.50	$5,204,309	9y7m	4/1/2005	11/1/2014
Grand Rapids	MN	Grand Rapids/Itasca County	GPZ		$3.00	$151,263	3y10m	12/1/1997	10/1/2001
Grand Rapids	MN	Grand Rapids/Itasca County	GPZ		$4.50	**	5y3m	10/1/2001	1/1/2007
Hibbing	MN	Range Regional	HIB	N	$3.00	$338,299	7y1m	6/1/1996	7/1/2003
Hibbing	MN	Range Regional	HIB	N	$4.50	**	3y10m	7/1/2003	5/1/2007
Hibbing	MN	Range Regional	HIB	N	$4.50	$461,737	10y6m	5/1/2007	11/1/2017
International Falls	MN	Falls International	INL	N	$3.00	$597,058	7y6m	12/1/1994	6/1/2002
International Falls	MN	Falls International	INL	N	$4.50	**	3y	6/1/2002	6/1/2005
International Falls	MN	Falls International	INL	N	$4.50	$477,226	9y7m	11/1/2005	6/1/2015
Minneapolis	MN	Minneapolis-St Paul International/Wold-Chamberlain	MSP	L	$3.00	$430,142,570	8y10m	6/1/1992	4/1/2001
Minneapolis	MN	Minneapolis-St Paul International/Wold-Chamberlain	MSP	L	$4.50	**	1y10m	4/1/2001	2/1/2003
Minneapolis	MN	Minneapolis-St Paul International/Wold-Chamberlain	MSP	L	$4.50	$1,121,742,10 7	16y5m	2/1/2003	7/1/2019
Rochester	MN	Rochester International	RST	N	$3.00	$5,507,696	5y10m	5/1/1996	3/1/2002
Rochester	MN	Rochester International	RST	N	$4.50	**	6y5m	3/1/2002	8/1/2008
Rochester	MN	Rochester International	RST	N	$4.50	$3,868,625	7y2m	8/1/2008	10/1/2015
St. Cloud	MN	St. Cloud Regional	STC		$3.00	$1,147,578	2y5m	2/1/2000	7/1/2002
St. Cloud	MN	St. Cloud Regional	STC		$4.50	**	11y6m	7/1/2002	1/1/2014
Thief River Falls	MN	Thief River Falls Regional	TVF		$4.50	$636,828	20y	6/1/2003	6/1/2023
Rota Island	MP	Rota International	GRO/ ROP	N	$4.50	$1,777,742	11y8m	1/1/2005	8/1/2016
Saipan Island	MP	Francisco C. Ada/Saipan International	GSN/S PN	S	$4.50	$29,573,280	11y8m	1/1/2005	8/1/2016

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Tinian Island	MP	Tinian International	TNI/TIQ	N	$4.50	$1,705,526	11y8m	1/1/2005	8/1/2016
Columbus	MS	Golden Triangle Regional	GTR	N	$3.00	$1,526,314	8y8m	8/1/1992	4/1/2001
Columbus	MS	Golden Triangle Regional	GTR	N	$4.50	**	2y9m	4/1/2001	1/1/2004
Columbus	MS	Golden Triangle Regional	GTR	N	$4.50	$2,149,304	14y9m	1/1/2004	10/1/2018
Greenville	MS	Mid Delta Regional	GLH	CS	$3.00	$148,873	4y4m	10/1/1998	2/1/2003
Greenville	MS	Mid Delta Regional	GLH	CS	$3.00	*	4m	4/1/2003	8/1/2003
Greenville	MS	Mid Delta Regional	GLH	CS	$3.00	$21,327	1y8m	8/1/2003	4/1/2005
Greenville	MS	Mid Delta Regional	GLH	CS	$4.50	**	8m	4/1/2005	12/1/2005
Greenville	MS	Mid Delta Regional	GLH	CS	$4.50	$162,432	5y4m	12/1/2005	8/1/2011
Gulfport	MS	Gulfport-Biloxi International	GPT	S	$3.00	$8,247,199	9y1m	7/1/1992	8/1/2001
Gulfport	MS	Gulfport-Biloxi International	GPT	S	$3.00	*	6m	12/1/2001	6/1/2002
Gulfport	MS	Gulfport-Biloxi International	GPT	S	$3.00	$1,031,474	9m	6/1/2002	5/1/2003
Gulfport	MS	Gulfport-Biloxi International	GPT	S	$4.50	$57,145,388	24y8m	5/1/2003	1/1/2028
Hattiesburg	MS	Hattiesburg-Laurel Regional	PIB	N	$3.00	$237,929	8y11m	7/1/1992	6/1/2001
Hattiesburg	MS	Hattiesburg-Laurel Regional	PIB	N	$4.50	$697,709	11y11m	6/1/2001	5/1/2013
Jackson	MS	Jackson-Evers International	JAN	S	$3.00	$22,059,819	10y5m	5/1/1993	10/1/2003
Jackson	MS	Jackson-Evers International	JAN	S	$4.50	**	2y3m	10/1/2003	1/1/2006
Jackson	MS	Jackson-Evers International	JAN	S	$4.50	$29,282,321	9y2m	1/1/2006	3/1/2015
Meridian	MS	Key Field	MEI	N	$3.00	$293,059	3y9m	11/1/1992	8/1/1996
Meridian	MS	Key Field	MEI	N	$3.00	$436,597	4y9m	3/1/1997	12/1/2001
Meridian	MS	Key Field	MEI	N	$4.50	**	2y5m	12/1/2001	5/1/2004
Meridian	MS	Key Field	MEI	N	$4.50	$1,640,134	15y	10/1/2005	10/1/2020
Tupelo	MS	Tupelo Regional	TUP	N	$3.00	$457,216	8y5m	11/1/1994	4/1/2003
Tupelo	MS	Tupelo Regional	TUP	N	$4.50	**	8m	4/1/2003	1/1/2004
Tupelo	MS	Tupelo Regional	TUP	N	$4.50	$1,285,973	14y11m	1/1/2004	12/1/2018
Columbia	MO	Columbia Regional	COU	N	$4.50	$809,302	10y3m	11/1/2002	2/1/2013
Joplin	MO	Joplin Regional	JLN	CS	$4.50	$889,664	9y2m	4/1/2003	6/1/2012
Kansas City	MO	Kansas City International	MCI	M	$3.00	$339,142,503	9y5m	3/1/1996	8/1/2005
Kansas City	MO	Kansas City International	MCI	M	$4.50	**	7y11m	8/1/2005	7/1/2013
Kansas City	MO	Kansas City International	MCI	M	$4.50	$30,646,859	1y	7/1/2013	7/1/2014
Kansas City	MO	Kansas City International	MCI	M	$3.00	$22,679,060	11m	7/1/2014	6/1/2015
Springfield	MO	Springfield-Branson National	SGF	S	$3.00	$3,110,598	3y9m	11/1/1993	5/1/1997
Springfield	MO	Springfield-Branson National	SGF	S	$3.00	$6,370,614	2y10m	7/1/1998	5/1/2001
Springfield	MO	Springfield-Branson National	SGF	S	$4.50	**	2y7m	5/1/2001	1/1/2004
Springfield	MO	Springfield-Branson National	SGF	S	$4.50	$2,168,000	1y3m	5/1/2004	8/1/2005
Springfield	MO	Springfield-Branson National	SGF	S	$4.50	$900,000	6m	9/1/2005	3/1/2006
Springfield	MO	Springfield-Branson National	SGF	S	$4.50	$83,651,097	29y	1/1/2007	1/1/2036
St Louis	MO	Lambert-St Louis International	STL	M	$3.00	$324,539,342	9y	12/1/1992	12/1/2001
St Louis	MO	Lambert-St Louis International	STL	M	$4.50	**	12y1m	12/1/2001	5/1/2002
St Louis	MO	Lambert-St Louis International	STL	M	$4.50	$783,625,492	19y9m	5/1/2002	2/1/2022
Billings	MT	Billings Logan International	BIL	S	$3.00	$18,555,709	19y6m	4/1/1994	10/1/2013
Bozeman	MT	Gallatin Field	BZN	S	$3.00	$9,144,326	15y7m	8/1/1993	3/1/2009

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Bozeman	MT	Gallatin Field	BZN	S	$4.50	$31,200,000	19y4m	3/1/2009	7/1/2028
Butte	MT	Bert Mooney	BTM	N	$3.00	$1,289,307	11y11m	7/1/1994	6/1/2006
Butte	MT	Bert Mooney	BTM	N	$3.00	$112,047	1y1m	7/1/2006	8/1/2007
Butte	MT	Bert Mooney	BTM	N	$3.00	$146,916	2y4m	11/1/2007	3/1/2010
Butte	MT	Bert Mooney	BTM	N	$4.50	$271,635	2y11m	3/1/2010	2/1/2013
Great Falls	MT	Great Falls International	GTF	N	$3.00	$3,059,263	9y8m	11/1/1992	7/1/2002
Great Falls	MT	Great Falls International	GTF	N	$4.50	$8,826,161	20y3m	7/1/2002	8/1/2018
Helena	MT	Helena Regional	HLN	N	$3.00	$1,949,098	9y4m	4/1/1993	8/1/2002
Helena	MT	Helena Regional	HLN	N	$4.50	**	1y2m	8/1/2002	10/1/2003
Helena	MT	Helena Regional	HLN	N	$4.50	$3,831,691	11y4m	10/1/2003	2/1/2015
Kalispell	MT	Glacier Park International	GPI/FCA	N	$3.00	$10,997,914	11y5m	12/1/1993	4/1/2005
Kalispell	MT	Glacier Park International	GPI/FCA	N	$4.50	**	11y3m	4/1/2005	7/1/2016
Kalispell	MT	Glacier Park International	GPI/FCA	N	$4.50	$833,138	1y4m	7/1/2016	11/1/2017
Missoula	MT	Missoula International	MSO	N	$3.00	$5,110,384	8y7m	9/1/1992	4/1/2001
Missoula	MT	Missoula International	MSO	N	$4.50	**	1y2m	4/1/2001	6/1/2002
Missoula	MT	Missoula International	MSO	N	$4.50	$14,996,624	15y5m	6/1/2002	11/1/2017
West Yellowstone	MT	Yellowstone	WYS	CS	$4.50	$277,202	14y	6/1/2011	6/1/2025
Grand Island	NE	Central Nebraska Regional	GRI	N	$3.00	$50,370	2y2m	2/1/1999	4/1/2001
Grand Island	NE	Central Nebraska Regional	GRI	N	$4.50	$1,460,580	15y	5/1/2001	5/1/2016
Kearney	NE	Kearney Regional	EAR	CS	$4.00	$0	1y10m	11/1/2005	9/1/2007
Kearney	NE	Kearney Regional	EAR	CS	$4.50	$231,600	3y10m	9/1/2007	7/1/2011
Kearney	NE	Kearney Regional	EAR	CS	$4.50	$191,378	4y6m	10/1/2011	4/1/2016
Scottsbluff	NE	Western Nebraska Regional/ William B. Heilig Field	BFF	CS	$3.00	$0	3y	3/1/2000	3/1/2003
Scottsbluff	NE	Western Nebraska Regional/ William B. Heilig Field	BFF	CS	$4.50	$1,299,534	20y	7/1/2004	7/1/2024
Elko	NV	Elko Regional	EKO	N	$3.00	$6,790,017	5y2m	9/1/1998	11/1/2003
Elko	NV	Elko Regional	EKO	N	$4.50	**	17y3m	11/1/2003	2/1/2021
Las Vegas	NV	McCarran International	LAS	L	$3.00	$849,713,056	12y5m	6/1/1992	11/1/2004
Las Vegas	NV	McCarran International	LAS	L	$4.50	**	1y10m	11/1/2004	9/1/2006
Las Vegas	NV	McCarran International	LAS	L	$3.00	**	4m	9/1/2006	1/1/2007
Las Vegas	NV	McCarran International	LAS	L	$4.00	**	1y9m	1/1/2007	10/1/2008
Las Vegas	NV	McCarran International	LAS	L	$4.50	$3,713,433,002	45y1m	10/1/2008	11/1/2053
Reno	NV	Reno/Tahoe International	RNO	M	$3.00	$61,222,704	7y1m	1/1/1994	2/1/2001
Reno	NV	Reno/Tahoe International	RNO	M	$4.50	$7,258,689	10m	8/1/2001	6/1/2002
Reno	NV	Reno/Tahoe International	RNO	M	$3.00	$6,734,192	8m	6/1/2002	2/1/2003
Reno	NV	Reno/Tahoe International	RNO	M	$4.50	$11,922,040	1y8m	2/1/2003	10/1/2004
Reno	NV	Reno/Tahoe International	RNO	M	$3.00	**	2m	10/1/2004	12/1/2004
Reno	NV	Reno/Tahoe International	RNO	M	$3.00	$53,000,000	5m	12/1/2004	4/1/2005
Reno	NV	Reno/Tahoe International	RNO	M	$4.50	**	2y4m	4/1/2005	7/1/2007
Reno	NV	Reno/Tahoe International	RNO	M	$3.00	$3,066,408	5m	7/1/2007	12/1/2007
Reno	NV	Reno/Tahoe International	RNO	M	$4.50	$58,369,376	9y4m	12/1/2007	4/1/2017
Lebanon	NH	Lebanon Municipal	LEB	CS	$3.00	$530,630	7y	8/1/1995	8/1/2002

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Lebanon	NH	Lebanon Municipal	LEB	CS	$4.50	$63,774	2y6m	11/1/2003	5/1/2006
Lebanon	NH	Lebanon Municipal	LEB	CS	$4.50	$203,144	6y1m	10/1/2007	11/1/2013
Manchester	NH	Manchester	MHT	S	$3.00	$123,305,983	15y	1/1/1993	1/1/2008
Manchester	NH	Manchester	MHT	S	$4.50	**	7y7m	1/1/2008	8/1/2015
Manchester	NH	Manchester	MHT	S	$4.50	$75,185,261	7y4m	8/1/2015	12/1/2022
Atlantic City	NJ	Atlantic City International	ACY	S	$3.00	$15,912,616	6y2m	10/1/1999	12/1/2005
Atlantic City	NJ	Atlantic City International	ACY	S	$4.50	**	3y5m	12/1/2005	4/1/2009
Atlantic City	NJ	Atlantic City International	ACY	S	$4.50	$14,594,296	5y1m	4/1/2009	5/1/2014
Newark	NJ	Newark Liberty International	EWR	L	$3.00	$935,667,735	13y6m	10/1/1992	4/1/2006
Newark	NJ	Newark Liberty International	EWR	L	$4.50	**	5y3m	4/1/2006	7/1/2011
Newark	NJ	Newark Liberty International	EWR	L	$4.50	$191,631,217	2y11m	7/1/2011	6/1/2014
Trenton	NJ	Trenton Mercer	TTN		$3.00	$0	3y4m	1/1/2001	5/1/2004
Trenton	NJ	Trenton Mercer	TTN		$4.50	$1,061,436	8y10m	5/1/2004	3/1/2013
Albuquerque	NM	Albuquerque International Sunport	ABQ	M	$3.00	$169,822,308	15y	7/1/1996	7/1/2011
Albuquerque	NM	Albuquerque International Sunport	ABQ	M	$4.50	**	6y3m	7/1/2011	10/1/2017
Farmington	NM	Four Corners Regional	FMN	N	$3.00	$661,102	13y11m	6/1/2003	5/1/2017
Roswell	NM	Roswell International Air Center	ROW	N	$3.00	$334,477	4y10m	4/1/1999	2/1/2004
Roswell	NM	Roswell International Air Center	ROW	N	$4.50	**	4m	2/1/2004	6/1/2004
Roswell	NM	Roswell International Air Center	ROW	N	$3.00	**	1y	6/1/2004	6/1/2005
Roswell	NM	Roswell International Air Center	ROW	N	$4.50	**	2y8m	6/1/2005	2/1/2008
Roswell	NM	Roswell International Air Center	ROW	N	$4.50	$776,507	5y8m	3/1/2008	11/1/2013
Albany	NY	Albany International	ALB	S	$3.00	$116,740,338	15y6m	3/1/1994	9/1/2009
Albany	NY	Albany International	ALB	S	$4.50	**	10y5m	9/1/2009	2/1/2020
Binghamton	NY	Greater Binghamton/Edwin A. Link Field	BGM	N	$3.00	$4,684,325	8y10m	11/1/1993	9/1/2002
Binghamton	NY	Greater Binghamton/Edwin A. Link Field	BGM	N	$4.50	**	3y10m	9/1/2002	7/1/2006
Binghamton	NY	Greater Binghamton/Edwin A. Link Field	BGM	N	$4.50	$559,849	3y2m	7/1/2006	2/1/2008
Binghamton	NY	Greater Binghamton/Edwin A. Link Field	BGM	N	$4.50	$4,909,532	8y4m	5/1/2008	9/1/2016
Buffalo	NY	Buffalo Niagara International	BUF	M	$3.00	$149,995,516	14y11m	8/1/1992	8/1/2007
Buffalo	NY	Buffalo Niagara International	BUF	M	$4.50	**	5y3m	8/1/2007	11/1/2012
Buffalo	NY	Buffalo Niagara International	BUF	M	$4.50	$17,214,369	1y7m	11/1/2012	6/1/2014
Elmira	NY	Elmira/Corning Regional	ELM	N	$3.00	$733,042	3y1m	12/1/2004	1/1/2008
Elmira	NY	Elmira/Corning Regional	ELM	N	$4.50	$5,857,162	12y7m	5/1/2008	12/1/2020
Islip	NY	Long Island MacArthur	ISP	S	$3.00	$27,723,078	10y9m	12/1/1994	9/1/2005
Islip	NY	Long Island MacArthur	ISP	S	$4.50	$37,133,218	9y7m	9/1/2005	4/1/2015
Ithaca	NY	Ithica Tompkins Regional	ITH	N	$3.00	$6,872,612	16y2m	1/1/1993	3/1/2009
Ithaca	NY	Ithica Tompkins Regional	ITH	N	$4.50	**	7y2m	3/1/2009	5/1/2016
Jamestown	NY	Chautauqua County/Jamestown	JHW	CS	$3.00	$593,058	9y2m	6/1/1993	8/1/2002
Jamestown	NY	Chautauqua County/Jamestown	JHW	CS	$4.50	$200,112	11y2m	9/1/2004	11/1/2015
Massena	NY	Massena International - Richards Field	MSS	CS	$3.00	$163,429	19y7m	4/1/1996	11/1/2015
New York	NY	John F. Kennedy International	JFK	L	$3.00	$992,679,240	13y6m	10/1/1992	4/1/2006
New York	NY	John F. Kennedy International	JFK	L	$4.50	**	5y3m	4/1/2006	7/1/2011

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New York	NY	John F. Kennedy International	JFK	L	$4.50	$255,794,990	2y11m	7/1/2011	6/1/2014
New York	NY	LaGuardia	LGA	L	$3.00	$702,439,084	13y6m	10/1/1992	4/1/2006
New York	NY	LaGuardia	LGA	L	$4.50	**	5y3m	4/1/2006	7/1/2011
New York	NY	LaGuardia	LGA	L	$4.50	$121,561,393	2y11m	7/1/2011	6/1/2014
Newburgh	NY	Stewart International	SWF	N	$3.00	$8,827,899	6y4m	11/1/1995	3/1/2002
Newburgh	NY	Stewart International	SWF	N	$4.50	**	3y8m	3/1/2002	11/1/2005
Newburgh	NY	Stewart International	SWF	N	$4.50	$254,187	4m	5/1/2007	9/1/2007
Newburgh	NY	Stewart International	SWF	N	$4.50	$4,415,202	3y7m	7/1/2010	2/1/2014
Ogdensburg	NY	Ogdensburg Intl	OGS		$3.00	$125,050	23y8m	4/1/1996	12/1/2019
Plattsburgh	NY	Clinton County	PLB	N	$3.00	$184,658	7y8m	7/1/1993	3/1/2001
Plattsburgh	NY	Clinton County	PLB	N	$3.00	$46,317	3y10m	6/1/2001	4/1/2003
Plattsburgh	NY	Plattsburgh International	PBG	N	$4.50	$56,902,809	34y1m	1/1/2009	2/1/2043
Rochester	NY	Greater Rochester International	ROC	S	$3.00	$20,664,219	6y8m	12/1/1997	9/1/2004
Rochester	NY	Greater Rochester International	ROC	S	$4.50	$77,242,638	16y9m	9/1/2004	6/1/2021
Saranac Lake	NY	Adirondack Regional	SLK	CS	$3.00	$120,749	13y1m	8/1/1994	9/1/2007
Saranac Lake	NY	Adirondack Regional	SLK	CS	$4.50	$470,825	22y4m	2/1/2011	6/1/2033
Syracuse	NY	Syracuse Hancock International	SYR	S	$3.00	$15,445,446	6y3m	10/1/1995	1/1/2002
Syracuse	NY	Syracuse Hancock International	SYR	S	$4.50	$10,495,193	2y10m	10/1/2002	8/1/2005
Syracuse	NY	Syracuse Hancock International	SYR	S	$4.50	$4,248,943	1y3m	11/1/2005	2/1/2007
Syracuse	NY	Syracuse Hancock International	SYR	S	$4.50	$96,732,010	19y4m	4/1/2007	8/1/2026
Utica	NY	Oneida County	UCA		$3.00	$1,298,631	12y10m	8/1/1997	6/1/2010
White Plains	NY	Westchester County	HPN	S	$3.00	$15,546,537	8y10m	2/1/1993	12/1/2001
White Plains	NY	Westchester County	HPN	S	$4.50	**	2y5m	12/1/2001	5/1/2004
White Plains	NY	Westchester County	HPN	S	$4.50	$34,300,000	9y3m	5/1/2004	8/1/2013
Asheville	NC	Asheville Regional	AVL	S	$3.00	$5,622,844	7y10m	12/1/1994	10/1/2002
Asheville	NC	Asheville Regional	AVL	S	$4.50	$4,916,517	4y1m	10/1/2002	11/1/2006
Asheville	NC	Asheville Regional	AVL	S	$4.50	$478,051	5m	4/1/2007	9/1/2007
Asheville	NC	Asheville Regional	AVL	S	$4.50	$11,754,891	10y4m	10/1/2007	2/1/2018
Charlotte	NC	Charlotte/Douglas International	CLT	L	$3.00	$1,039,775,656	18y9m	11/1/2004	8/1/2023
Fayetteville	NC	Fayetteville Regional/Grannis Field	FAY	N	$3.00	$1,676,077	5y3m	11/1/2000	2/1/2006
Fayetteville	NC	Fayetteville Regional/Grannis Field	FAY	N	$4.00	$3,796,330	4y11m	7/1/2009	6/1/2014
Greensboro	NC	Piedmont Triad International	GSO	S	$4.50	$43,872,158	10y8m	9/1/2011	5/1/2022
Greenville	NC	Pitt-Greenville	PGV	N	$3.00	$494,486	3y6m	10/1/1997	4/1/2001
Greenville	NC	Pitt-Greenville	PGV	N	$4.50	**	3m	4/1/2001	7/1/2001
Greenville	NC	Pitt-Greenville	PGV	N	$4.50	$11,487,343	37y3m	7/1/2001	10/1/2038
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	$208,878	2y9m	1/1/1996	10/1/1998
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	*	11m	9/1/1999	8/1/2000
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	$988,225	3y10m	3/1/2005	1/1/2009
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	$115,842	2y9m	2/1/2009	11/1/2011
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	$11,845,235	3m	11/1/2011	2/1/2012
Jacksonville	NC	Albert J. Ellis	OAJ	N	$4.50	**	17y2m	2/1/2012	4/1/2029
New Bern	NC	Coastal Carolina Regional	EWN	N	$3.00	$10,681,398	6y9m	2/1/1997	11/1/2003

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New Bern	NC	Coastal Carolina Regional	EWN	N	$4.50	**	21y	11/1/2003	11/1/2024
New Bern	NC	Coastal Carolina Regional	EWN	N	$4.50	$518,877	11m	11/1/2024	10/1/2025
Raleigh	NC	Raleigh-Durham International	RDU	M	$3.00	$7,439,029	1y6m	4/1/2003	10/1/2004
Raleigh	NC	Raleigh-Durham International	RDU	M	$4.50	$765,251,376	28y11m	10/1/2004	9/1/2032
Wilmington	NC	Wilmington International	ILM	S	$3.00	$1,526,487	2y7m	2/1/1994	9/1/1996
Wilmington	NC	Wilmington International	ILM	S	$3.00	$7,984,994	4y11m	6/1/1998	5/1/2003
Wilmington	NC	Wilmington International	ILM	S	$4.50	**	3y11m	5/1/2003	4/1/2007
Wilmington	NC	Wilmington International	ILM	S	$4.50	$15,574,579	12y6m	4/1/2007	10/1/2019
Bismarck	ND	Bismarck Municipal	BIS	N	$3.00	$349,092	1y	7/1/1996	7/1/1997
Bismarck	ND	Bismarck Municipal	BIS	N	$3.00	$1,342,095	3y10m	6/1/1998	4/1/2002
Bismarck	ND	Bismarck Municipal	BIS	N	$4.50	$12,915,129	19y10m	4/1/2002	2/1/2022
Fargo	ND	Hector International	FAR	S	$3.00	$4,633,814	5y7m	1/1/1997	8/1/2002
Fargo	ND	Hector International	FAR	S	$4.50	**	1y11m	8/1/2002	7/1/2004
Fargo	ND	Hector International	FAR	S	$4.50	$21,050,526	19y1m	7/1/2004	8/1/2023
Grand Forks	ND	Grand Forks International	GFK	N	$3.00	$680,106	3y6m	2/1/1993	8/1/1996
Grand Forks	ND	Grand Forks International	GFK	N	$3.00	$1,649,102	3y11m	5/1/1997	4/1/2001
Grand Forks	ND	Grand Forks International	GFK	N	$4.50	**	2y2m	4/1/2001	6/1/2003
Grand Forks	ND	Grand Forks International	GFK	N	$4.50	$1,506,569	4y5m	5/1/2004	10/1/2008
Grand Forks	ND	Grand Forks International	GFK	N	$4.50	$3,211,072	9y	1/1/2009	1/1/2018
Minot	ND	Minot International	MOT	N	$3.00	$825,445	4y4m	3/1/1994	7/1/1998
Minot	ND	Minot International	MOT	N	$3.00	$990,656	2y11m	3/1/1999	2/1/2002
Minot	ND	Minot International	MOT	N	$4.50	**	1y2m	2/1/2002	4/1/2003
Minot	ND	Minot International	MOT	N	$4.50	$2,432,182	9y4m	4/1/2003	8/1/2012
Akron	OH	Akron-Canton Regional	CAK	S	$3.00	$9,066,039	10y	9/1/1992	9/1/2002
Akron	OH	Akron-Canton Regional	CAK	S	$4.50	$44,624,553	16y4m	9/1/2002	1/1/2019
Cleveland	OH	Cleveland-Hopkins International	CLE	M	$3.00	$199,934,647	9y4m	11/1/1992	3/1/2002
Cleveland	OH	Cleveland-Hopkins International	CLE	M	$4.50	**	2y5m	3/1/2002	8/1/2004
Cleveland	OH	Cleveland-Hopkins International	CLE	M	$4.50	$360,575,600	16y6m	8/1/2004	2/1/2021
Columbus	OH	Port Columbus International	CMH	M	$3.00	$128,445,302	9y6m	10/1/1992	4/1/2002
Columbus	OH	Port Columbus International	CMH	M	$4.50	**	2y6m	4/1/2002	10/1/2004
Columbus	OH	Port Columbus International	CMH	M	$4.50	$334,181,216	19y4m	10/1/2004	2/1/2024
Dayton	OH	James M Cox Dayton International	DAY	S	$3.00	$28,098,728	6y11m	10/1/1994	9/1/2001
Dayton	OH	James M Cox Dayton International	DAY	S	$4.50	**	1y10m	9/1/2001	7/1/2003
Dayton	OH	James M Cox Dayton International	DAY	S	$4.50	$95,294,745	14y4m	7/1/2003	11/1/2017
Toledo	OH	Toledo Express	TOL	N	$3.00	$2,246,374	3y	9/1/1993	9/1/1996
Toledo	OH	Toledo Express	TOL	N	$3.00	$6,442,493	4y	7/1/1997	7/1/2001
Toledo	OH	Toledo Express	TOL	N	$4.50	**	2y6m	7/1/2001	1/1/2004
Toledo	OH	Toledo Express	TOL	N	$4.50	$7,789,544	14y5m	1/1/2004	6/1/2018
Youngstown	OH	Youngstown-Warren Regional	YNG	N	$3.00	$214,384	2y2m	5/1/1994	7/1/1996
Youngstown	OH	Youngstown-Warren Regional	YNG	N	$3.00	$477,044	4y6m	8/1/1997	2/1/2002
Youngstown	OH	Youngstown-Warren Regional	YNG	N	$4.50	$2,493,885	22y10m	4/1/2007	2/1/2030
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$2.00	$452,189	1y5m	8/1/1992	1/1/1994
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$3.00	**	2y3m	1/1/1994	4/1/1996

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Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$3.00	$380,745	2y7m	1/1/1998	8/1/2000
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$4.50	$303,687	1y9m	6/1/2002	3/1/2004
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$4.50	$249,492	1y1m	9/1/2004	10/1/2005
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$4.50	$1,274,888	6y	11/1/2007	11/1/2013
Oklahoma City	OK	Will Rogers World	OKC	S	$3.00	$131,057,571	12y9m	7/1/1997	4/1/2010
Oklahoma City	OK	Will Rogers World	OKC	S	$4.50	**	10y1m	4/1/2010	5/1/2020
Oklahoma City	OK	Will Rogers World	OKC	S	$4.50	$5,226,000	7m	5/1/2020	12/1/2020
Tulsa	OK	Tulsa International	TUL	S	$3.00	$15,986,724	3y7m	8/1/1992	3/1/1996
Tulsa	OK	Tulsa International	TUL	S	$3.00	$118,426,569	12y11m	1/1/1997	8/1/2010
Tulsa	OK	Tulsa International	TUL	S	$4.50	**	8y4m	8/1/2010	4/1/2019
Tulsa	OK	Tulsa International	TUL	S	$4.50	$7,875,712	1y2m	4/1/2019	6/1/2020
Eugene	OR	Mahlon Sweet Field	EUG	S	$3.00	$6,537,176	7y7m	11/1/1993	6/1/2001
Eugene	OR	Mahlon Sweet Field	EUG	S	$4.50	$21,812,157	15y1m	6/1/2001	7/1/2016
Klamath Falls	OR	Klamath Falls	LMT	N	$3.00	$426,251	1y1m	3/1/2000	4/1/2001
Klamath Falls	OR	Klamath Falls	LMT	N	$4.50	**	3y1m	4/1/2001	5/1/2004
Klamath Falls	OR	Klamath Falls	LMT	N	$4.50	$877,799	7y7m	5/1/2004	12/1/2011
Medford	OR	Rogue Valley International - Medford	MFR	N	$3.00	$4,881,207	7y9m	7/1/1993	4/1/2001
Medford	OR	Rogue Valley International - Medford	MFR	N	$4.50	**	2y	4/1/2001	4/1/2003
Medford	OR	Rogue Valley International - Medford	MFR	N	$4.50	$28,869,233	22y5m	4/1/2003	9/1/2025
North Bend	OR	Southwest Oregon Regional	OTH	N	$3.00	$520,605	7y6m	2/1/1994	8/1/2001
North Bend	OR	Southwest Oregon Regional	OTH	N	$4.50	**	1y9m	8/1/2001	5/1/2003
North Bend	OR	Southwest Oregon Regional	OTH	N	$4.50	$2,557,363	17y9m	5/1/2003	2/1/2021
Pendleton	OR	Eastern Oregon Regional at Pendleton	PDT	CS	$3.00	$486,540	13y10m	12/1/1995	10/1/2009
Pendleton	OR	Eastern Oregon Regional at Pendleton	PDT	CS	$4.50	**	5y5m	10/1/2009	3/1/2015
Portland	OR	Portland International	PDX	M	$3.00	$613,687,685	9y3m	7/1/1992	10/1/2001
Portland	OR	Portland International	PDX	M	$4.50	**	14y7m	10/1/2001	5/1/2016
Portland	OR	Portland International	PDX	M	$4.50	$451,611,641	14y10m	5/1/2016	3/1/2031
Redmond	OR	Roberts Field	RDM	N	$3.00	$3,517,536	8y1m	10/1/1993	11/1/2001
Redmond	OR	Roberts Field	RDM	N	$4.50	**	2y1m	11/1/2001	12/1/2003
Redmond	OR	Roberts Field	RDM	N	$4.50	$2,083,546	3y	12/1/2003	12/1/2006
Redmond	OR	Roberts Field	RDM	N	$4.50	$27,930,168	33y4m	3/1/2007	7/1/2040
Allentown	PA	Lehigh Valley International	ABE	S	$3.00	$11,092,349	8y3m	11/1/1992	2/1/2001
Allentown	PA	Lehigh Valley International	ABE	S	$3.00	$2,807,572	5m	6/1/2001	11/1/2001
Allentown	PA	Lehigh Valley International	ABE	S	$4.50	**	1y2m	11/1/2001	1/1/2003
Allentown	PA	Lehigh Valley International	ABE	S	$4.50	$31,075,601	14y11m	9/1/2003	8/1/2018
Altoona	PA	Altoona-Blair County	AOO	CS	$3.00	$110,500	2y9m	5/1/1993	2/1/1996
Altoona	PA	Altoona-Blair County	AOO	CS	$3.00	$116,620	2y9m	1/1/1997	10/1/1999
Altoona	PA	Altoona-Blair County	AOO	CS	$3.00	$298,660	8y5m	7/1/2000	12/1/2008
Altoona	PA	Altoona-Blair County	AOO	CS	$4.50	**	3y	12/1/2008	12/1/2011
Altoona	PA	Altoona-Blair County	AOO	CS	$4.50	$139,918	3y	12/1/2011	12/1/2014
Bradford	PA	Bradford Regional	BFD	CS	$3.00	$206,793	7y9m	8/1/1995	5/1/2003

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Bradford	PA	Bradford Regional	BFD	CS	$4.50	$437,822	14y6m	5/1/2003	11/1/2017
Du Bois	PA	Dubois Regional	DUJ	CS	$3.00	$386,636	5y10m	6/1/1995	4/1/2001
Du Bois	PA	Dubois Regional	DUJ	CS	$4.50	**	2y7m	4/1/2001	11/1/2003
Du Bois	PA	Dubois Regional	DUJ	CS	$4.50	$325,413	9y6m	4/1/2004	10/1/2013
Erie	PA	Erie International/Tom Ridge Field	ERI	N	$3.00	$2,022,109	4y8m	10/1/1992	6/1/1997
Erie	PA	Erie International/Tom Ridge Field	ERI	N	$3.00	$1,216,914	3y5m	12/1/1997	5/1/2001
Erie	PA	Erie International/Tom Ridge Field	ERI	N	$4.50	$618,885	1y5m	8/1/2003	1/1/2005
Erie	PA	Erie International/Tom Ridge Field	ERI	N	$4.50	$12,070,540	19y7m	7/1/2005	2/1/2025
Harrisburg	PA	Harrisburg International	MDT	S	$3.00	$17,744,614	5y11m	2/1/1997	1/1/2003
Harrisburg	PA	Harrisburg International	MDT	S	$4.50	$118,372,500	31y6m	1/1/2003	7/1/2034
Johnstown	PA	John Murtha Johnstown-Cambria County	JST	CS	$3.00	$148,269	3y1m	11/1/1993	12/1/1996
Johnstown	PA	John Murtha Johnstown-Cambria County	JST	CS	$3.00	$510,227	5y4m	12/1/1997	5/1/2001
Johnstown	PA	John Murtha Johnstown-Cambria County	JST	CS	$4.50	**	5y8m	5/1/2001	1/1/2007
Johnstown	PA	John Murtha Johnstown-Cambria County	JST	CS	$4.50	$285,335	6y10m	7/1/2007	5/1/2014
Lancaster	PA	Lancaster	LNS	CS	$3.00	$384,858	14y	2/1/1995	2/1/2009
Latrobe	PA	Arnold Palmer Regional	LBE		$3.00	$1,397,687	17y2m	3/1/1996	5/1/2013
Philadelphia	PA	Philadelphia International	PHL	L	$3.00	$1,141,562,798	8y7m	9/1/1992	4/1/2001
Philadelphia	PA	Philadelphia International	PHL	L	$4.50	**	11y10m	4/1/2001	2/1/2013
Philadelphia	PA	Philadelphia International	PHL	L	$3.00	$24,400,000	5m	2/1/2013	7/1/2013
Philadelphia	PA	Philadelphia International	PHL	L	$4.50	$249,450,000	4y11m	7/1/2013	6/1/2018
Pittsburgh	PA	Pittsburgh International	PIT	M	$3.00	$100,098,648	3y2m	10/1/2001	12/1/2004
Pittsburgh	PA	Pittsburgh International	PIT	M	$4.50	**	1y9m	12/1/2004	9/1/2006
Pittsburgh	PA	Pittsburgh International	PIT	M	$4.50	$426,674,028	18y3m	9/1/2006	12/1/2024
Reading	PA	Reading Regional/Carl A Spaatz Field	RDG		$3.00	$1,006,653	13y7m	12/1/1994	7/1/2008
State College	PA	University Park	UNV/SCE	N	$3.00	$3,742,876	11y	11/1/1992	11/1/2003
State College	PA	University Park	UNV/SCE	N	$4.50	**	2y8m	11/1/2003	7/1/2006
State College	PA	University Park	UNV/SCE	N	$4.50	$5,621,690	8y5m	7/1/2006	12/1/2014
Wilkes-Barre	PA	Wilkes-Barre/Scranton International	AVP	N	$3.00	$4,453,122	3y6m	12/1/1993	6/1/1997
Wilkes-Barre	PA	Wilkes-Barre/Scranton International	AVP	N	$3.00	*	3y5m	12/1/1997	5/1/2001
Wilkes-Barre	PA	Wilkes-Barre/Scranton International	AVP	N	$4.50	$17,206,290	24y1m	5/1/2001	6/1/2025
Williamsport	PA	Williamsport Regional	IPT	N	$3.00	$132,488	1y6m	5/1/1997	11/1/1998
Aguadilla	PR	Rafael Hernandez	BQN	N	$3.00	$0	3y2m	3/1/1993	5/1/1996
Aguadilla	PR	Rafael Hernandez	BQN	N	$4.50	$9,828,476	16y	12/1/2005	12/1/2021
Ponce	PR	Mercedita	PSE	N	$3.00	$866,000	5y5m	3/1/1993	9/1/1998
San Juan	PR	Luis Munoz Marin International	SJU	M	$3.00	$186,378,136	12y9m	3/1/1993	12/1/2005
San Juan	PR	Luis Munoz Marin International	SJU	M	$4.50	**	2y6m	12/1/2005	6/1/2008
San Juan	PR	Luis Munoz Marin International	SJU	M	$4.50	$479,036,578	22y	6/1/2008	6/1/2030
San Juan	PR	Luis Munoz Marin International	SJU	M	$3.00	$19,713,152	1y7m	6/1/2030	1/1/2032

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Providence	RI	Theodore Francis Green State	PVD	M	$3.00	$100,136,720	12y7m	2/1/1994	9/1/2006
Providence	RI	Theodore Francis Green State	PVD	M	$4.50	**	1y6m	9/1/2006	3/1/2008
Providence	RI	Theodore Francis Green State	PVD	M	$4.50	$83,421,991	8y8m	3/1/2008	11/1/2016
Charleston	SC	Charleston AFB/International	CHS	S	$4.50	$14,833,920	3y3m	3/1/2010	6/1/2013
Columbia	SC	Columbia Metropolitan	CAE	S	$3.00	$70,528,884	8y1m	11/1/1993	12/1/2001
Columbia	SC	Columbia Metropolitan	CAE	S	$4.50	**	26y10m	12/1/2001	10/1/2028
Florence	SC	Florence Regional	FLO	N	$3.00	$669,334	3y11m	12/1/1995	11/1/1999
Florence	SC	Florence Regional	FLO	N	$3.00	*	2m	12/1/1999	2/1/2000
Hilton Head Island	SC	Hilton Head	HXD/HHH	N	$3.00	$1,542,300	6y4m	2/1/1994	6/1/2000
Hilton Head Island	SC	Hilton Head	HXD/HHH	N	$3.00	$1,375,156	6y10m	12/1/2000	10/1/2007
Myrtle Beach	SC	Myrtle Beach International	MYR	S	$3.00	$27,941,134	5y10m	10/1/1996	8/1/2001
Myrtle Beach	SC	Myrtle Beach International	MYR	S	$4.50	**	6y	8/1/2001	8/1/2007
Myrtle Beach	SC	Myrtle Beach International	MYR	S	$4.50	$104,020,700	21y7m	6/1/2010	1/1/2032
Aberdeen	SD	Aberdeen Regional	ABR	N	$3.00	$677,809	2y	1/1/2000	1/1/2002
Aberdeen	SD	Aberdeen Regional	ABR	N	$4.50	**	5y5m	1/1/2002	6/1/2007
Aberdeen	SD	Aberdeen Regional	ABR	N	$4.50	$533,588	6y5m	6/1/2007	11/1/2013
Pierre	SD	Pierre Regional	PIR	N	$4.50	$366,239	6y5m	2/1/2003	7/1/2009
Pierre	SD	Pierre Regional	PIR	N	$4.50	$422,107	7y	9/1/2009	9/1/2016
Rapid City	SD	Rapid City Regional	RAP	N	$3.00	$700,358	2y5m	8/1/1997	1/1/2000
Rapid City	SD	Rapid City Regional	RAP	N	$3.00	$4,109,960	6y	6/1/2000	6/1/2006
Rapid City	SD	Rapid City Regional	RAP	N	$4.50	**	9m	6/1/2006	5/1/2007
Rapid City	SD	Rapid City Regional	RAP	N	$4.50	$30,800,773	27y5m	5/1/2007	10/1/2034
Bristol	TN	Tri-Cities Regional TN/VA	TRI	N	$3.00	$10,521,507	10y5m	2/1/1997	7/1/2007
Bristol	TN	Tri-Cities Regional TN/VA	TRI	N	$4.50	**	4y8m	7/1/2007	3/1/2012
Bristol	TN	Tri-Cities Regional TN/VA	TRI	N	$4.50	$668,500	1y4m	3/1/2012	7/1/2013
Chattanooga	TN	Lovell Field	CHA	N	$3.00	$15,091,446	6y9m	7/1/1994	4/1/2001
Chattanooga	TN	Lovell Field	CHA	N	$4.50	**	3y7m	4/1/2001	11/1/2004
Chattanooga	TN	Lovell Field	CHA	N	$3.00	**	3m	11/1/2004	2/1/2005
Chattanooga	TN	Lovell Field	CHA	N	$4.50	**	5y6m	2/1/2005	8/1/2010
Chattanooga	TN	Lovell Field	CHA	N	$4.50	$2,413,001	2y2m	8/1/2010	10/1/2012
Jackson	TN	McKellar-Sipes Regional	MKL	CS	$4.50	$332,248	22y8m	10/1/2002	6/1/2025
Knoxville	TN	McGhee Tyson	TYS	S	$3.00	$99,080,294	9y9m	1/1/1994	10/1/2003
Knoxville	TN	McGhee Tyson	TYS	S	$4.50	**	18y9m	10/1/2003	7/1/2022
Knoxville	TN	McGhee Tyson	TYS	S	$4.50	$4,691,627	1y2m	7/1/2022	9/1/2023
Memphis	TN	Memphis International	MEM	M	$3.00	$53,700,000	4y5m	8/1/1992	1/1/1997
Nashville	TN	Nashville International	BNA	M	$3.00	$223,093,064	22y8m	1/1/1993	12/1/2009
Nashville	TN	Nashville International	BNA	M	$4.50	**	9m	12/1/2009	9/1/2010
Nashville	TN	Nashville International	BNA	M	$3.00	$81,618,442	5y9m	9/1/2010	6/1/2016
Nashville	TN	Nashville International	BNA	M	$4.50	$11,698,934	7m	6/1/2016	1/1/2017
Nashville	TN	Nashville International	BNA	M	$3.00	$2,512,500	2m	1/1/2017	3/1/2017
Abilene	TX	Abilene Regional	ABI	N	$3.00	$2,008,611	4y8m	1/1/1998	9/1/2002
Abilene	TX	Abilene Regional	ABI	N	$4.50	**	5y10m	9/1/2002	7/1/2008
Abilene	TX	Abilene Regional	ABI	N	$4.50	$2,519,008	7y1m	7/1/2008	8/1/2015

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Amarillo	TX	Rick Husband Amarillo International	AMA	S	$4.50	$19,200,000	9y7m	12/1/2008	7/1/2018
Austin	TX	Robert Mueller Municipal	AUS	M	$2.00	$6,189,459	3m	11/1/1993	2/1/1994
Austin	TX	Robert Mueller Municipal	AUS	M	$3.00	**	1y	2/1/1994	2/1/1995
Austin	TX	Austin-Bergstrom International	AUS	M	$3.00	$343,074,546	8y9m	7/1/1995	4/1/2004
Austin	TX	Austin-Bergstrom International	AUS	M	$4.50	**	15y9m	4/1/2004	1/1/2020
Austin	TX	Austin-Bergstrom International	AUS	M	$4.50	$4,125,000	4m	1/1/2020	5/1/2020
Beaumont/Port Arthur	TX	Jack Brooks Regional	BPT	N	$3.00	$2,784,768	7y6m	9/1/1994	3/1/2002
Beaumont/Port Arthur	TX	Jack Brooks Regional	BPT	N	$4.50	**	3y1m	3/1/2002	4/1/2005
Beaumont/Port Arthur	TX	Jack Brooks Regional	BPT	N	$4.50	$1,758,573	16y6m	4/1/2005	10/1/2021
Brownsville	TX	Brownsville/South Padre Island International	BRO	N	$3.00	$1,099,404	5y7m	10/1/1997	5/1/2003
Brownsville	TX	Brownsville/South Padre Island International	BRO	N	$4.50	$5,925,705	17y11m	5/1/2003	4/1/2021
College Station	TX	Easterwood Field	CLL	N	$3.00	$2,063,797	4y9m	7/1/1996	4/1/2001
College Station	TX	Easterwood Field	CLL	N	$4.50	**	2y9m	4/1/2001	1/1/2004
College Station	TX	Easterwood Field	CLL	N	$4.50	$3,479,637	9y	1/1/2004	1/1/2013
Corpus Christi	TX	Corpus Christi International	CRP	N	$3.00	$49,700,114	9y1m	3/1/1994	3/1/2003
Corpus Christi	TX	Corpus Christi International	CRP	N	$4.50	**	23y10m	3/1/2003	1/1/2027
Dallas	TX	Dallas Love Field	DAL	M	$3.00	$383,636,108	2y	2/1/2008	2/1/2010
Dallas	TX	Dallas Love Field	DAL	M	$4.50	**	16y2m	2/1/2010	4/1/2026
Dallas-Ft Worth	TX	Dallas/Ft Worth International	DFW	L	$3.00	$182,438,761	2y1m	5/1/1994	6/1/1996
Dallas-Ft Worth	TX	Dallas/Ft Worth International	DFW	L	$3.00	$2,306,174,080	5y5m	2/1/1997	7/1/2002
Dallas-Ft Worth	TX	Dallas/Ft Worth International	DFW	L	$4.50	**	14y8m	7/1/2002	3/1/2017
Dallas-Ft Worth	TX	Dallas/Ft Worth International	DFW	L	$3.00	$51,900,495	2m	3/1/2017	5/1/2017
Dallas-Ft Worth	TX	Dallas/Ft Worth International	DFW	L	$4.50	$2,988,412,952	17y4m	5/1/2017	9/1/2034
Del Rio	TX	Del Rio International	DRT	N	$4.50	$403,739	5y10m	2/1/2010	12/1/2015
El Paso	TX	El Paso International	ELP	S	$3.00	$76,826,242	13y7m	1/1/1997	8/1/2010
El Paso	TX	El Paso International	ELP	S	$4.50	**	2y7m	8/1/2010	3/1/2013
Harlingen	TX	Valley International	HRL	S	$3.00	$9,716,744	9y1m	11/1/1998	12/1/2007
Harlingen	TX	Valley International	HRL	S	$4.50	$3,876,104	1y7m	12/1/2007	7/1/2009
Harlingen	TX	Valley International	HRL	S	$4.50	$13,044,000	6y9m	8/1/2009	5/1/2016
Houston	TX	William P. Hobby	HOU	M	$3.00	$163,517,150	12y	11/1/2006	11/1/2017
Houston	TX	George Bush Intercontinental/ Houston	IAH	L	$3.00	$1,372,445,143	18y11m	12/1/2008	11/1/2027
Killeen	TX	Killeen Municipal	ILE	N	$3.00	$242,051	1y10m	1/1/1993	11/1/1994
Killeen	TX	Killeen Municipal	ILE	N	$3.00	$3,579,834	6y1m	4/1/1995	5/1/2001
Killeen	TX	Killeen Municipal	ILE	N	$4.50	**	2y3m	5/1/2001	8/1/2003
Killeen	TX	Robert Gray AAF	ILE/GRK	N	$4.50	*	2y1m	12/1/2003	1/1/2006
Killeen	TX	Robert Gray AAF	GRK	N	$4.50	$4,794,772	6y6m	6/1/2006	12/1/2012
Laredo	TX	Laredo International	LRD	N	$3.00	$6,303,839	15y8m	10/1/1993	6/1/2009
Laredo	TX	Laredo International	LRD	N	$4.50	**	9y2m	6/1/2009	8/1/2016
Laredo	TX	Laredo International	LRD	N	$4.50	$7,852,765	9y5m	8/1/2016	1/1/2026

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Longview	TX	East Texas Regional	GGG	N	$3.00	$472,571	5y7m	9/1/1996	4/1/2002
Longview	TX	East Texas Regional	GGG	N	$3.00	$699,232	10y3m	9/1/2002	12/1/2012
Lubbock	TX	Lubbock Preston Smith International	LBB	S	$3.00	$16,178,722	11y4m	10/1/1993	2/1/2005
Lubbock	TX	Lubbock Preston Smith International	LBB	S	$2.00	$4,168,971	2y	2/1/2005	2/1/2007
Lubbock	TX	Lubbock Preston Smith International	LBB	S	$3.00	$14,974,138	1y4m	2/1/2007	6/1/2008
Lubbock	TX	Lubbock Preston Smith International	LBB	S	$4.50	**	5y6m	6/1/2008	12/1/2013
Lubbock	TX	Lubbock Preston Smith International	LBB	S	$4.50	$13,101,351	6y4m	12/1/2013	4/1/2020
McAllen	TX	McAllen Miller International	MFE	N	$3.00	$15,479,029	13y2m	4/1/1998	6/1/2011
McAllen	TX	McAllen Miller International	MFE	N	$4.50	**	2y	6/1/2011	6/1/2013
Midland	TX	Midland International	MAF	S	$3.00	$35,873,495	11y9m	1/1/1993	9/1/2004
Midland	TX	Midland International	MAF	S	$4.50	**	9y4m	9/1/2004	1/1/2014
Midland	TX	Midland International	MAF	S	$3.00	$1,395,921	10m	1/1/2014	11/1/2014
Midland	TX	Midland International	MAF	S	$4.50	$1,544,032	9m	11/1/2014	8/1/2015
San Angelo	TX	San Angelo Regional/Mathis Field	SJT	N	$3.00	$1,266,877	8y11m	5/1/1993	4/1/2002
San Angelo	TX	San Angelo Regional/Mathis Field	SJT	N	$4.50	**	2y4m	4/1/2002	8/1/2004
San Angelo	TX	San Angelo Regional/Mathis Field	SJT	N	$4.50	$2,942,045	10y	8/1/2004	8/1/2014
San Antonio	TX	San Antonio International	SAT	M	$3.00	$364,227,049	5y11m	11/1/2001	10/1/2007
San Antonio	TX	San Antonio International	SAT	M	$4.50	**	11y7m	10/1/2007	5/1/2019
San Antonio	TX	San Antonio International	SAT	M	$4.50	$142,929,158	6y2m	5/1/2019	7/1/2025
Tyler	TX	Tyler Pounds Regional	TYR	N	$3.00	$2,901,212	9y6m	3/1/1994	9/1/2003
Tyler	TX	Tyler Pounds Regional	TYR	N	$4.50	**	4y11m	9/1/2003	8/1/2008
Tyler	TX	Tyler Pounds Regional	TYR	N	$4.50	$3,220,587	9y1m	8/1/2008	9/1/2017
Victoria	TX	Victoria Regional	VCT	CS	$3.00	$195,960	3y	12/1/1994	8/1/1998
Victoria	TX	Victoria Regional	VCT	CS	$3.00	$188,872	3y	1/1/1999	1/1/2002
Victoria	TX	Victoria Regional	VCT	CS	$4.50	$444,905	11y9m	1/1/2002	10/1/2013
Waco	TX	Waco Regional	ACT	N	$3.00	$2,438,451	5y11m	11/1/1995	10/1/2001
Waco	TX	Waco Regional	ACT	N	$4.50	**	6y3m	10/1/2001	1/1/2008
Waco	TX	Waco Regional	ACT	N	$4.50	$1,458,418	4y3m	1/1/2008	4/1/2012
Wichita Falls	TX	Sheppard AFB/Wichita Falls Municipal	SPS	N	$4.50	$1,646,268	9y2m	10/1/2008	12/1/2017
Cedar City	UT	Cedar City Regional	CDC	CS	$4.50	$229,900	4y8m	2/1/2007	10/1/2011
Cedar City	UT	Cedar City Regional	CDC	CS	$4.50	$170,000	4y1m	2/1/2012	3/1/2016
Salt Lake City	UT	Salt Lake City International	SLC	L	$3.00	$166,173,468	6y4m	12/1/1994	4/1/2001
Salt Lake City	UT	Salt Lake City International	SLC	L	$4.50	**	3m	4/1/2001	7/1/2001
Salt Lake City	UT	Salt Lake City International	SLC	L	$4.50	$435,127,130	12y8m	7/1/2001	3/1/2013
St George	UT	St George Municipal	DXZ/SGU	N	$3.00	$23,568	4y4m	5/1/1998	9/1/2002
St George	UT	St George Municipal	DXZ/SGU	N	$4.50	$3,515,402	12y7m	6/1/2003	1/1/2016
Wendover	UT	Wendover	ENV		$3.00	$142,300	3y2m	8/1/1996	10/1/1999
Burlington	VT	Burlington International	BTV	S	$3.00	$25,408,285	6y5m	4/1/1997	9/1/2003
Burlington	VT	Burlington International	BTV	S	$4.50	**	6y1m	9/1/2003	10/1/2009
Burlington	VT	Burlington International	BTV	S	$4.50	$17,467,574	4y4m	12/1/2009	4/1/2014

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Charlotte Amalie	VI	Cyril E. King	STT	S	$3.00	$3,808,574	2y5m	3/1/1993	8/1/1995
Charlotte Amalie	VI	Cyril E. King	STT	S	$3.00	$7,792,000	7y	12/1/1995	12/1/2002
Charlotte Amalie	VI	Cyril E. King	STT	S	$3.00	$13,500,000	7y9m	8/1/2004	4/1/2012
Charlotte Amalie	VI	Cyril E. King	STT	S	$4.50	$13,353,396	9y6m	4/1/2012	10/1/2021
Christiansted	VI	Henry E. Rohlsen	STX	N	$3.00	$2,158,095	3y1m	3/1/1993	4/1/1996
Christiansted	VI	Henry E. Rohlsen	STX	N	$3.00	$4,914,898	6y7m	12/1/1996	7/1/2003
Christiansted	VI	Henry E. Rohlsen	STX	N	$3.00	$1,869,822	9y4m	10/1/2011	2/1/2021
Arlington	VA	Ronald Reagan Washington National	DCA	L	$3.00	$249,603,543	7y6m	11/1/1993	5/1/2001
Arlington	VA	Ronald Reagan Washington National	DCA	L	$4.50	**	4y1m	5/1/2001	6/1/2005
Arlington	VA	Ronald Reagan Washington National	DCA	L	$4.50	$350,449,489	9y9m	6/1/2005	3/1/2015
Chantilly	VA	Washington Dulles International	IAD	L	$3.00	$269,427,498	7y6m	1/1/1994	5/1/2001
Chantilly	VA	Washington Dulles International	IAD	L	$4.50	**	4y	5/1/2001	5/1/2005
Chantilly	VA	Washington Dulles International	IAD	L	$4.50	$2,173,226,652	33y7m	5/1/2005	12/1/2038
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$2.00	$305,992	1y1m	9/1/1992	10/1/1993
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$3.00	$3,847,780	9y9m	4/1/1995	1/1/2005
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$4.50	**	1m	1/1/2005	2/1/2005
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$4.50	$1,448,699	4y11m	2/1/2005	1/1/2010
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$4.50	$3,454,340	6y	8/1/2010	8/1/2016
Lynchburg	VA	Lynchburg Regional/Preston Glenn Field	LYH	N	$3.00	$184,209	1y	7/1/1995	7/1/1996
Lynchburg	VA	Lynchburg Regional/Preston Glenn Field	LYH	N	$3.00	$827,616	1y9m	9/1/2000	6/1/2002
Lynchburg	VA	Lynchburg Regional/Preston Glenn Field	LYH	N	$4.50	$5,731,108	20y3m	6/1/2002	9/1/2022
Newport News	VA	Newport News/Williamsburg International	PHF	S	$3.00	$552,500	9m	10/1/2006	7/1/2007
Newport News	VA	Newport News/Williamsburg International	PHF	S	$4.50	$15,866,709	9y8m	7/1/2010	3/1/2020
Norfolk	VA	Norfolk International	ORF	S	$3.00	$64,951,249	12y7m	5/1/1997	1/1/2010
Norfolk	VA	Norfolk International	ORF	S	$4.50	$47,090,687	6y1m	9/1/2010	10/1/2016
Richmond	VA	Richmond International	RIC	S	$3.00	$137,014,261	10y7m	5/1/1994	1/1/2005
Richmond	VA	Richmond International	RIC	S	$4.50	**	14y10m	1/1/2005	10/1/2019
Roanoke	VA	Roanoke Regional/Woodrum Field	ROA	N	$3.00	$6,463,183	3y3m	9/1/1998	12/1/2001
Roanoke	VA	Roanoke Regional/Woodrum Field	ROA	N	$4.50	**	3y2m	12/1/2001	2/1/2005
Roanoke	VA	Roanoke Regional/Woodrum Field	ROA	N	$3.00	$8,158,043	9m	2/1/2005	11/1/2005
Roanoke	VA	Roanoke Regional/Woodrum Field	ROA	N	$4.50	**	6y	11/1/2005	11/1/2011
Roanoke	VA	Roanoke Regional/Woodrum Field	ROA	N	$4.50	$6,471,251	4y4m	11/1/2011	3/1/2016
Staunton	VA	Shenandoah Valley Regional	SHD	N	$3.00	$87,482	5y	12/1/2001	12/1/2006
Staunton	VA	Shenandoah Valley Regional	SHD	N	$4.50	$244,810	10y9m	6/1/2007	3/1/2018
Bellingham	WA	Bellingham International	BLI	S	$3.00	$1,594,527	5y1m	7/1/1993	8/1/1998
Bellingham	WA	Bellingham International	BLI	S	$3.00	*	10m	3/1/1999	1/1/2000
Bellingham	WA	Bellingham International	BLI	S	$3.00	$1,400,000	2y6m	1/1/2000	7/1/2002
Bellingham	WA	Bellingham International	BLI	S	$4.50	**	2y11m	7/1/2002	6/1/2005
Bellingham	WA	Bellingham International	BLI	S	$4.50	$5,241,939	5y1m	6/1/2005	7/1/2010

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Bellingham	WA	Bellingham International	BLI	S	$4.50	$30,250,000	17y3m	10/1/2010	10/1/2027
Friday Harbor	WA	Friday Harbor	FRD/FHR	N	$3.00	$517,077	15y5m	2/1/2001	7/1/2016
Moses Lake	WA	Grant County International	MWH		$3.00	$470,000	6y8m	3/1/1999	11/1/2005
Moses Lake	WA	Grant County International	MWH		$4.50	**	10y2m	11/1/2005	1/1/2016
Pasco	WA	Tri-Cities	PSC	N	$3.00	$3,657,898	7y11m	11/1/1993	10/1/2001
Pasco	WA	Tri-Cities	PSC	N	$4.50	**	1y6m	10/1/2001	4/1/2003
Pasco	WA	Tri-Cities	PSC	N	$4.50	$13,289,313	18y6m	4/1/2003	10/1/2021
Port Angeles	WA	William R. Fairchild International	CLM	N	$3.00	$117,556	1y9m	8/1/1993	5/1/1995
Port Angeles	WA	William R. Fairchild International	CLM	N	$3.00	$877,100	15y1m	9/1/1996	10/1/2011
Pullman	WA	Pullman/Moscow Regional	PUW	N	$3.00	$169,288	2y8m	6/1/1994	2/1/1996
Pullman	WA	Pullman/Moscow Regional	PUW	N	$3.00	$706,727	1y11m	2/1/2000	1/1/2002
Pullman	WA	Pullman/Moscow Regional	PUW	N	$4.50	**	3y9m	1/1/2002	10/1/2005
Pullman	WA	Pullman/Moscow Regional	PUW	N	$4.50	$1,059,235	8y4m	10/1/2005	2/1/2014
Seattle	WA	Seattle-Tacoma International	SEA	L	$3.00	$369,583,600	8y11m	11/1/1992	10/1/2001
Seattle	WA	Seattle-Tacoma International	SEA	L	$4.50	**	1y7m	10/1/2001	3/1/2003
Seattle	WA	Seattle-Tacoma International	SEA	L	$4.50	$1,797,794,860	25y8m	3/1/2003	11/1/2028
Spokane	WA	Spokane International	GEG	S	$3.00	$52,372,419	9y10m	6/1/1993	4/1/2003
Spokane	WA	Spokane International	GEG	S	$4.50	**	2y1m	4/1/2003	5/1/2005
Spokane	WA	Spokane International	GEG	S	$4.50	$62,533,633	9y4m	5/1/2005	9/1/2014
Walla Walla	WA	Walla Walla Regional	ALW	N	$3.00	$3,745,775	7y11m	11/1/1993	10/1/2001
Walla Walla	WA	Walla Walla Regional	ALW	N	$4.50	**	18y	10/1/2001	10/1/2019
Wenatchee	WA	Pangborn Memorial	EAT	N	$3.00	$622,488	2y2m	8/1/1993	10/1/1995
Wenatchee	WA	Pangborn Memorial	EAT	N	$3.00	$660,570	4y1m	6/1/1998	7/1/2002
Wenatchee	WA	Pangborn Memorial	EAT	N	$4.50	**	7m	7/1/2002	2/1/2003
Wenatchee	WA	Pangborn Memorial	EAT	N	$4.50	$1,197,819	6y11m	5/1/2003	4/1/2010
Wenatchee	WA	Pangborn Memorial	EAT	N	$4.50	$881,750	4y9m	5/1/2010	2/1/2015
Yakima	WA	Yakima Air Terminal/McAllister Field	YKM	N	$3.00	$1,565,797	6y	2/1/1993	2/1/1999
Yakima	WA	Yakima Air Terminal/McAllister Field	YKM	N	$3.00	*	1y1m	5/1/1999	6/1/2000
Yakima	WA	Yakima Air Terminal/McAllister Field	YKM	N	$3.00	$1,976,471	10y10m	6/1/2000	4/1/2011
Yakima	WA	Yakima Air Terminal/McAllister Field	YKM	N	$4.50	$178,995	1y4m	4/1/2011	8/1/2012
Charleston	WV	Yeager	CRW	N	$3.00	$6,921,430	8y3m	8/1/1993	11/1/2001
Charleston	WV	Yeager	CRW	N	$4.50	**	1y5m	11/1/2001	4/1/2003
Charleston	WV	Yeager	CRW	N	$4.50	$18,720,086	15y2m	4/1/2003	6/1/2018
Clarksburg	WV	North Central West Virginia	CKB	N	$3.00	$79,103	2y1m	3/1/1994	10/1/1995
Clarksburg	WV	North Central West Virginia	CKB	N	$4.50	$101,489	1y10m	4/1/2001	8/1/2002
Clarksburg	WV	North Central West Virginia	CKB	N	$4.50	$2,920,641	50y	5/1/2004	5/1/2054
Huntington	WV	Tri-State/Milton J. Ferguson Field	HTS	N	$3.00	$1,853,497	13y	12/1/1995	12/1/2008
Huntington	WV	Tri-State/Milton J. Ferguson Field	HTS	N	$3.00	$1,195,890	3y1m	5/1/2009	6/1/2012
Lewisburg	WV	Greenbrier Valley	LWB	N	$4.50	$1,105,408	13y9m	4/1/2011	1/1/2025
Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$2.00	$54,012	1y1m	12/1/1992	1/1/1994
Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$2.00	$211,390	7y1m	12/1/1994	1/1/2002

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Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$4.50	**	2y5m	1/1/2002	6/1/2004
Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$4.50	$227,618	3y9m	6/1/2004	3/1/2008
Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$4.50	$663,774	16y7m	6/1/2009	1/1/2026
Parkersburg	WV	Mid-Ohio Valley Regional	PKB	CS	$3.00	$305,491	3y3m	5/1/1999	8/1/2002
Parkersburg	WV	Mid-Ohio Valley Regional	PKB	CS	$4.50	$286,543	13y5m	8/1/2003	1/1/2016
Appleton	WI	Outagamie County Regional	ATW	N	$3.00	$10,466,940	11y11m	7/1/1994	6/1/2006
Appleton	WI	Outagamie County Regional	ATW	N	$4.50	**	1y10m	6/1/2006	4/1/2008
Appleton	WI	Outagamie County Regional	ATW	N	$3.00	$318,410	5m	4/1/2008	9/1/2008
Appleton	WI	Outagamie County Regional	ATW	N	$4.50	$4,717,500	4y4m	9/1/2008	1/1/2013
Eau Claire	WI	Chippewa Valley Regional	EAU	N	$3.00	$708,253	5y10m	2/1/1996	12/1/2001
Eau Claire	WI	Chippewa Valley Regional	EAU	N	$4.50	**	4y1m	12/1/2001	1/1/2006
Eau Claire	WI	Chippewa Valley Regional	EAU	N	$4.50	$662,411	7y9m	8/1/2006	5/1/2014
Green Bay	WI	Austin Straubel International	GRB	N	$3.00	$7,530,958	9y	3/1/1993	3/1/2002
Green Bay	WI	Austin Straubel International	GRB	N	$4.50	$38,768,829	18y7m	3/1/2002	10/1/2020
La Crosse	WI	La Crosse Municipal	LSE	N	$3.00	$1,964,469	6y9m	7/1/1994	4/1/2001
La Crosse	WI	La Crosse Municipal	LSE	N	$4.50	**	6m	4/1/2001	10/1/2001
La Crosse	WI	La Crosse Municipal	LSE	N	$4.50	$6,981,624	14y2m	10/1/2001	1/1/2016
Madison	WI	Dane County Regional - Truax Field	MSN	S	$3.00	$12,308,713	8y2m	9/1/1993	11/1/2001
Madison	WI	Dane County Regional - Truax Field	MSN	S	$4.50	$79,902,856	21y11m	11/1/2001	10/1/2023
Milwaukee	WI	General Mitchell International	MKE	M	$3.00	$361,324,193	28y11m	5/1/1995	4/1/2024
Mosinee	WI	Central Wisconsin	CWA	N	$3.00	$7,725,600	13y10m	11/1/1993	9/1/2007
Mosinee	WI	Central Wisconsin	CWA	N	$4.50	**	3y2m	9/1/2007	12/1/2010
Mosinee	WI	Central Wisconsin	CWA	N	$4.50	$3,529,500	5y9m	12/1/2010	9/1/2016
Rhinelander	WI	Rhinelander-Oneida County	RHI	N	$3.00	$204,771	2y2m	1/1/1994	4/1/1996
Rhinelander	WI	Rhinelander-Oneida County	RHI	N	$3.00	$457,484	5y3m	6/1/1996	9/1/2001
Rhinelander	WI	Rhinelander-Oneida County	RHI	N	$4.50	**	2y4m	9/1/2001	1/1/2004
Rhinelander	WI	Rhinelander-Oneida County	RHI	N	$4.50	$1,432,752	8y5m	1/1/2004	6/1/2012
Casper	WY	Casper/ Natrona County International	CPR	N	$3.00	$1,629,582	7y7m	9/1/1993	4/1/2001
Casper	WY	Casper/ Natrona County International	CPR	N	$4.50	**	2y2m	4/1/2001	6/1/2003
Casper	WY	Casper/ Natrona County International	CPR	N	$4.50	$2,890,545	11y2m	6/1/2003	8/1/2014
Casper	WY	Casper/ Natrona County International	CPR	N	$3.00	$443,082	1y10m	8/1/2014	6/1/2016
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	N	$3.00	$957,013	7y5m	11/1/1993	4/1/2001
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	N	$4.50	**	5y8m	4/1/2001	1/1/2007
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	N	$4.50	$407,728	5y6m	1/1/2007	7/1/2012
Cody	WY	Yellowstone Regional	COD	N	$3.00	$413,037	3y11m	8/1/1997	7/1/2001
Cody	WY	Yellowstone Regional	COD	N	$4.50	**	2y	7/1/2001	7/1/2003
Cody	WY	Yellowstone Regional	COD	N	$4.50	$76,373	1y9m	7/1/2003	4/1/2005
Cody	WY	Yellowstone Regional	COD	N	$4.50	$982,034	10y9m	9/1/2005	6/1/2016
Gillette	WY	Gillette-Campbell County	GCC	N	$3.00	$369,132	8y3m	9/1/1993	12/1/2001
Gillette	WY	Gillette-Campbell County	GCC	N	$4.50	$162,537	2y6m	12/1/2001	6/1/2004

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Gillette	WY	Gillette-Campbell County	GCC	N	$4.50	*	6m	1/1/2005	7/1/2005
Gillette	WY	Gillette-Campbell County	GCC	N	$4.50	$972,544	9y1m	7/1/2005	8/1/2014
Jackson	WY	Jackson Hole	JAC	N	$3.00	$3,799,325	7y8m	8/1/1993	4/1/2001
Jackson	WY	Jackson Hole	JAC	N	$4.50	**	1y4m	4/1/2001	8/1/2002
Jackson	WY	Jackson Hole	JAC	N	$4.50	$21,146,288	23y10m	8/1/2002	6/1/2026
Laramie	WY	Laramie Regional	LAR	CS	$3.00	$126,457	4y2m	8/1/1996	10/1/2000
Laramie	WY	Laramie Regional	LAR	CS	$3.00	*	9m	12/1/2000	8/1/2001
Laramie	WY	Laramie Regional	LAR	CS	$4.50	$252,009	6y4m	12/1/2006	4/1/2013
Riverton	WY	Riverton Regional	RIW	N	$3.00	$1,055,040	5y11m	5/1/1995	4/1/2001
Riverton	WY	Riverton Regional	RIW	N	$4.50	**	22y6m	4/1/2001	10/1/2023
Rock Springs	WY	Rock Springs-Sweetwater County	RKS	N	$3.00	$382,300	11y	4/1/1995	4/1/2006
Rock Springs	WY	Rock Springs-Sweetwater County	RKS	N	$4.50	$476,907	6y5m	4/1/2006	9/1/2012
Sheridan	WY	Sheridan County	SHR	N	$3.00	$218,988	5y10m	3/1/1996	12/1/2001
Sheridan	WY	Sheridan County	SHR	N	$4.50	$433,610	6y9m	12/1/2001	9/1/2008
Sheridan	WY	Sheridan County	SHR	N	$4.50	$736,114	6y8m	10/1/2008	6/1/2015
Worland	WY	Worland Municipal	WRL	CS	$4.50	$72,022	5y2m	1/1/2003	3/1/2008
Worland	WY	Worland Municipal	WRL	CS	$4.50	$193,038	13y11m	8/1/2008	7/1/2022
NOTES:									
Collections at locations noted by * in the amount column were prematurely stopped due to FAA processing errors.									
** Amount shown on line immediately above the double asterisk is the total approved collections at this location at both the $3 and $4.50 levels.									

Letter of Intent (LOI) Commitments by Fiscal Year

State	City	Airport Name	Discretionary 2012	Entitlement 2012	Discretionary 2013	Entitlement 2013
AK	Anchorage	Ted Stevens Anchorage International	7,280,000	3,487,800	4,000,000	4,250,837
CA	Los Angeles	Los Angeles International	10,000,000	11,500,000	10,000,000	0
CA	Sacramento	Sacramento International	6,000,000	2,171,000	6,000,000	2,220,000
CO	Denver	Denver International	6,000,000	0	2,000,000	0
FL	Ft. Lauderdale	Ft Lauderdale International	20,000,000	4,000,000	20,000,000	4,000,000
IA	Cedar Rapids	Cedar Rapids/ Eastern Iowa	1,500,000	0	0	0
IL	Chicago	Chicago O'Hare International - Phase 1	20,000,000	0	20,000,000	0
IL	Chicago	Chicago O'Hare International - Completion Phase	70,000,000	0	65,000,000	0
IN	Gary	Gary/Chicago International	5,000,000	1,000,000	5,000,000	1,000,000
LA	Baton Rouge	Baton Rouge Metropolitan, Ryan Field	3,000,000	3,400,000	0	0
MA	Boston	General Edward Lawrence Logan International	5,800,000	3,870,000	0	0
MD	Hagerstown	Hagerstown Regional-Richard A Henson Field	850,000	150,000	850,000	150,000
NC	Charlotte	Charlotte/Douglas International	12,000,000	8,500,000	12,000,000	0
NC	Greensboro	Piedmont Triad International	0	5,200,000	0	6,115,513
NY	New York	John F Kennedy International	14,800,000	0	11,800,000	0
OH	Cleveland	Cleveland-Hopkins International	0	3,233,000	0	3,304,000
OH	Columbus	Port Columbus International	10,000,000	1,989,000	10,000,000	2,026,000
PA	Philadelphia	Philadelphia International	15,000,000	6,800,000	23,000,000	6,800,000
TX	Dallas	Dallas Love Field	7,000,000	900,000	7,000,000	900,000
UT	St. George	St. George/New Airport	10,000,000	1,000,000	10,000,000	1,000,000
VA	Washington	Washington Dulles International	20,000,000	0	13,000,000	0
WA	Seattle	Seattle-Tacoma International	0	5,500,000	0	5,600,000
		Total	244,230,000	62,700,800	219,650,000	37,366,350

Letter of Intent (LOI) Commitments by Fiscal Year

State	City	Airport Name	Discretionary 2014	Entitlement 2014	Discretionary 2015	Entitlement 2015
AK	Anchorage	Ted Stevens Anchorage International	4,000,000	1,911,930	4,000,000	0
CA	Los Angeles	Los Angeles International	10,000,000	0	11,000,000	0
CA	Sacramento	Sacramento International	6,000,000	2,271,000	5,131,512	2,328,884
CO	Denver	Denver International	0	0	0	0
FL	Ft. Lauderdale	Ft Lauderdale International	20,000,000	4,000,000	20,000,000	4,000,000
IA	Cedar Rapids	Cedar Rapids/ Eastern Iowa	0	0	0	0
IL	Chicago	Chicago O'Hare International - Phase 1	20,000,000	0	20,000,000	0
IL	Chicago	Chicago O'Hare International - Completion Phase	45,000,000	0	30,000,000	0
IN	Gary	Gary/Chicago International	5,000,000	1,000,000	2,844,597	1,000,000
LA	Baton Rouge	Baton Rouge Metropolitan, Ryan Field	0	0	0	0
MA	Boston	General Edward Lawrence Logan International	0	0	0	0
MD	Hagerstown	Hagerstown Regional-Richard A Henson Field	0	0	0	0
NC	Charlotte	Charlotte/Douglas International	6,000,000	0	0	0
NC	Greensboro	Piedmont Triad International	0	0	0	0
NY	New York	John F Kennedy International	10,900,000	0	7,000,000	0
OH	Cleveland	Cleveland-Hopkins International	0	3,378,000	0	3,455,000
OH	Columbus	Port Columbus International	10,000,000	2,064,000	10,000,000	2,104,000
PA	Philadelphia	Philadelphia International	23,000,000	6,900,000	28,000,000	7,000,000
TX	Dallas	Dallas Love Field	7,000,000	900,000	5,000,000	900,000
UT	St. George	St. George/New Airport	10,000,000	1,000,000	9,000,000	1,000,000
VA	Washington	Washington Dulles International	13,000,000	0	14,000,000	0
WA	Seattle	Seattle-Tacoma International	0	5,700,000	0	6,231,753
		Total	189,900,000	29,124,930	165,976,109	28,019,637

Letter of Intent (LOI) Commitments by Fiscal Year

State	City	Airport Name	Discretionary 2016	Entitlement 2016	Discretionary 2017	Entitlement 2017
AK	Anchorage	Ted Stevens Anchorage International	1,000,000	0	0	0
CA	Los Angeles	Los Angeles International	11,000,000	0	11,000,000	0
CA	Sacramento	Sacramento International	0	0	0	0
CO	Denver	Denver International	0	0	0	0
FL	Ft. Lauderdale	Ft Lauderdale International	20,000,000	0	20,000,000	0
IA	Cedar Rapids	Cedar Rapids/ Eastern Iowa	0	0	0	0
IL	Chicago	Chicago O'Hare International - Phase 1	20,000,000	0	20,000,000	0
IL	Chicago	Chicago O'Hare International - Completion Phase	25,000,000	0	25,000,000	0
IN	Gary	Gary/Chicago International	0	0	0	0
LA	Baton Rouge	Baton Rouge Metropolitan, Ryan Field	0	0	0	0
MA	Boston	General Edward Lawrence Logan International	0	0	0	0
MD	Hagerstown	Hagerstown Regional-Richard A Henson Field	0	0	0	0
NC	Charlotte	Charlotte/Douglas International	0	0	0	0
NC	Greensboro	Piedmont Triad International	0	0	0	0
NY	New York	John F Kennedy International	7,000,000	0	0	0
OH	Cleveland	Cleveland-Hopkins International	0	3,535,000	0	658,991
OH	Columbus	Port Columbus International	10,000,000	2,144,000	1,703,869	1,703,869
PA	Philadelphia	Philadelphia International	28,000,000		28,000,000	0
TX	Dallas	Dallas Love Field	5,000,000	900,000	5,000,000	0
UT	St. George	St. George/New Airport	0	0	0	0
VA	Washington	Washington Dulles International	9,000,000	0	0	0
WA	Seattle	Seattle-Tacoma International	0	0	0	0
		Total	136,000,000	6,579,000	110,703,869	2,362,860

Letter of Intent (LOI) Commitments by Fiscal Year

State	City	Airport Name	Discretionary 2018	Entitlement 2018	Discretionary Beyond	Entitlement Beyond
AK	Anchorage	Ted Stevens Anchorage International		0	0	0
CA	Los Angeles	Los Angeles International	11,000,000	0	0	0
CA	Sacramento	Sacramento International	0	0	0	0
CO	Denver	Denver International	0	0	0	0
FL	Ft. Lauderdale	Ft Lauderdale International	20,000,000	0	70,000,000	0
IA	Cedar Rapids	Cedar Rapids/ Eastern Iowa	0	0	0	0
IL	Chicago	Chicago O'Hare International - Phase 1	20,000,000	0	40,000,000	0
IL	Chicago	Chicago O'Hare International - Completion Phase	35,000,000	0	220,000,000	0
IN	Gary	Gary/Chicago International	0	0	0	0
LA	Baton Rouge	Baton Rouge Metropolitan, Ryan Field	0	0	0	0
MA	Boston	General Edward Lawrence Logan International	0	0	0	0
MD	Hagerstown	Hagerstown Regional-Richard A Henson Field	0	0	0	0
NC	Charlotte	Charlotte/Douglas International	0	0	0	0
NC	Greensboro	Piedmont Triad International	0	0	0	0
NY	New York	John F Kennedy International	0	0	0	0
OH	Cleveland	Cleveland-Hopkins International	0	0	0	0
OH	Columbus	Port Columbus International	0	0	0	0
PA	Philadelphia	Philadelphia International	28,000,000		266,000,000	
TX	Dallas	Dallas Love Field	0	0	0	0
UT	St. George	St. George/New Airport	0	0	0	0
VA	Washington	Washington Dulles International	0	0	0	0
WA	Seattle	Seattle-Tacoma International	0	0	0	0
		Total	114,000,000	0	596,000,000	0

Letter of Intent (LOI) Commitments by Fiscal Year

State	City	Airport Name	Discretionary Total	Entitlement Total
AK	Anchorage	Ted Stevens Anchorage International	20,280,000	9,650,567
CA	Los Angeles	Los Angeles International	74,000,000	11,500,000
CA	Sacramento	Sacramento International	23,131,512	8,990,884
CO	Denver	Denver International	8,000,000	0
FL	Ft. Lauderdale	Ft Lauderdale International	210,000,000	16,000,000
IA	Cedar Rapids	Cedar Rapids/ Eastern Iowa	1,500,000	0
IL	Chicago	Chicago O'Hare International - Phase 1	180,000,000	0
IL	Chicago	Chicago O'Hare International - Completion Phase	515,000,000	0
IN	Gary	Gary/Chicago International	17,844,597	4,000,000
LA	Baton Rouge	Baton Rouge Metropolitan, Ryan Field	3,000,000	3,400,000
MA	Boston	General Edward Lawrence Logan International	5,800,000	3,870,000
MD	Hagerstown	Hagerstown Regional-Richard A Henson Field	1,700,000	300,000
NC	Charlotte	Charlotte/Douglas International	30,000,000	8,500,000
NC	Greensboro	Piedmont Triad International	0	11,315,513
NY	New York	John F Kennedy International	51,500,000	0
OH	Cleveland	Cleveland-Hopkins International	0	17,563,991
OH	Columbus	Port Columbus International	51,703,869	12,030,869
PA	Philadelphia	Philadelphia International	439,000,000	27,500,000
TX	Dallas	Dallas Love Field	36,000,000	4,500,000
UT	St. George	St. George/New Airport	39,000,000	4,000,000
VA	Washington	Washington Dulles International	69,000,000	0
WA	Seattle	Seattle-Tacoma International	0	23,031,753
		Total	1,776,459,978	166,153,577

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FACILITIES AND EQUIPMENT, RECOVERY ACT

Program and Financing
(in millions of dollars)

Identification code: 69-1304-0-1-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Change in obligated balances:			
3000	Unpaid Obligation balance, start of year:	124	34	9
3031	Obligations incurred, unexpired accounts	1	.....	.....
3040	Total outlays (gross)	-89	-25	-9
3081	Recoveries of prior year unpaid obligations, unexpired accounts	-2	.....	.....
3100	Obligated balance, end of year	34	9	
	Net budget authority and outlays			
4011	Outlays from discretionary balances	89	25	9
4190	Outlays (total)	89	25	9

The American Recovery and Reinvestment Act of 2009 provided $200 million to FAA's Facilities & Equipment (F&E) account, which finances major capital investments related to modernizing and improving air traffic control and airway facilities, equipment, and systems. Funds were appropriated from the General Fund of the U.S. Treasury and available for obligation through FY 2010. The funding is being used to upgrade, modernize, and improve FAA power systems, air route traffic control centers, air traffic control towers, terminal radar approach control facilities, and navigation and landing equipment.

GRANTS-IN-AID FOR AIRPORTS, RECOVERY ACT

Program and Financing
(in millions of dollars)

Identification code: 69-1306-0-1-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Change in obligated balances:			
3000	Unpaid obligations, brought forward, Oct 1 (gross)................	195	15	0
3040	Outlays (gross)...	-164	-15	0
3081	Recoveries of prior year unpaid obligations, expired	-16	0	0
3090	Unpaid Obligations, end of year (gross)	15	0	0
3100	Obligated balance, end of year...	15	0	0
	Net budget authority and outlays:			
4011	Outlays from discretionary balances	164	15	0
4190	Outlays, net (total)	164	15	0

The American Recovery and Reinvestment Act of 2009 provided $1.1 billion for Grants-in-Aid for Airports (AIP). Funds are appropriated from the General Fund of the U.S. Treasury and are available for obligation through FY 2010. These funds were allocated to qualified airports as discretionary grants, and were distributed based on a project priority system that addresses airport safety and security, infrastructure, runway safety, increased capacity, and mitigation of environmental impacts.

AVIATION INSURANCE REVOLVING FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4120-0-3-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Obligations by program activity:			
0801	Program administration	4	7	7
0900	Total new obligations	4	7	7
	Budget resources:			
	Unobligated balance:			
1000	Unobligated balance brought forward, Oct. 1	1,450	1,676	1,864
1021	Recoveries of prior year unpaid obligations	3	......	......
1050	Unobligated balance total	1,453	1,676	1,864
	Budget authority:			
	Spending authority form offsetting collections, mandatory:			
1800	Collected	227	195	196
1850	Spending auth from offsetting collections, mand (total)	227	195	196
1930	Total budgetary resources available	1,680	1,871	2,060
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	1,676	1,864	2,053
	Change in obligated balance:			
	Obligated balance, start of year (net):			
3000	Unpaid obligations, brought forward, Oct. 1 (gross)	5	2	2
3030	Obligations incurred, unexpired accounts	4	7	7
3040	Outlays (gross)	-4	-7	-2
3080	Recoveries of prior year unpaid obligations, unexpired	-3	......	......
	Obligated balance, end of year (net):			
3090	Unpaid obligations, end of year (gross)	2	2	7
3100	Obligated balance, end of year	2	2	7
	Budget authority and outlays net:			
	Mandatory:			
4090	Budget authority, gross	227	195	196
	Outlay, gross:			
4100	Outlays from new mandatory authority	4	7	2
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4121	Interest on Federal securities	-31	-34	-26
4123	Non-Federal sources	-196	-161	-170
4130	Offsets against gross budget authority and outlays (total)	-227	-195	-196
4160	Budget authority, net (mandatory)	....	....	....
4170	Outlays, net (mandatory)	-223	-188	-194
4180	Budget authority, net (total)	....	....	....
4190	Outlays, net (total)	-223	-188	-194
	Memorandum (non-add) entries:			
5000	Total investments, SOY: Federal securities: Par value	1,452	1,631	1,855
5001	Total investments, EOY: Federal securities: Par value	1,631	1,855	2,047

The fund provides direct support for the aviation insurance program (chapter 443 of title 49, U.S. Code). Income to the fund is derived from premium collections for premium insurance coverage issued, income from authorized investments, and filing fees for non-premium coverage issued. The non-premium program provides aviation insurance coverage for aircraft used in connection with certain Government contract operations by a Department or Agency that agrees to indemnify the Secretary of Transportation for any losses covered by the insurance. The premium program provides war risk insurance coverage at a premium based on activity.

The Homeland Security Act of 2002 (P.L. 107-296) added a provision to require the Secretary to provide additional premium war risk insurance coverage (hull loss or damage and passenger and crew liability) to air carriers insured for third-party war risk liability on November 25, 2002.

The FAA premium war risk insurance policy covers: (i) hull losses at agreed value; (ii) death, injury, or property loss to passengers or crew, the limit being the same as the air carrier's commercial coverage as of November 25, 2002; and (iii) third party liability.

Now that commercial underwriters are expressing a stronger interest in writing a small but limited amount of war risk, the Budget proposes to establish a $150 million deductible for hull and liability exposures in FAA premium war risk policies. The Administration's goal is to incentivize the commercial marketplace to underwrite most but not all aviation war risks.

Object Classification
(in millions of dollars)

Identification code: 69-4120-0-3-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Reimbursable obligations:			
2111	Personnel Compensation: Full time permanent........................	1	2	2
2440	Refunds	3	5	5
9999	Total new obligations	4	7	7

Employment Summary

Identification code: 69-4120-0-3-402		FY 2011 Actual	FY 2012 Estimate	FY 2012 Estimate
2001	Reimbursable Civilian full-time equivalent employment...	5	4	5

ADMINISTRATIVE SERVICES FRANCHISE FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4562-0-4-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Obligations by program activity:			
0801	Accounting Services	59	60	60
0804	Information Services	96	111	113
0805	Duplicating Services	4	4	4
0806	Multi Media	2	2	2
0807	CMEL/Training	11	12	11
0808	International Training	5	4	4
0810	Logistics	203	207	218
0811	Aircraft Maintenance	50	56	57
0812	Acquisition	10	10	10
0900	Total new obligations	440	466	479
	Budgetary Resources:			
1000	Unobligated balance brought forward, Oct 1	130	128	137
1021	Recoveries of prior year unpaid obligations	26	....	....
1050	Unobligated balance (total)	156	128	137
	Budget authority:			
	Spending authority from offsetting collections, discretionary:			
1700	Collected	422	475	466
1701	Change in uncollected payments, federal sources	-10	....	....
1750	Spending auth from offsetting collections, disc (total)	412	475	466
1930	Total budgetary resources available	568	603	603
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	128	137	124
	Change in obligated balances:			
	Obligated balance, start of year (net):			
3000	Unpaid obligations, brought forward, Oct 1 (gross)	187	142	90
3010	Uncollected pymts, Fed sources, brought forward, Oct 1	-23	-13	-13
3020	Obligated balance, start of year (net)	164	129	77
3030	Obligations incurred, unexpired accounts	440	466	479
3040	Outlays (gross)	-459	-518	-487
	Change in uncollected customer payments, Federal sources,			
3050	unexpired	10	....	....
3080	Recoveries of prior year unpaid obligations unexpired	-26	....	....
3090	Unpaid obligations, end of year (gross)	142	90	82
3091	Uncollected pymts, fed sources, end of year	-13	-13	-13
3100	Obligated balance, end of year (net)	129	77	69
	Budget authority and Outlays, net:			
	Discretionary:			
4000	Budget authority, gross	412	475	466
	Outlays gross:			
4010	Outlays from new discretionary authority	319	323	317
4011	Outlays from discretionary balances	140	195	170
4020	Outlays, gross (total)	459	518	487
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-422	-475	-466
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pmts, Fed sources unexpired	10	....	....
4080	Outlays, net (discretionary)	37	43	21
4180	Budget authority, net (discretionary)	....	....	....
4190	Outlays, net (total)	37	43	21

In 1997, the Federal Aviation Administration established a franchise fund to finance operations where the costs for goods and services provided are charged to the users on a fee for service basis. The fund improves organizational efficiency and provides better support to FAA's internal and external customers. The activities included in this franchise fund are: training, accounting, travel, duplicating services, multi-media services, information technology, materiel management (logistics), and aircraft maintenance.

Object Classification
(in millions of dollars)

Identification code: 69-4562-0-4-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Reimbursable obligations:			
2111	Personnel compensation: Full-time permanent	124	135	138
2121	Civilian personnel benefits	37	40	41
2210	Travel and transportation of persons	4	5	5
2220	Transportation of things	6	6	6
2233	Communications, utilities, and miscellaneous charges	12	22	22
2240	Printing and reproduction	1	1	1
2252	Other services	188	181	187
2260	Supplies and materials	58	59	62
2310	Equipment	10	17	17
9999	Total new obligations	440	466	479

Employment Summary

Identification code: 69-4562-0-4-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
2001	Reimbursable civilian full-time equivalent employment	1,676	1,676	1,676

AVIATION USER FEES

Special and Trust Fund Receipts
(in millions of dollars)

Identification code: 69-5422-0-2-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Balance, start of year:			
0100	Balance, start of year......	31	51	66
	Receipts:			
0200	Aviation User Fee, Overflight Fee[021-00-542240-0]	56	65	75
0400	Total Balances and collections	87	116	141
	Appropriations:			
0500	Aviation User Fees[021-12-5422-0]......	-50	-50	-50
0501	Aviation User Fees-Legislative Proposal, subject to PAYGO [0201-12-5422-4-1201]......	.....	.....	-50
0599	Total appropriations......	-50	-50	-100
0610	Essential Air Services and Rural Airport Improvement Fund [021-04-5423-0-1950]......	1	.....	.....
0611	Aviation User Fees [021-12-5422-0-1950]	13	.....	.....
0799	Balance, end of year	51	66	41

Program and Financing
(in millions of dollars)

Identification code: 69-5422-0-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Budgetary Resources:			
	Unobligated balance:			
1001	Unobligated balance transferred from other...... accounts [69-5423]	13	....	....
1029	Other balances withdrawn......	-13	....	....
	Budget authority:			
	Appropriations, mandatory:			
1201	Appropriations (special or trust fund)......	50	50	100
1220	Transferred to other accounts [69-5423]	-50	-50	-100
1260	Appropriations, mandatory (total)......	....	....	....
	Special and non-revolving trust funds:			
1950	Other balances withdrawn......	13	....	....

The Federal Aviation Reauthorization Act of 1996 (P.L. 104-264) authorized the collection of user fees for air traffic control and related services provided by the FAA to aircraft that neither take off nor land in the United States, commonly known as overflight fees. The Budget estimates that $75 million in overflight fees will be collected in 2013.

The Budget proposes to increase the amount of funding provided from overflight fees to the Essential Air Service (EAS) Program from $50 million to $100 million. The additional funding will be used to pay subsidies to air carriers providing service under the EAS program, thereby reducing the amount of discretionary budget authority needed to fund the program.

AIRPORT AND AIRWAY TRUST FUND

Program and Financing
(in millions of dollars)

Identification code: 69-8103-0-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Memorandum (non-add) entries:			
50.00	Total investments, start of year: Federal securities: Par value	7,045	8,641	8,411
50.01	Total investments, end of year: Federal securities: Par value	8,641	8,411	7,418

Section 9502 of Title 26, U.S. Code, provides for amounts equivalent to the funds received in the Treasury for the passenger ticket tax and certain other taxes paid by airport and airway users to be transferred to the Airport and Airway Trust Fund. In turn, appropriations are authorized from this fund to meet obligations for airport improvement grants, FAA facilities and equipment, research, operations, payment to air carriers, and for the Bureau of Transportation Statistics Office of Airline Information.

To more equitably distribute the cost of air traffic services across the aviation user community, the Administration proposes to establish a new surcharge for air traffic services of $100 per flight. Military aircraft, public aircraft, piston aircraft, air ambulances, aircraft operating outside of controlled airspace, and Canada-to- Canada flights would be exempt. The revenues generated by the surcharge would be deposited into the Airport and Airway Trust Fund. The surcharge would be effective for flights beginning after September 30, 2012.

The status of the fund is as follows:

Status of Funds (in millions of dollars)

Identification code: 69-8103-0-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Unexpended balance, start of year:			
01.00	Balance, start of year..	9,428	10,326	10,051
	Adjustments:			
01.99	Total balance, start of year	9,428	10,326	10,051
	Cash Income during the year:			
	Current law:			
	Receipts			
12.00	Excise Taxes, Airport and Airway Trust Fund [021-00-810310-0]	11,532	11,600	11,949
	Offsetting receipts (intragovernmental):			
12.40	Interest, Airport and Airway Trust Fund [021-00-810320-0] .	182	206	226
12.41	Interest, Airport and Airway Trust Fund [021-00-810320-0]	10	....	....
	Offsetting collections:			
12.80	Facilities and Equipment (Airport and Airway and Airport Trust Fund [021-12-8107-0]...	......	1	1
12.81	Research, engineering and development (Airport and Airway Trust Fund) [021-12-8108]..	67	26	26
12.82	Grants-in-aid for Airports (Airport and Airway Trust Fund) [021-12-8106-0]..	......	62	62
12.83	Facilities and Equipment (Airport and Airway and Airport Trust Fund [021-12-8107-0]...	7	12	12
12.99	Income under present law	11,798	11,907	12,276
22.01	Airport and Airway Trust Fund - Air Traffic Service Fee Receipts	......	....	863
22.99	Income under proposed legislation	......	....	863
32.99	Total cash income	11,798	11,907	13,139
	Cash outgo during year:			
	Current law:			
45.00	Payments to Air Carriers [021-12-8304-0]	-135	-149	-126
45.01	Grants-in-aid for Airports (Airport and Airway Trust Fund) [021-12-8106-0]..	-3,216	-3,851	-3,766
45.02	Facilities and Equipment (Airport and Airway Trust Fund) [021-12-8107-0]..	-2,818	-2,921	-3,005
45.03	Research, Engineering and Development (Airport and Airway Trust Fund) [021-12-8108-0]	-181	-200	-201
45.04	Trust Fund Share of FAA Activities (Airport and Airway Trust Fund) [021-12-8104-0]...	-4,550	-5,061	-6,721
45.99	Outgo under current law (-)	-10,900	-12,182	-13,819
55.00	Grants-in-aid for Airports (Airport and Airway Trust Fund)	....	....	167
55.99	Outgo under proposed legislation (-)	....	....	167
65.99	Total Cash outgo (-)	-10,900	-12,182	-13,652
	Unexpended balance, end of year:			
87.00	Uninvested balance (net), end of year	1,685	1,640	2,120
87.01	Airport and Airway Trust Fund...	8,641	8,411	7,418
87.99	Total balance, end of year	10,326	10,051	9,538

TRUST FUND SHARE OF FAA ACTIVITIES
(AIRPORT AND AIRWAY TRUST FUND)

Program and Financing
(in millions of dollars)

Identification code: 69-8104-0-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
	Obligations by program activity:			
00.01	Payment to operations	4,550	5,061	6,721
09.00	Total new obligations	4,550	5,061	6,721
	Budgetary resources:			
	Appropriations, discretionary:			
11.01	Appropriations (special or trust fund).	4,559	5,061	6,721
11.32	Appropriations temporarily reduced	-9	....	....
11.60	Appropriations, discretionary: (total)	4,550	5,061	6,721
19.30	Total budgetary resources available	4,550	5,061	6,721
	Change in obligated balance:			
	Obligated balance, start of year (net):			
30.30	Obligation incurred, unexpired accounts	4,550	5,061	6,721
30.40	Outlays (gross):	-4,550	-5,061	-6,721
	Budget authority and outlays, net:			
	Discretionary:			
40.00	Budget authority, gross	4,550	5,061	6,721
	Outlays, gross:			
40.10	Outlays from new discretionary authority	4,550	5,061	6,721
40.70	Budget authority, net (discretionary)	4,550	5,061	6,721
40.80	Outlays, net (discretionary)	4,550	5,061	6,721
41.80	Budget authority, net (total)	4,550	5,061	6,721
41.90	Outlays, net (total)	4,550	5,061	6,721

For 2013, the Budget proposes $9,718 million for FAA Operations, of which $6,721 million would be provided from the Airport and Airway Trust Fund.

Object Classification
(in millions of dollars)

Identification code: 69-8104-0-7-402		FY 2011 Actual	FY 2012 Estimate	FY 2013 Estimate
19.40	Direct obligations: Financial Transfers	4,550	5,061	6,721

FAA Administrative Provisions in FY 2013 President's Budget

Proposed Language	Justification
Sec. 110. The Administrator of the Federal Aviation Administration may reimburse amounts made available to satisfy 49 U.S.C. 41742(a)(1) from fees credited under 49 U.S.C. 45303: Provided, That during fiscal year 2013, 49 U.S.C. 41742(b) shall not apply, and any amount remaining in such account at the close of that fiscal year may be made available to satisfy section 41742(a)(1) for the subsequent fiscal year.	In order to satisfy 49 U.S.C. 41742(a)(1), at the beginning of each fiscal year FAA makes available to the Essential Air Services (EAS) program $50 million from the Facilities & Equipment (F&E) account. This provision allows FAA to reimburse F&E from the overflight fees collected and is needed in order to continue the practice in FY 2013.
Sec. 111. Amounts collected under section 40113(e) of title 49, United States Code, shall be credited to the appropriation current at the time of collection, to be merged with and available for the same purposes of such appropriation.	As authorized under 49 USC 40113(e), the FAA may provide safety-related training and operational services to foreign aviation authorities with or without reimbursement. While FAA generally enforces a prepayment policy for reimbursable goods and services provided to foreign countries or international organizations, many have laws or regulations similar to the U.S. that prohibit advance payments. In those instances, FAA often receives payments for services provided during a fiscal year after that year has ended. This provision allows FAA to use the funds for additional technical assistance work that cannot be prepaid, instead of returning the funds to a lapsed appropriation.
Sec. 112. None of the funds limited by this Act for grants under the Airport Improvement Program shall be made available to the sponsor of a commercial service airport if such sponsor fails to agree to a request from the Secretary of Transportation for cost-free space in a non-revenue producing, public use area of the airport terminal or other airport facilities for the purpose of carrying out a public service air passenger rights and consumer outreach campaign.	This provision requires airports to make space available, at the request of the Secretary, in the public use areas of a terminal (both non-revenue and revenue-producing areas) for an air passenger rights and consumer outreach campaign. The space includes areas that are currently leased to airline tenants.
Sec. 113. None of the funds in this Act shall be available for paying premium pay under subsection 5546(a) of title 5, United States Code, to any Federal Aviation Administration employee unless such employee actually performed work during the time corresponding to such premium pay.	The provision stems from past legal action taken by air traffic controllers to receive premium pay for a full shift, even if only part of the shift was eligible for premium pay. The FAA recommends retaining this provision as a GP that would apply to all FAA accounts. FAA also recommends keeping this provision for FY 2013 in order to minimize potential payroll liability.
Sec. 114. None of the funds in this Act may be obligated or expended for an employee of the Federal Aviation Administration to purchase a store gift card or gift certificate through use of a Government-issued credit card.	This provision prohibits FAA employees from using a government-issued credit card to purchase a store gift card or gift certificate. FAA recommends retaining this provision as a GP that would apply to all FAA accounts.
Sec. 115. None of the funds in this Act may be obligated or expended for retention bonuses for an employee of the Federal Aviation Administration without the prior written approval of the Deputy Assistant Secretary for Administration of the Department of Transportation.	The FY 2013 budget proposes to retain the provision that all FAA retention bonuses continue to be approved by the Deputy Assistant Secretary for Administration.
Sec. 116. Subparagraph (D) of section 47124(b)(3) of title 49, United States Code, is amended by striking "20 percent." and inserting "50 percent.''	The FY 2012 appropriations act covering the FAA (P.L. 112-55) amended Title 49 to establish a 20 percent cap on the maximum allowable local cost share in FAA's Contract Tower Cost Share program. This program covers airports with Benefit/Cost ratios less than the 1.0 needed to qualify for the full Contract Tower Program. The FY 2013 budget proposes to increase the maximum allowable local cost for these airports from 20 to 50 percent.

Sec. 117. None of the funds appropriated under chapter 443 of title 49 shall be used to administer a program for air carrier insurance coverage provided under that chapter unless any policy issued under such chapter contains a deductible of $150,000,000 per loss event for hull loss or damage and liability to passenger, crew, and third parties. The FAA is authorized to include such a provision in its policies.	Now that commercial underwriters are expressing a stronger interest in writing a small but limited amount of war risk, the FY 2013 Budget proposes to establish a $150 million deductible for hull and liability exposures in all FAA war risk policies. The Administration's goal is to incentivize the commercial marketplace to underwrite most but not all aviation war risks.

FEDERAL AVIATION ADMINISTRATION

OPERATIONS

ESTIMATES		APPROPRIATIONS	
2003	[1, 2] 7,481,970,000	2003	[3, 4, 5] 7,019,170,377
2004	[6] 7,590,648,000	2004	[7, 8] 7,479,206,153
2005	[9] 7,849,000,000	2005	[10, 11] 7,706,537,000
2006	[12, 13] 8,201,000,000	2006	[14, 15] 8,104,140,000
2007	[16] 8,366,000,000	2007	[17] 8,374,374,217
2008	[18] 8,725,783,000	2008	[19] 8,740,000,000
2009	[20] 8,998,461,700	2009	[21] 9,046,167,000
2010	[22] 9,335,798,000	2010	[23, 24] 9,351,400,000
2011	[25] 9,793,000,000	2011	[26] 9,516,172,000
2012	[27] 9,823,000,000	2012	[28] 9,653,395,000
2013	[29] 9,718,000,000		

[1] FY 2003 includes $404,768,000 for CSRS/Health benefit accruals proposed by the Administration.
[2] Includes 3,799,278,000 from Airport and Airway Trust Fund.
[3] Includes $3,774,582,693 from Airport and Airway Trust Fund and $3,248,064,934 from General Fund.
[4] Reflects 0.65 percent across-the-board rescission per P.L. 108-7 and Working Capital Fund cut of $3.9M.
[5] Excludes Midway Island Airfield earmark for $3,500,000—reduced to $3,477,250 by 0.65 rescission.
[6] Administration proposes $6,000,000,000 from Airport and Airway Trust Fund.
[7] Reflects 0.59 percent across-the-board rescission per P.L. 108-199; Working Capital Fund cut by $7.3M.
[8] Includes $4,469,000,000 from Airport Airway Trust Fund.
[9] Includes $6,002,000,000 from Airport and Airway Trust Fund with $2M for Bureau of Transportation Statistics.
[10] Reflects 0.80 percent across-the-board rescission per P.L. 108-447 and Working Capital Fund cut of $6.3M.
[11] Includes $$4,878,728,416 from Airport and Airway Trust Fund.
[12] Includes $6,500,000,000 from the Airport and Airway Trust Fund.
[13] Includes $150,000,000 for Flight Service Station A-76 Competition.
[14] Reflects 1.0 percent across-the-board rescission per P.L. 109-148.
[15] Includes $5,541,000,000 from Airport and Airway Trust Fund.
[16] Includes $5,445,000,000 from Airport and Airway Trust Fund.
[17] Includes $5,627,900,000 from Airport and Airway Trust Fund
[18] Includes $6,243,027,000 from Airport and Airway Trust Fund. FAA did not request funding for this account in FY 2008. Funding was requested in the proposed Safety and Operations and Air Traffic Organization accounts. The Operations amount is shown here for comparative purposes.
[19] Includes $6,397,061,000 from Airport and Airway Trust Fund.
[20] Includes $6,280,973,000 from Airport and Airway Trust Fund. FAA did not request funding for this account in FY 2009. Funding was requested in the proposed Safety and Operations and Air Traffic Organization accounts. The Operations amount is shown here for comparative purposes.
[21] Includes $5,238,005,000 from Airport and Airway Trust Fund. Also includes $3.7 million transfer from the U.S. Department of State.
[22] Includes $6,207,798,000 from Airport and Airway Trust Fund.
[23] Includes $4,000,000,000 from Airport and Airway Trust Fund.
[24] Includes $1,300,000 transfer from the U.S. Department of State
[25] Includes $6,064,000,000 from Airport and Airway Trust Fund
[26] Reflects as rescission of $19,066,000 per P.L. 112-55. Includes $4,549,882,000 from Airport and Airway Trust Fund. Also includes $2.3 million transfer from the U.S. Department of State
[27] Includes $4,958,000,000 from Airport and Airway Trust Fund
[28] Includes $5,060,694,000 from Airport and Airway Trust Fund
[29] Includes $6,721,000,000 from Airport and Airway Trust Fund

FEDERAL AVIATION ADMINISTRATION

FACILITIES AND EQUIPMENT (AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2003	[1]2,981,022,000	2003	[2]2,961,645,357
		2003 Rescission	[3]-20,000,000
2004	2,916,000,000	2004	[4]2,892,831,000
		2004 Rescission	[5]-30,000,000
2005	2,500,000,000	2005	[6]2,519,680,000
		2005 Supplemental (P.L.108-324)	[7]5,100,000
2006	2,448,000,000	2006	[8]2,514,600,000
		2006	[9]40,600,000
2007	2,503,000,000	2007	2,517,520,000
2008	[10]2,461,566,000	2008	2,513,611,000
2009	[11]2,723,510,000	2009	2,742,095,000
		2009 Supplemental (P.L.111-5)	[12]200,000,000
2010	2,925,202,000	2010	[13]2,928,315,000
2011	2,970,000,000	2011	[14]2,730,731,000
2012	[15]3,120,000,000	2012	2,730,731,000
2013	2,850,000,000		

[1] FY 2003 request excludes $18,551,000 for CSRS/Health benefit accruals proposed by the Administration.
[2] Reflects 0.65 percent across-the-board rescission of per P.L. 108-7.
[3] Rescission of unobligated balances.
[4] Reflects 0.59 percent across-the–board rescission per P.L. 108-199.
[5] Rescission of unobligated balances.
[6] Reflects 0.80 percent across-the-board rescission per P.L. 108-447.
[7] American Recovery and Reinvestment Act Supplemental per P.L. 111-5, from the General Fund.
[8] Reflects 1.0 percent across-the-board rescission, per P. L. 109-148.
[9] Hurricane Supplemental fund per P.L. 109-148
[10] FAA did not request funding for this account in FY 2008. Funding was requested in the proposed Safety and Operations and Air Traffic Organization accounts. The Facilities and Equipment amount is shown here for comparative purposes.
[11] FAA did not request funding for this account in FY 2009. Funding was requested in the proposed Safety and Operations and Air Traffic Organization accounts. The Facilities amount is shown here for comparative purposes.
[12] American Recovery and Reinvestment Act Supplemental per P.L. 111-5, from the General Fund.
[13] Reflects $7,888,000 rescission of prior year authority per P.L. 111-117.
[14] Reflects a rescission of $5,472,000 per P.L. 112-55.
[15] Includes $250,000,000 of mandatory General Fund from the Administration's Infrastructure proposal.

FEDERAL AVIATION ADMINISTRATION

RESEARCH, ENGINEERING, AND DEVELOPMENT

ESTIMATES		APPROPRIATIONS	
2003	126,744,000	2003	[1]147,485,075
2004	100,000,000	2004	[2]118,734,310
2005	117,000,000	2005	[3]129,879,584
2006	130,000,000	2006	[4]136,620,000
2007	130,000,000	2007	130,234,000
2008	[5]140,000,000	2008	146,828,000
2009	[6]171,028,000	2009	171,000,000
2010	180,000,000	2010	190,500,000
2011	190,000,000	2011	[7]169,660,000
2012	190,000,000	2012	167,556,000
2013	180,000,000		

[1] Reflects a 0.65 percent across-the-board rescission per P.L. 108-7.
[2] Reflects a 0.59 percent across-the-board rescission per P.L. 108-199.
[3] Reflects a 0.80 percent across-the-board rescission per P.L. 108-447.
[4] Reflects a 1.0 percent across-the-board rescission of 1.0 percent per P.L. 109-148.
[5] Includes $122,867,000 from the Airport and Airway Trust Fund.
[6] Includes $156,003,000 from the Airport and Airway Trust Fund.
[7] Reflects a $340,000 rescission per P.L. 112-55.

FEDERAL AVIATION ADMINISTRATION

GRANTS-IN-AID FOR AIRPORTS
(LIQUIDATION OF CONTRACT AUTHORIZATION)
(AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2002	1,800,000,000	2002	1,800,000,000
2002 Rescission	-331,000,000	2002 Rescission	[1]-301,720,000
		2002	[2]175,000,000
2003	3,100,000,000	2003	3,100,000,000
2004	3,400,000,000	2004	3,400,000,000
2005	2,800,000,000	2005	2,800,000,000
2006	3,300,000,000	2006	3,399,000,000
2007	4,000,000,000	2007	4,399,000,000
2008	4,300,000,000	2008	4,399,000,000
2009	3,600,000,000	2009	3,600,000,000
		2009 Supplemental (P.L. 111-5)	[3]1,100,000,000
2010	3,000,000,000	2010	3,000,000,000
2011	3,550,000,000	2011	3,550,000,000
2012	3,600,000,000	2012	3,435,000,000
2013	3,400,000,000		

[1] Rescission of Contract Authority per P.L. 107-87.
[2] Emergency Supplemental Funding included in P.L. 107-117, FY 2002 Department of Defense Appropriations Bill.
[3] American Recovery and Reinvestment Act Supplemental, per P.L. 111-5, from the General Fund.

FEDERAL AVIATION ADMINISTRATION

GRANTS-IN-AID FOR AIRPORTS
LIMITATION ON OBLIGATIONS
(AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2002	(3,300,000,000)	2002	[1](3,474,944,000)
2003	(3,400,000,000)	2003	[2](3,377,900,000)
2004	(3,400,000,000)	2004	[3] (3,379,940,000)
		2004	[4](1,988,200)
2005	(3,500,000,000)	2005	[5](3,497,000,000)
2006	(3,000,000,000)	2006	(3,514,500,000)
2007	(2,750,000,000)	2007	(3,514,500,000)
2008	(2,750,000,000)	2008	(3,514,500,000)
2009	(2,750,000,000)	2009	(3,514,500,000)
2010	(3,515,000,000)	2010	(3,515,000,000)
2011	(3,515,000,000)	2011	(3,515,000,000)
2012	(2,424,000,000)	2012	(3,350,000,000)
2013	(2,424,000,000)		

[1] Includes direct appropriation, DOD supplemental of $175,000,000 per P.L. 107-117 and reflects admin. rescission of $-56,000 per P.L. 107-206.
[2] Reflects 0.65 percent across-the-board rescission per P.L. 108-7.
[3] Reflects 0.59 percent across-the-board rescission per P.L. 108-199.
[4] Direct appropriation from General Fund for Ft. Worth Alliance Airport, pursuant to Division H, Section 167, P.L. 108-199.
[5] Includes 0.80 percent across-the-board rescission per P.L. 108-447 and includes a $25,000,000 Hurricane supplemental per P.L. 108-324. 324.

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FEDERAL AVIATION ADMINISTRATION
RESEARCH, DEVELOPMENT, AND TECHNOLOGY

The FAA's Research, Engineering, and Development (R,E&D) program, in partnership with the aviation community, provides world leadership by conducting high-priority research and developing innovative technologies to support a safe, efficient, and environmentally acceptable global aviation system. The program undertakes research and coordinates its research with both domestic and international partners. It is responsible for establishing and overseeing FAA's Research and Development (R&D) policy and plans, developing its R&D investment portfolio, and serving as the agency's R&D spokesperson. Its diverse scientific, engineering and technical workforce supports all aspects of aviation from research on materials to development of new products and procedures.

Under the management of the William J. Hughes Technical Center, the R&D program develops and tests specific technologies, tools, and procedures critical to enhancing FAA's unique mission to regulate and certify airmen and aircraft and to enhance the safety and efficiency of the National Aviation System. The program also enables FAA to keep pace with new technologies that affect FAA's ability to regulate and manage the National Airspace System. The FAA publishes the annual National Aviation Research Plan which documents each R&D program area, provides intended outcomes, outputs, programmatic structure, partnerships, and a long-range outlook for the program.

One way FAA ensures its research meets the President's criteria for research and development is through the Research, Engineering, and Development Advisory Committee (REDAC), established by Congress in 1989. This group reports to the FAA Administrator on R&D issues and provides feedback on the FAA's portfolio and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of programs to the National Airspace System and works to ensure that FAA's program goals and priorities properly link to national needs. The Committee also examines the quality and performance of the R&D program and provides FAA with advice on how best to allocate funds to ensure a high quality R&D program. The REDAC considers aviation research needs in five key areas: air traffic services, airport technology, aircraft safety, human factors, and the environment. Representing corporations, universities, associations, consumers, and other agencies, there are up to 30 REDAC and subcommittee members who hold two-year terms. The REDAC meets with FAA senior managers two times a year and annually reviews the Agency's proposed R&D budget submission.

RESEARCH, DEVELOPMENT & TECHNOLOGY
DEPARTEMENT OF TRANSPORTATION
BUDGET AUTHORITY
($ in Thousands)
EXHIBIT IV-1

	FEDERAL AVIATION ADMINISTRATION	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	FY 2013 Applied	FY 2013 Development
A. Research, Engineering and Development		**169,660**	**167,556**	**180,000**	**180,000**	
A11	**Improve Aviation Safety**	**91,321**	**89,314**	**94,760**	**94,760**	
a.	Fire Research and Safety	7,158	7,158	7,667	7,667	
b.	Propulsion and Fuel System	2,301	2,300	2,882	2,882	
c.	Advanced Structural/Structural Safety	2,534	2,534	2,569	2,569	
d.	Aircraft Icing - Atmospheric Hazards/Digital System Safety	6,534	5,404	6,644	6,644	
e.	Continued Airworthiness	10,632	11,600	13,202	13,202	
f.	Aircraft Catastrophic Failure Prevention Research	1,147	1,147	1,691	1,691	
g.	Flightdeck/Maintenance/System Integration Human Factors	7,083	6,162	5,416	5,416	
h.	System Safety Management	11,694	10,027	11,345	11,345	
I.	Air Traffic Control/Technical Operations Human Factors	10,364	10,364	10,014	10,014	
j.	Aeromedical Research	11,098	11,000	9,895	9,895	
k.	Weather Program	16,143	16,043	15,539	15,539	
l.	Unmanned Aircraft System	3,635	3,504	5,901	5,901	
m.	NextGen - Alternative Fuels for General Aviation	998	2,071	1,995	1,995	
A12	**Improve Efficiency**	**37,798**	**34,174**	**45,144**	**45,144**	
a.	JPDO	13,764	5,000	12,000	12,000	
b.	NextGen - Wake Turbulence	10,664	10,674	10,350	10,350	
c.	NextGen - Air Ground Integration	5,603	7,000	10,172	10,172	
d.	NextGen - Self-Separation	5,260	3,500	7,796	7,796	
e.	NextGen- Weather Technology in the Cockpit	2,507	8,000	4,826	4,826	
A13	**Reduce Environmental Impact**	**35,134**	**38,574**	**34,637**	**34,637**	
a.	Environment and Energy	15,074	15,074	14,776	14,776	
b.	NextGen - Environmental Research, Aircraft Technologies Fuels and Metrics	20,060	23,500	19,861	19,861	
A14	**Mission Support**	**5,407**	**5,494**	**5,459**	**5,459**	
a.	System Planning and Resource Management	1,727	1,717	1,757	1,757	
b.	William J. Hughes Technical Center Laboratory Facility	3,680	3,777	3,702	3,702	
B. Facilities and Equipment		**118,479**	**144,645**	**118,388**		**97,888**
a.	Advanced Technology Development and Prototype	15,100	17,100	18,898		18,898
b.	Plant	21,457	22,500	20,500		N/A
c.	CAASD	21,536	20,045	17,990		17,990
d.	NextGen System Development	60,386	85,000	61,000		61,000
C. Airport Improvement Program, Airport Technology		**37,472**	**44,250**	**44,300**	**44,300**	
a.	Airport Technology Research	22,472	29,250	29,300	29,300	
b.	Airport Cooperative Research	15,000	15,000	15,000	15,000	
D. Operations		**9,474**	**9,286**	**10,350**		**10,350**
E. Commercial Space Transportation		**165**	**1,000**	**1,000**		**1,000**
	Subtotal, Research and Development	**313,793**	**344,237**	**333,538**	**224,300**	**109,238**
	Subtotal , Facilities (F)	**21,457**	**22,500**	**20,500**	**N/A**	**N/A**
	TOTAL FAA	**335,250**	**366,737**	**354,038**	**224,300**	**109,238**

NextGen Generation Air Transportation System (NextGen)

Executive Summary

The FAA continues to make critical progress implementing Next Generation Air Transportation System (NextGen) capabilities, which encompasses the deployment of new systems, technologies, and procedures that will help reduce delays, expand air traffic capacity, and mitigate aviation's impact on the environment, while ensuring the highest levels of safety.

Expanded satellite-based surveillance has increased. To date, Automatic Dependent Surveillance-Broadcast (ADS-B) has been implemented in South Florida, Louisville, Philadelphia, the Gulf of Mexico, and Juneau. Implementation of ADS-B to control air traffic in the Gulf of Mexico is a significant improvement. We have improved airport runway access, and continue to maintain and improve safety with each step.

Our collaborative work in response to the 2009 RTCA NextGen Mid-Term Implementation Task Force final report includes supporting efforts to share surface movement data for better decision making as well as increasing throughput at airports with closely space and converging or intersecting runways. We are looking for ways to increase access to the NAS for all aviation user groups (i.e., recreational general aviation, air taxi, commercial) and are working toward providing controllers with the tools and operator procedures they need to enable the safest, most efficient, economical and environmentally friendly routes of travel.

As we transition to the NextGen mid-term, we continue to expand the ADS-B technology, while adding Performance Based Navigation (PBN) procedures to increase safety and capacity. PBN procedures can also save time and decrease carbon emissions and noise pollution. We are working more closely with our stakeholders to ensure closer coordination in our NextGen efforts, such as the Continuous Lower Emissions, Energy, and Noise (CLEEN) program. Here, we are advancing noise and emissions reductions while improving energy efficiency. NextGen should create a system where travelers will enjoy fewer delays and more predictable trips, flight path neighborhoods will experience less noise, and local economies can be strengthened.

Introduction

For FY 2013, $1,034 million is requested for NextGen programs and activities. FAA will continue the development and implementation of transformative improvements in how safely and efficiently we operate the National Airspace System (NAS), and in how well we fulfill our responsibilities as stewards of the environment. This funding is needed to support the continuing effort that began in previous years.

NextGen is not a single program. It encompasses many programs, systems, and procedures, at different levels of maturity. Some are being deployed now, some are in development and nearing deployment, and still more are being defined as the technology necessary for them becomes available-all are being coordinated to complement each other.

As the number of international passengers and aviation activities across the globe increase every year, it becomes even more important for the United States to continue to be the gold standard for aviation safety. To make this happen, FAA actively builds partnerships and shares knowledge to create a safe, seamless and efficient global aviation system. Our premise is simple: national boundary lines should not be impediments to safety. The global aviation system moves more than 6.2 million people and tons of cargo to their destinations every day. Through the Office of Policy, International Affairs and Environment (APL), FAA collaborates with our domestic and international partners to improve aviation safety, efficiency and the environment. People across the globe benefit from the work we do.

The public at large benefits from reduced aviation noise and emission impacts. The aviation industry also benefits because lower impacts reduce environmental constraints on aviation operation growth. Improvements in fuel burn and energy efficiency improve emission, reduce the economic burden imposed by high fuel costs and contribute to U.S. energy conservation.

FY 2013 will be the second year of the period we have identified as the NextGen mid-term. At the end of the mid-term, the air transportation system will be fundamentally different from the one we know today. The way we track aircraft will be transforming from ground-based radar to satellite-based position-fixing. For commercial aviation, satellite-based surveillance is a technology leap that will greatly increase accuracy and enable improved situational awareness at air traffic control facilities and on properly equipped aircraft.

The way we control aircraft will transition from today's cumbersome, step-by-step clearances to more precise, more direct trajectories in all phases of flight – takeoff, ascent, cruise, descent, and landing. These PBN procedures will reduce flight distances, flight times, fuel consumption, and harmful engine emissions.

The way we transfer information between and among aircraft and control facilities will be in an early but productive stage of a shift from voice to data communication. Applied initially to messages between airport towers and aircraft on the surface, data communications will improve safety and reduce the time it takes to get from the gate into the air. Eventually it will become the principal method of routine communications through all phases of flight.

Organizing information for pilots, controllers, airports, airlines and other NAS stakeholders will be going through perhaps the greatest change of all from disjointed data presentations in ad-hoc formats, to improved, fully-merged data presented in the same format to all players.

We must also reduce the size of the environmental footprint of greenhouse-gas emissions and noise created by the aviation industry. Through research and development of new products and procedures, we endeavor to reduce the environmental impact while ensuring the continuation of a safe and secure system.

NextGen Today

The FAA already has achieved a number of critical NextGen milestones on all of these fronts. We have begun and are expanding satellite-based surveillance of essential services. We have improved airport runway access, increased safety and efficiency on the airport surface, and enhanced airspace safety and operations. NextGen systems and procedures, along with airspace redesign, have enabled more direct routes and more efficient operations, which use less fuel and reduce emissions.

NextGen's most prominent achievement to date is the authorization in September 2010 for air traffic controllers to use ADS-B throughout the U.S. to separate aircraft equipped with Automatic Dependent Surveillance-Broadcast (ADS-B) system "Out" avionics. The attainment of initial operating capability (IOC) for the ADS-B for airspace over the Gulf of Mexico in January 2010 and others at Louisville in November 2009, Philadelphia in March 2010 and Juneau in April 2010, served as important enablers for this nationwide declaration Full deployment of ADS-B ground stations across the U.S. is scheduled for 2013.

Beyond ADS-B, other recent improvements help lay a solid foundation for upcoming NextGen advances. Airspace redesign and PBN procedures already are saving fuel, reducing emissions and managing noise in demonstrations with our domestic and international partners. The FAA has worked closely with European and Asian/Pacific Rim airlines and air traffic service providers to ensure that aircraft flying globally can take advantage of operational benefits in various international air traffic environments. We also are advancing aircraft and energy technologies to reduce emissions further – in 2009 we secured approval of the first aviation alternative fuels specifications.

During 2009-2010, FAA engaged in a major outreach effort with the aviation community that yielded an unprecedented level of collaboration on and support for NextGen. The RTCA NextGen Mid-Term Implementation Task Force recommendations, resulting from that effort, continue to guide the path for NextGen development.

The FAA responded to those recommendations with plans for achieving Task Force objectives. We have completed more than a third of our Task Force response actions, making progress in areas identified by the Task Force as high priority, including metroplex operations. Work continues as scheduled for many of the remaining response actions. We have been working with the aviation community to prioritize where we should implement Performance Based Navigation (PBN) routes and procedures, and are working to streamline the PBN operations approval process.

These plans support key operational capabilities recommended by the Task Force, such as sharing surface movement data for better collaborative decision making. We are working to help airports safely increase throughput on closely spaced as well as converging or intersecting runways. We also are working to safely increase access to the NAS for all operators, and to provide controllers with the tools and operator procedures they need to enable the safest, most efficient, economical and environmentally friendly routes of travel, particularly in dense metroplex areas.

The following tables depict a partial illustration of the progress being made in responding to the Task Force recommendations.

Program	RTCA Task Force	FY 2011	FY 2012	FY 2013 - Mid-Term
Automatic Dependent Surveillance - Broadcast (ADS-B)	NAS Access #28	▪ Continued to deploy ADS-B ground infrastructure	▪ Complete final assessment of 3-nautical mile (nm) separation in 3-nautical mile (nm) separation in en route operations (beyond those achievable in the near-term prior to achievable in the near-term prior to (FIS-B)	▪ Complete NAS-wide deployment of ADS-B, Traffic Information Services–Broadcast (TIS-B) and Flight Information Services–Broadcast (FIS-B)
		▪ Pursued ADS-B program expansion to provide surveillance services in nonradar airspace		▪ Provide initial operating capability for surface alerting
Data Communications (DataComm)	DataComm #16, 17, 39, 44, 42	▪ Released solicitation for Data Comm network service provider	▪ Achieve final investment decision for procurement of en route Data Comm automation infrastructure and controller-pilot data link communications applications	▪ Achieve final investment decision on acquisition of the digital very high frequency (VHF) aeronautical mobile communications infrastructure
		▪ Initiated development of revised departure clearance capability in tower		▪ Initiate development of en route automation enhancements
				▪ Enable revised departure clearance capability in the tower environment via VHF Data Link mode 2 for aircraft equipped with Future Air Navigation System 1/A+
System Wide Information Management (SWIM)	Surface #40, 35	▪ Provided Corridor Integrated Weather System publication	▪ Achieve final investment decision for SWIM Segment 2	▪ Publish data for: (1) pilot weather report, (2) Traffic Flow Management, (3) flight data, and (4) Runway Visual Range
		▪ Provided reroute data exchange capability		▪ Provide terminal data distribution capability
		▪ Provided flight data publication for initial flight data services		▪ Provide flight data services with publish/subscribe
		▪ Provided Integrated Terminal Weather system publication		▪ Provide flight data publication host air traffic management data distribution system/flight data input/output and

Program	RTCA Task Force	FY 2011	FY 2012	FY 2013 - Mid-Term
				AIM Special Use Airspace client
Collaborative Air Traffic Management Technologies (CATMT)	Integrated ATM #47	▪ Continued CATMT Work Package 3 concept engineering and planning to support: (1) modernization of the decision support tool suite, and (2) collaborative information exchange	▪ Upgrade the Traffic Flow Management System to include an initial electronic negotiation capability for more efficient flight planning	▪ Deploy CATMT Work Package 2 capabilities to include: (1) arrival uncertainty management, (2) weather integration, (3) collaborative airspace constraint resolution, and (4) airborne reroute execution
		▪ Continued the analysis to develop the requirements to implement proven decision-support tools and data sharing capabilities		

Best Equipped – Best Served

NextGen will be implemented airport by airport, region by region, aircraft by aircraft, over a period of years. The FAA proposes moving from the concept of "first come, first served" to "best equipped, best served." While early adopters will reap the greatest benefits, lesser equipped aircraft must still be accommodated. The FAA must work with the aviation community on an operational transition plan that adequately accommodates all types of operators with varying levels of equipage, while maximizing overall system performance and enhancing safety.

Among all factors that determine how much and how quickly NextGen will increase efficiency, safety, and environmental performance in the NAS, decisions by aircraft operators on equipage will have a significant effect. For this reason, FAA is developing options for different ways to encourage rapid deployment of NextGen avionics throughout the industry.

NextGen Benefits

We've estimated that NextGen will reduce total flight delays about 35 percent by 2018, compared with the level delays would reach in the absence of NextGen, while providing $23 billion in cumulative benefits to the traveling public, aircraft operators, and the FAA. Aircraft owners will save about 1.4 billion gallons of fuel during this period, reducing carbon dioxide emissions by 14 million tons.

Flight planners in the mid-term will have increased access to information on the status of the NAS through a shared network-enabled information source. Operators will be able to see current and planned strategies to deal with congestion and other airspace constraints. New information will indicate whether airspace is blocked for military, security or space operations. It will describe other airspace limitations, such as those due to current or forecasted weather and congestion.

As the time for the flight approaches, the flight crew will receive the final flight path agreement as a data message. Data communications will provide pre-departure clearances that allow for amendments to flight plans. When the aircraft taxis out, the flight crew's situational awareness will be improved by flight deck displays of a moving map that indicates the aircraft's position on the airport surface and, at busy airports, the position of other aircraft and surface vehicles. In the tower, improved ground systems, such as surface-movement displays, will enable controllers to manage taxiways and runways more efficiently. Surface-movement displays will help controllers choose the best runway and taxi paths for a departing aircraft's intended flight path, and provide the status and positions of all other aircraft on the airport surface and in the terminal area.

These flight deck and tower displays are important safety tools that will improve the prevention of runway incursions and other surface conflicts, especially when visibility is low. More efficient management will mean fewer radio transmissions, shorter wait times, fewer departure delays and reduced fuel consumption and emissions. Weather information will be integrated into decision-making for surface management.

Departure performance will be improved by using multiple precise departure paths from each runway end through Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures. Multiple departure paths will enable controllers to place each aircraft on its own separate track, avoiding known constraints, thunderstorms and other severe weather near the airport. The ability to operate simultaneously on closely spaced parallel runways – through increased accuracy in surveillance and navigation, and through improved understanding of wake vortices – means airports will gain capacity for their existing runways.

Together, these capabilities will enhance safety, improve environmental performance, and reduce operators' delay and fuel costs.

As an aircraft climbs into the en route airspace, enhanced processing of surveillance data will improve position information and enable the flight crew and controllers to take advantage of reduced separation standards. Because the flight crew will be able to monitor the position of other aircraft from their own aircraft's flight deck, air traffic personnel will be able to assign spacing responsibility to the flight crew as the aircraft climbs to its cruising altitude. The aircraft will be able to merge into the overhead stream with minimal additional maneuvers.

Data communications will provide routine and strategic information to the flight crew and automate some routine tasks for both pilots and controllers. Also fewer voice communications will reduce radio-frequency congestion and oral miscommunication.

In oceanic operations, air traffic management (ATM) personnel will provide aircraft entering oceanic airspace with an optimized trajectory. Airspace entry will be specified by track entry time and the intended trajectory. As weather and wind conditions change, both individual reroutes and changes to the entire route structure will be managed via data communications.

NextGen capabilities will provide a number of improvements to terminal area operations that save fuel, increase predictability and minimize holding patterns, delaying vectors and other such maneuvers. Enhanced traffic management tools will analyze flights approaching an airport from hundreds of miles away, across air traffic control facility boundaries, and will calculate scheduled arrival times to maximize arrival performance. These advances will improve the flow of arrival traffic to maximize use of existing capacity. Precision arrivals will save fuel and reduce emissions.

NextGen Performance Measures

In May 2009, the FAA asked RTCA to form a Federal Advisory Committee that would develop industry consensus on a broad range of NextGen strategic issues, including the development performance metrics to gauge NextGen's impact of NAS operations. The NextGen Advisory Committee (NAC) develops a common understanding of NextGen priorities in the context of overall NextGen capabilities and implementation constraints, with an emphasis on the near- and mid-term through 2018. The NAC is comprised of top-level executives representing operators, manufacturers, air traffic management, aviation safety, airports and environmental, civil and military, domestic and international.

During FY 2011, the FAA formed an internal working group to develop a suite of outcome-based performance metrics. The work group used the ICAO framework to identify metrics in each key performance area such as capacity, efficiency, and safety. These metrics were provided to the NAC as a starting point for industry input. In September 2011, the NAC delivered to FAA its recommendations for a suite of outcome-based performance metrics. The FAA concurred with: (1) the recommended metrics in the key performance areas of capacity and efficiency; (2) the recommendation to use existing FAA metrics in the key performance areas of safety and environment; and (3) the recommendations for continued joint FAA/NAC work in this area.

The metrics have been grouped into three categories based on whether they can be immediately used or required additional work:

- **Established:** These metrics are already in use within FAA, and have industry concurrence and approval for use from FAA's NextGen Management Board. They include metrics related to: safety, environment, capacity and efficiency.

Key Performance Area	Performance Metric
Safety	**NAS-Wide System Level**
	▪ Commercial Aviation Fatalities per 100 Million Persons on Board
	▪ General Aviation Fatalities per 100K Flight Hours
	▪ Fatalities per 100K Departures (Improved Global Performance through Collaboration)
	Surface
	▪ Serious Runway Incursions per 1K Events
	Aircraft to Aircraft
	▪ Serious Loss of Separation per 1K LoSS (Loss of Standard Separation)
Environment	**Noise:**
	▪ Number of people exposed to significant noise around US airports
	Climate:
	▪ Amount of aircraft CO_2 emissions
	Energy/Efficiency:
	▪ Annual amount of fuel burned per miles flown
	Air Quality:
	▪ Amount of regulated health-based criteria pollutants in aviation emissions other than CO_2
	Water Quality:
	▪ Amount of adverse discharges to US waters
Capacity	**NAS-Wide Throughput**
	Annual Throughput
	Peak Day Throughput
Efficiency	**Operating Time Efficiency**
	Airborne Time Efficiency
	Aircraft Operating Delay
	Aircraft Airborne Delay
Cost Effectiveness	**Air Navigation Service Provider Cost per Flight**
Global Interoperability	**Aircraft Using Fully Interoperable NextGen Technologies**

- **Provisional:** These less mature metrics are generally understood but require further refinement or data sources before FAA can determine whether to employ them. They include metrics related to: predictability, access and equity and flexibility

Key Performance Area	Performance Metric
Predictability	**Variance in Aircraft Operating Time**
	Variance in Aircraft Airborne Time
	Variance in Aircraft Operating Delay
	Variance in Aircraft Airborne Delay
Access & Equity	**% of Airframes Capable of Using NextGen Services**
	% of NAS where NextGen Services are Available (including time & geographic component)
	% of Non-NextGen Capable Airframes Accommodated
Flexibility	**% of Flights not Subjected to Constraints**
	% of Flight Operator Requests Granted
Security	**Number of Times Pilots Inappropriately Operate in Restricted Airspace**
	Number of Detections of Security Anomalies or Aircraft Operating in the NAS

Conceptual: These metrics require a great deal of further exploration and joint development with industry.

Moving forward, the NAC is expected to provide more detailed recommendations for key performance indicators (metrics) that, from industry's perspective, will illustrate collective progress in the key performance areas of flexibility and access and equity. Availability of data is often a limiting factor for performance measurement; therefore, the NAC is asked to help the FAA obtain data to which the agency does not currently have access, including fuel burn.

The FAA will publish an initial web-enabled set of NextGen post-implementation performance snapshots in March 2012. The initial information will be based on the established category metrics, and will address existing NextGen implementations within key locations. The FAA will continue to improve and expand these snapshots in the coming years.

There will be a continued effort to develop targets associated with the established metrics. The FAA is currently working to incorporate NextGen metrics into the FY 2014 budget submission.

FY 2013 Funding Profile

This budget supports continued progress on our NextGen effort. The entire FY 2013 NextGen portfolio totals $1,034 million distributed among F&E programs ($955 million), Research, Engineering, & Development programs ($67 million), and Operations activities ($12 million). This portfolio reflects an increase of $99 million, or approximately 11 percent, above the FY 2012 enacted level. This level of program funding enables the FAA to continue to support near-term NextGen commitments in a budget-constrained environment. Line item detail for each account is shown in the table below.

NextGen Programs
($ in Thousands)

	FY 2011 Actual	FY 2012 Enacted	FY 2013 Request
Facilities and Equipment (F&E)	**812,025**	**862,800**	**954,714**
NextGen Network Enabled weather	18,214	0	0
Data Communication in Support of NextGen	134,031	143,000	142,630
NextGen – Demonstration and Infrastructure Development	20,811	15,000	24,600
NextGen – System Development	60,386	85,000	61,000
NextGen – Trajectory Based Operations	39,560	7,000	16,500
NextGen – Reduce Weather Impact	21,444	15,600	16,600
NextGen – High Density arrivals/Departures	43,221	12,000	11,000
NextGen – Collaborative ATM	55,788	24,000	24,200
NextGen – Flexible Terminals and Airportss	57,372	33,300	30,500
NextGen – Safety, Security and Environment	1,729	0	0
NextGen – System Network Facilities	23,340	5,000	11,000
NextGen – Future Facilities	0	15,000	95,000
Joint Planning and Development Office (JPDO)	0	0	0
Performance Based Navigation – Optimization of Airspace and Procedures for Metroplexes	0	29,200	36,200
En Route Automation Modernization (ERAM) – D Position Upgrade and System Enhancements	4,990	0	10,000
System – Wide Information Management	89,121	66,350	57,200
ADS – B Wide Implementation	175,748	285,100	271,600
Collaborative Air Traffic Management Technologies	35,828	41,500	34,420
Colorado ADS – B WAM Cost Share	0	3,800	1,400
Tactical Flow Time Based Flow Management (TBFM)	0	38,700	12,900
NAS Voice System	4,192	9,000	10,250
Tower Flight Data Manager*	0	0	37,600
Aviation Safety Information Analysis and Sharing (ASIAS)*	0	0	15,000
Aeronautical Information Management Program (AIM) Seg 2,3	0	8,000	2,000
Activity 5 F&E PCBT – NextGen Staffing (ATO 132 EOY/111 FTE)	13,500	13,500	17,016
Activity 5 F&E PCBT – NextGen Staffing (ANG 85 EOY/85 FTE)	12,750	12,750	12,798
Activity 5 F&E PCBT – NextGen Staffing (AVS 40 EOY/20 FTE)			3,300
Research, Engineering and Development (RE&D)	**58,856**	**59,745**	**67,000**
NextGen – Alternative Fuels for General Aviation	998	2,071	1,995
NextGen – Wake Turbulence	10,664	10,674	10,350
NextGen – Air Ground Integration	5,603	7,000	10,172
NextGen – Self Separation	5,260	3,500	7,796
NextGen – Weather in the Cockpit	2,507	8,000	4,826
NextGen – Environmental Research, Aircraft Technologies, Fuels and Metrics	20,060	23,500	19,861
Joint Planning and Development Office (JPDO)	13,764	5,000	12,000
Operations	**12,395**	**12,400**	**12,444**
Intergrate Environmental Performance into NextGen (APL 5 EOY/5 FTE)	7725	725	728
NextGen Environmental/Noise Studies (APL 5 EOY/5 FTE)	1,670	1,675	1,678
NextGen Staffing (ATO 51 EOY/51 FTE)	6,800	6,800	6,826
NextGen Staffing (ANG 24 EOY/24 FTE)	3,200	3,200	3,212
Total NextGen Programs	**883,276**	**934,945**	**1,034,158**

Note:
* These new budget line items reflect the migration of pre-implementation activities from the NextGen solution sets into implementation programs beginning in FY 2013.

NextGen Staffing

The development and implementation of NextGen will require FAA to hire new employees over the next several years, primarily through attrition. These individuals will have expertise in disciplines such as research and engineering, system engineering, program management, business and financial management, cost estimating, and contracting. They will support all lines-of-business across the FAA, including the NextGen office, Air Traffic Organization (particularly the new Program Management Office), Aviation Safety, and Policy, International Affairs, and Environment.

Developing and implementing NextGen systems and procedures entails short-and long-term staffing requirements. Information on staffing levels provided through the budget process to jump start NextGen is provided below. We are also working to identify, quantify, and track in the agency's administrative systems existing staff (across all lines-of-business) which have been reassigned to the NextGen effort in order to determine total NextGen staffing strength. For the long-term, FAA asked the National Academy of Public Administration (NAPA) and the Stevens Institute to examine overall personnel requirements for NextGen. The FAA has adopted and implemented many of these recommendations.

NextGen Staffing (Dedicated)

	FY 2011 Enacted			FY 2012 Enacted			FY 2013 Request			FY 2013 Change		
	FTP Positions	FTP EOY	Total FTE	FTP Positions	FTP EOY	Total FTE	FTP Positions	FTP EOY	Total FTE	FTP Positions	FTP EOY	Total FTE
Facilities and Equipment (F&E)												
ANG:												
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Various Programs/Projects)	85	85	85.0	85	85	85.0	85	85	85.0	-	-	-
ATO:												
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Various Programs/Projects)	90	90	90.0	90	90	90.0	132	132	111.0	42	42	21.0
AVS:												
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Performance Based Navigation)	-	-	-	-	-	-	40	40	20.0	40	40	20.0
Subtotal, NextGen F&E	**175**	**175**	**175.0**	**175**	**175**	**175.0**	**257**	**257**	**216.0**	**82**	**82**	**41.0**
Research, Engineering & Development (R,E&D)												
JPDO:												
NextGen – JPDO	14	14	14.0	11	11	11.0	11	11	11.0	-	-	-
ANG:												
NextGen – Wake Turbulence	2	2	2.0	1	1	1.0	1	1	1.0	-	-	-
NextGen – Air Ground Integration	1	1	1.0	1	1	1.0	1	1	1.0	-	-	-
NextGen – Self Separation	1	1	1.0	1	1	1.0	1	1	1.0	-	-	-
NextGen – Weather in the Cockpit	4	4	4.0	4	4	4.0	4	4	4.0	-	-	-
APL:												
NextGen – Environmental Research, AircraftTechnologies, Fuels and Metrics	3	3	3.0	3	3	3.0	3	3	3.0	-	-	-
Subtotal, NextGen R,E&D	**25**	**25**	**25.0**	**21**	**21**	**21.0**	**21**	**21**	**21.0**	**-**	**-**	**-**
Operations												
ANG:												
NextGen Staffing	24	24	24.0	24	24	24.0	24	24	24.0	-	-	-
ATO:												
NextGen Staffing	51	51	51.0	51	51	51.0	51	51	51.0	-	-	-
APL:												
Integrate Environmental Performance into NextGen	5	5	5.0	5	5	5.0	5	5	5.0	-	-	-
NextGen Environmental/Noise Studies	5	5	5.0	5	5	5.0	5	5	5.0	-	-	-
Subtotal, NextGen Operations	**85**	**85**	**85.0**	**85**	**85**	**85.0**	**85**	**85**	**85.0**	**-**	**-**	**-**
Total NextGen Staffing	**285**	**285**	**285.0**	**281**	**281**	**281.0**	**363**	**363**	**322.0**	**82**	**82**	**41.0**
JPDO	14	14	14	11	11	11	11	11	11	-	-	-
ANG	117	117	117	116	116	116	116	116	116	-	-	-
ATO	141	141	141	141	141	141	183	183	162	42	42	21
AVS	-	-	-	-	-	-	40	40	20	40	40	20
APL	13	13	13	13	13	13	13	13	13	-	-	-

The FY 2013 budget requests funding to support a total of 363 positions fully dedicated to NextGen. In FY 2013, an increase of 41 FTEs is required within the overall F&E, Activity 5, account to finance 42 new hires to support Performance Based Navigation activities within the Air Traffic Organization (Optimization of Airspace and Procedures for Metroplexes) and 40 new hires to support Aviation Safety NextGen activities. These NextGen positions will replace existing legacy positions in F&E, Activity 5, but will not increase overall total positions in F&E, Activity 5.

NextGen Challenges

NextGen's multiple capabilities are interdependent, and we will incorporate them into our airspace over varying time frames. This calls for a deliberate and incremental approach, not only in technology and infrastructure development but also the policies, standards, and operational practices that ensure our careful approach. The logical progression of our deployments – near-term, mid-term, long-term, each laying a solid foundation for the next – belies its overall complexity.

Enhancing safety, security, and environmental performance must remain the center of our planning as we improve the current NAS and accommodate new elements with the proliferation of very light jets, unmanned aircraft systems, and commercial space flight. Furthermore, the needs and capabilities of the diverse segments of the aviation community vary across and within sectors and by locality. The FAA is aware that these are complex and sometimes competing factors.

Variable maturity times for interdependent projects create a communications challenge, arising from perceptions about complexity and uncertainty. The FAA must continually ensure that our intent, commitment and timing remain clear to all stakeholders as we move forward together with NextGen.

Proper recognition and management of uncertainty must be a central feature of our overall approach to NextGen development and deployment. Failure to do so would place NextGen capabilities, benefits and costs in jeopardy. For example, premature specification of detailed requirements for distinct NextGen systems could artificially constrain both industry and FAA by locking in specific technical solutions when more cost-effective alternatives could emerge through development activities. Rarely is there only one option, because capabilities often can be realized through combinations of operational practices, policies, systems, and technologies. The FAA must fully explore these possibilities with our stakeholders, global partners, and in our internal business practices to ensure the most effective solutions.

As we make our respective investment decisions, FAA and the private sector must consider the full context of capabilities and benefits, rather than focusing only on specific systems or deployments in isolation. In FAA's case, that requires changes in our acquisition management system so that we can deploy NextGen in an integrated way. Likewise, private-sector stakeholders must use their own internal processes to commit to investing in NextGen capabilities. A thorough understanding of expected benefits and costs will help solidify the business cases both FAA and individual stakeholders need to justify investment decisions. The FAA and stakeholders must work closely together and remain flexible to adjust to factors, whether environmental, economic or global conditions, that drive those decisions.

As stakeholders equip their aircraft in varying ways to achieve specific NextGen benefits, air traffic controllers will face the challenge of managing a diverse fleet with very different capabilities. While operators who upgrade avionics for NextGen will receive the earliest benefits, we will continue to accommodate lesser-equipped operators. We are examining best-equipped/best-served concepts, whereby aircraft equipped for NextGen capabilities would be served in ways that deliver the NextGen benefits. Ensuring international harmonization of aircraft equipage standards, so that aircraft equipped for NextGen will be able to operate using equivalent capabilities in other regions of the world, is another complex endeavor. Both of these requirements make partnership an integral component of FAA's strategy for NextGen.

Stakeholder engagement is a way to manage priorities and risks collaboratively by reaching a common understanding of what to implement, and where, when and how benefits will result. By leveraging opportunities for demonstrations and other critical work with willing partners, we gain extremely valuable insight into NextGen benefits, which can reduce uncertainty. Benefits can be clearly measured in a real-world, operational environment. Solutions to integration issues can be accelerated, and specific programmatic requirements and operational and certification standards can crystallize outcomes that can help solidify the case for follow-on investments.

Operational demonstrations and prototypes also present solutions to uncertainties that arise due to local factors, such as unique airport or airspace considerations. These and other local, technical or political factors may require implementation teams tasked with working out a specific local implementation plan guided by an overarching national framework. A properly managed and effective mix of FAA and stakeholder participants is needed to ensure bilateral implementation of respective NextGen capabilities.

These types of teams may also be instrumental in developing local applications of emerging best-equipped/best-served principles to stimulate higher levels of aircraft equipage.

NextGen is a wide ranging transformation of the entire national air transportation system. It has aligned research and prototyping activities, developed the components of a mid-term architecture, integrated implementation plans, moved forward with execution, and enhanced industry engagement. NextGen will meet future demands while improving safety and protecting the environment.

Next Generation Air Transportation System

	Facilities and Equipment (F&E)	**FY 2013**
1A05	Data Communications for Trajectory Based Operations (NextGen)	$142,630,000
1A06	Next Generation Transportation System – Demonstration and Infrastructure Development	$24,600,000
1A07	Next Generation Transportation System – System Development	$61,000,000
1A08	Next Generation Transportation System – Trajectory Based Operations	$16,500,000
1A09	Next Generation Transportation System – Reduce Weather Impact	$16,600,000
1A10	Next Generation Transportation System – High Density Arrivals/Departures	$11,000,000
1A11	Next Generation Transportation System – Collaborative ATM	$24,200,000
1A12	Next Generation Transportation System – Flexible Terminals and Airports	$30,500,000
1A13	Next Generation Transportation System – System Network Facilities	$11,000,000
1A14	Next Generation Transportation System – Future Facilities	$95,000,000
1A15	Performance Based Navigation (PBN) – RNAV/RNP	$36,200,000
2A02	En Route Automation Modernization (ERAM) – D-Position Upgrade and System Enhancements	$10,000,000
2A12	System-Wide Information Management (SWIM)	$57,200,000
2A13	ADS-B NAS Wide Implementation	$271,600,000
2A15	Collaborative Air Traffic Management Technologies	$34,420,000
2A16	Colorado ADS-B WAM Cost Share	$1,400,000
2A17	Tactical Flow Time Based Flow Management (TBFM)	$12,900,000
2B13	National Airspace System Voice System (NVS)	$10,250,000
2B18	Tower Flight Data Manager (TFDM)	$37,600,000
3A11	Aviation Safety Information Analysis and Sharing (ASIAS)	$15,000,000
4A09	Aeronautical Information Management Program	$2,000,000
5A01	Personnel and Related Expenses – NextGen (ANG 85 EOY/85 FTE)	$12,798,000
5A01	Personnel and Related Expenses – NextGen (ATO 132 EOY/111 FTE)	$17,016,000
5A01	Personnel and Related Expenses – NextGen (AVS 40 EOY/20 FTE)	$3,300,000
	Total, Facilities and Equipment	**$954,714,000**

Research, Engineering, and Development (RE&D)		FY 2013
A11M	NextGen – Alternative Fuels- General Aviation	$1,995,000
A12A	NextGen – JPDO	$12,000,000
A12B	NextGen – Wake Turbulence	$10,350,000
A12C	NextGen – Air Ground Integration	$10,172,000
A12D	NextGen – Self Preparation	$7,796,000
A12E	NextGen – Weather in the Cockpit	$4,826,000
A13B	NextGen Env. Research – Aircraft Tech, Fuels and Metrics	$19,861,000
	Total, Research, Engineering, and Development	**$67,000,000**

Operations	FY 2013
Integrate Environmental Performance into NextGen (APL5 EOY/5 FTE)	$728,000
NextGen Environmental/Noise Studies (APL 5 EOY/5 FTE)	$1,678,000
NextGen – Staffing (ANG 24 EOY/24 FTE)	$3,212,000
NextGen – Staffing (ATO 51 EOY/51 FTE)	$6,826,000
Total, Operations	**$12,444,000**
Total, NextGen Programs	**$1,034,158,000**

Detailed Justification for - 1A05 Data Communications in support of Next Generation Air Transportation System

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Data Communications in Support of Next Generation Air Transportation System ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted t
Data Communications in support of Next Generation Air Transportation System	$134,031	$143,000	$142,630	-$370

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Final Investment Decision (FID) Management Planning	---	$2,352.2
2. Systems Engineering	---	15,185.0
3. Operational Integration	---	4,757.8
4. Data Communications (Data Comm) Air Ground Network Service	---	49,321.0
5. Program Management	---	8,316.8
6. Business Management	---	2,317.0
7. En Route	---	56,427.0
8. Tower Revised DCL and Trials	---	3,603.2
9. Independent Operational Test and Evaluation (IOT&E)	--	350.0
Total	Various	$142,630.0

For FY 2013, $142,280,000 is requested for the Data Communications (Data Comm) program to provide two-way data between controllers, automation and flight crews; safety-of-flight Air Traffic Control (ATC) clearances, instructions, traffic flow management (TFM), flight crew requests and reports. Data Comm will enhance automation for ATC message generation and exchange. Also requested is $350,000 for IOT&E activities.

2. What Is This Program?

The Data Comm program will provide data communications between ATC facilities and aircraft, and will serve as the primary enabler for the Next Generation Air Transportation System (NextGen) operational improvements. Data Comm is necessary to transition from voice-based ATC communications sytem to data-centric NextGen.

Data Comm will improve National Airspace Systems (NAS) operations by:

- Improving controller productivity and reducing controller workload by automating delivery of routine clearances
- Improving NAS capacity and reducing flight delay by enabling existing controller staffing to handle increased traffic
- Enhancing safety by reducing operational errors associated with voice communications
- Enabling many of the NextGen operational improvements that require negotiation or exchange of information that cannot be efficiently delivered via voice communications

Data Comm Segment 1 will deliver the initial set of Data Comm services integrated with automation support tools, which provides NAS benefits and lays the foundation for a data-driven NAS. Data Comm Segment 2 will enable more advanced NextGen operations, which would not be possible using the existing voice systems.

Near-term Data Comm program efforts focus on:

- Final Investment Decision (FID) for the Data Comm Network Services, resulting in baselined program cost and schedule profiles
- Data Comm Network Services (DCNS) contract modification of the Data Comm Integrated Services contract
- Commence Avionics Equipment Initiative
- Initiate Roll-out of Data Comm Network Service Infrastructure to Testing
- Revised Departure Clearance (DCL) Operational Trials and Validation
- Develop Operational Procedures for initial Tower Services (DCL)
- Develop Controller Training for Initial Tower Services (DCL)
- Complete Software Development for Logon and Protocol Gateway Functionality for DCL
- Complete Developmental Testing for Logon and Protocol Gateway for DCL
- Complete Software Development and Functional Testing of Tower Data Link System (TDLS)
- Finalize National Airspace System (NAS) Enterprise Architecture Documents
- Complete Engineering Documentation for En Route Services (Transfer of Communications/Initial Check-in/Go Button)
- Develop Prototype Software for En Route Services (Transfer of Communications/Initial Check-in/Go Button)
- Initiate Developmental Testing for En Route Services (Transfer of Communications/Initial Check-in/Go Button)
- Develop Security Certification and Authorization Package (SCAP) for initial Tower Service Sub-Systems
- Continue Spectrum Reallocation Planning
- Initiate end-to-end System Integration and Testing for DCL service
- Continue specification work for initial En Route services (i.e. Transfer of Communications/Initial Check-in/Go-Button)
- Complete setup of Operational Test Bed and Test Procedures
- Commence Independent Operational Assessment (IOA) Plan
- Finalize Software Assurance Level Audits
- Complete initial DCIS engineering and implementation plans
- Develop Safety Requirements Management for Hazard Analysis

3. Why Is This Particular Program Necessary?

The operations and services enabled by Data Comm will allow more efficient, strategic management of the airspace, enabling the Agency to meet the growing demand for air travel, all while improving operational and life-cycle costs for both airspace managers and users. Each Data Comm segment will improve the capacity, operational effectiveness, and cost efficiency of the Agency's ATM services. Segment 1 will deliver the initial set of data communications services, and lays the foundation for a data-driven NAS. Segment 2 will enable the core set of advanced NextGen-enabling operations, which would not be possible without DataComm.

Current analog voice communications contribute to operational errors due to miscommunications, stolen clearances, and delayed messages due to frequency congestion. In FY 2004 and FY 2005, approximately 20 percent of en route operational errors were voice communication related. Of those, 30 percent of the high severity operational errors were deemed to be communications related. With substantial aircraft equipage, Data Comm will significantly reduce communications related operational errors and improve the safety of air travel.

Data Comm will enable air traffic controller productivity improvements, and will permit capacity growth without requisite cost growth associated with equipment, maintenance, and labor. As a result, unit costs (the resources necessary to provide controller pilot communication service per aircraft operation) will decrease. Data Comm will enable these benefits by automating repetitive tasks, transitioning from the tactical voice communications to a strategic, more accurate and less workload-intensive data communications, which will enable ground systems to use real-time aircraft data to improve traffic management efficiency. As indicated, Data Comm does not completely replace voice communications, rather it augments these services. Several studies suggest that with 70 percent of aircraft Data Comm equipped, exchanging routine controller-pilot messages and clearances via data can enable controllers to safely handle approximately 30 percent more traffic. This increase in traffic handling ability has a direct correlation to reduced delays and increased capacity - recent benefits analysis suggests airline operations will benefit from reduced flight times, improved on time performance and the opportunity to expand flight schedules. Data Comm enables NextGen services, including 4D trajectories and conformance management, will further improve capacity and efficiency by shifting air traffic operations from short-term, minute-by-minute tactical control, to more predictable and planned strategic traffic management.

The capacity and productivity of the NAS will be improved by data communications. Initially, Data Comm will be used in conjunction with the current traffic control strategies as well as planned strategies such as traffic flow management (TFM) re-routes. Data Comm will increase controller efficiency by automating routine exchanges as well as enabling the initial phase of Trajectory Based Operations (TBO). As controllers become more productive, sector capacity will grow without the need to assign additional resources. Data Comm benefits will be realized in en route and tower/ground operations. The busiest positions, whether in en route sectors, en route feeder sectors in metro corridors, terminal approach sectors, or airport clearance delivery positions at Core 30 airports will see the most dramatic benefit.

New services enabled by Data Comm will contribute even more dramatically to air traffic capacity. Advanced 4-dimensional trajectories will enable more strategic operations that can ensure the most efficient use of airspace resources, with greatly reduced ground management oversight. More predictable traffic flows will yield better on-time performance, and minimize service impact associated with weather-related system disruptions. Many of these new services will have positive impact in other arenas: Optimized Profile Descent (OPD), for example, will enable pilots to throttle back to idle on their descent to the airport, reducing noise, emissions, and fuel consumption. Data Comm, by allowing exchange of data to carefully coordinate the aircraft's position in time and space, will allow the FAA to effectively employ these approaches even in congested airspace.

4. How Do You Know The Program Works?

The Data Comm program is currently in the Final Investment Analysis phase. Final investment Decision (FID) for Automation Enhancements (Tower and En Route) combined with Authorization to Proceed (ATP) for Data Comm Integrated Services contract (DCIS) award will occur in early FY 2012. A subsequent FID will take place for the Data Comm Network Services award as part of the DCIS in early FY 2013.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$142,630,000 is required to fund the DCIS contract to allow the award of the Data Comm Network Service, along with integration and engineering activities, implementation plans, and avionics equipage initiatives leading to the initial roll-out of the data communications services. The funding will also support the enhancement of En Route Automation Modernization (ERAM) system software for FANS logon and protocol gateway functionality. Funding in FY 2013 is required to ensure a seamless integration into overall ERAM deployment, which is critical to achieving the initial roll-out of Data Comm Tower services. Also, work will continue on specifications of initial En Route services (i.e. Transfer of Communications/Initial Check-in/Go-Button).

At the end of FY 2013 the program will complete software enhancements and functional testing of Tower Data Link Services (TDLS). Additionally, TDLS regression testing will occur subsequent to functional testing. The program will focus on optimizing integration of all the data communication subsystems leading into setup of end-to-end integration testing. Furthermore, engineering resources will be utilized to develop test case and test plans for operational test and evaluation. Spectrum engineers will initiate spectrum reallocation activities in FY 2013 to create the availability of required bandwidth.

The program office will be well into conducting our initial trials at several sites within the NAS. The trials will exercise the operational procedures for both the cockpit and controller for initial Tower service of revised departure clearance. Further, output of trials efforts will feed into the development of training procedures and computer-based instructions for Tower controllers.

These preceding activities will support the objective of achieving Initial Operational Capabilities (IOC) for Tower services by a planning date of 2015.

Additionally, the program will complete engineering specification activities associated with initial En Route services for Transfer of Communications, Initial Check-in, and Go-Button. Upon completion of engineering specifications, the program will begin software prototyping followed by initial developmental testing.

Data Comm will bridge the gap between current voice-only ATC, and the data-intensive NextGen. To ensure the NAS has the capacity to grow, Data Comm will implement services that maximize controller productivity, reduce operational errors associated with voice communications, and enable new air traffic services and reduce delays. Data Comm is comprised of automation enhancements for air traffic control message generation and exchange (hardware and software), and the communications data link between ground and airborne users.

The FAA will begin the transition to Data Comm with the introduction of digital revised departure clearances. This will reduce the aircraft gate and taxi delays associated with delivery of clearances, an improvement that will get aircraft off the ground sooner and reduce controller workload. Aircraft equipped through the DCIS equipage initiative will provide the foundation for accrual of the following significant Segment 1 benefits:

- En Route $28.44 Billion
- DCL $.94 Billion
- FAA Staffing $1.8 Billion

These benefits are being finalized for the Final Investment Decision at FAA that will occur in May 2012. The estimates are for Segment 1 Departure Clearance (DCL) and En Route Services only.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 16, 17, 39, 44, 42, DataComm

- Achieve final investment decision on acquisition of the digital very high frequency (VHF) aeronautical mobile communications infrastructure
- Initiate development of en route automation enhancements
- Enable revised departure clearance capability in the tower environment via VHF Data Link mode 2 for aircraft equipped with Future Air Navigation System 1/A+

Detailed Justification for - 1A06 Next Generation Air Transportation System (NextGen) – Demonstrations and Infrastructure Development (DEMO)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Demonstrations and Infrastructure Development (DEMO)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Demonstrations and Infrastructure Development	$20,811	$15,000	$24,600	+$9,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Future Planning - Demonstrations	---	$24,600.0

For FY 2013, $24,600,000 is requested to provide for the following:

International Air Traffic Interoperability
- Continue demonstration activities of collaborative end-to-end domain systems
- Support standards and alternatives development in support of initial investment decision and OMB Exhibit 300 preparation/development for NextGen transformational technologies to assure timely implementation into the NAS
- Continue standards and alternatives development
- Continue demonstration activities of mid- term end-to-end trajectory based operations
- Continue demonstration activities for enhanced avionics capabilities
- Continue demonstration activities for enhanced navigation capabilities
- Post-Demonstration Analysis and Final Report

Airborne Access to System Wide Information Management (AAtS)
- Continue Development of Cockpit Display
- Implement Wireless link to Aircraft to enable communications of SWIM data
- Perform System Integration and Testing
- Conduct data analysis of transmission, accuracy and quality of data sent from ground to aircraft over commercial service provider
- Conduct limited flight demonstration of one product available for use
- Conduct live flight demonstration of three products available for use including at least one weather and one other operational information product
- Conduct integrated live flight demonstration of all available SWIM products
- Produce Final Report of Demonstration Results
- Continue efforts in Project Management/Stakeholder Coordination

Airborne Execution of Flow Strategies
- Continue work towards execution of the demonstration
- Continue to develop Metrics and methodology
- Continue work with Systems Engineering
- Continue efforts towards Integration and Testing
- Continue efforts in Project Management/Stakeholder Coordination toward collaboration
- Post-Demonstration Analysis and Final Report

Global Harmonization of Flight Information and Exchange Strategies

- Demo planning and initiate implementation
- Develop Concept of Operations and scope for Scenarios
- Develop metrics and methodology
- Develop evaluation strategies to harmonize Flight Objects
- Continue efforts in Project Management/Stakeholder Coordination

Future Planning - Demonstrations
This segment provides the planning and integration of current technology with transformational technology demonstrations to achieve NextGen operational objectives as early as possible and sustainment of the demonstration sites.

2. What Is This Program?

The NextGen Demonstrations and Infrastructure Development Program is designated to integrate demonstration projects and programs, provide validation of mature solutions, and demonstrate implementation alternatives for the NAS. This program provides agility and flexibility in demonstrating alternative technologies, and concepts, while supporting procedure and standards development, as well as providing for the integration of near-term emerging technologies, procedures and/or customers' initiatives with on-going demonstrations. The demonstration program leverages the individual project demonstrations and supports the integration of these individual projects into multiple-domains designed to capture the synergies that are needed to provide timely NAS transformation.

International Air Traffic Interoperability

This demonstration project is designed to help the FAA promote safe, affordable and rapidly implemented innovations into Air Traffic Management (ATM) along oceanic routes. It will demonstrate and accelerate airline and Air Navigation Service Providers (ANSP) efficiency improvements using existing systems and technologies. The flight trials development stage will include system architecture, design, hardware and software development (where applicable), procedures development, simulations, component/subsystems testing and certification, and system checkout. Flight trial execution could include scripted flight tests, limited operational testing and/or extended operational evaluations. This international interoperability demonstration program contributes directly to NextGen concepts and supports international collaboration, avoids overlap, and will coordinate activities with national and international organizations, including DOD. Further, the International Air Traffic Interoperability demonstrations and development initiatives will assist the international communities and the FAA to validate new DOD 4-D Trajectory Based Operations (TBO) and Performance-based Air Traffic Management (PATM) alternatives.

Airborne Access to System Wide Information Management (AAtS)

This demonstration will begin validation of the preliminary requirements for Airborne SWIM and show the capability for the FAA system and airborne aircraft to communicate non-safety critical information via an airborne network. This capability should provide information such as traffic management with the capability to communicate data essential to system efficiency. Additionally, using this link, the flight crew could use this capability to communicate ETAs, 4D Intent information, and negotiated reroutes back to the FAA system. In addition to air traffic data, the link can be used to transmit weather data/information such as updated wind fields to the aircraft or state of the atmosphere information from the aircraft.

Airborne Execution of Flow Strategies

This project seeks to show how a metering Decision Support Tool (DST), such as the Traffic Management Advisor (TMA), could be informed by a fleet prioritization element within the Flight Object, in order to aide flight operators in sequencing their "higher value" flights. Demonstration will show the capability to define airborne flights to be rerouted by region, destination, or flow. With the current flight(s) defined, demonstrate the capability for Traffic Management to electronically negotiate the initiative with the Airline Operation Center in a timely manner.

Global Harmonization of Flight Information and Exchange Strategies

The purpose of this proposed demonstration is to continue to validate the Flight Object concept and the use of the Flight Information eXchange Model (FIXM) standard. The demonstration will show how ANSPs and flight operators, in both the Pacific and Atlantic regions, can leverage the FIXM standard as a means for sharing common flight information elements.

Future Planning

During the FY 2010 to FY 2015 time frame, demonstration, development, and validation results can lead to implementation of early improvements in the NAS while supporting long-term operational objectives. The initial segment initiatives provides integrated demonstration and end-to-end demonstration activities, near-term activities necessary to refine and integrate solution set capabilities with emerging technologies and/or emerging customers' NAS initiatives, and mid-term development to better understand future operational concepts. The initial segment also provides integration of current technology with transformational technology demonstrations to achieve NextGen operational objectives as early as possible and sustainment of the demonstration sites.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The NextGen Technology Demonstration program is a development effort to support the transformation of the NAS to 4-D trajectory management and a performance-based system. The program provides integration and demonstration of alternate technologies and concepts, while supporting procedures and standards development, integration of near-term emerging technologies and airspace customers' initiatives with on-going scheduled demonstrations. This program provides a vehicle to test concepts and leverage individual transformational program and project technology to create multi-domain cohesive demonstrations to capture the synergies needed to transform the NAS in an expedited manner. The evaluation of technology and the collaboration between public/private industry partners, Air Navigation Service Providers, customers, and owners will continue into perpetuity.

4. How Do You Know The Program Works?

Demonstrations and Infrastructure Development encompasses the airspace and airports within the NAS. Demonstrations typically take place over the course of 18-24 months, with new demonstrations added as previous projects are completed. Since its beginning, the DEMO portfolio has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities from completed and ongoing demonstrations that have and will continue to improve the overall operations within the NAS.

a. International Air Traffic Interoperability

- Conducted Gate to Gate demonstration with Air France
- Expanded lateral optimization procedures to include AIRE Eastbound demonstrations
- Coordinated SRMD safety review process related to ADS-C Climb and descent procedures (ADS-C CDP)

b. Unmanned Aircraft Systems 4D Trajectory Based

- Drafted final UAS "Demonstration Test Plan (Ver 1.5) for UAS NextGen Flight Test at CCAFS
- Drafted final Safety Risk Management Document Memorandum (SRMD)M for UAS NextGen Flight Test at CCAFS
- Conducted UAS Demonstration (3) at CCAFS for a limited ADS-B CDTI capability providing enhanced situational awareness to the UA Pilot in the GCS and provided limited point to point digital radio connectivity from the UA pseudo pilot to ATC at CCAFS Skid Strip Tower (KXMR)

5. Why Do We Want / Need To Fund The Program At The Requested Level?

For FY 2013, $24,600,000 is required to continue activities within the NextGen - Technology Demonstrations and Infrastructure Development solution set. This solution set is designated to integrate demonstration projects and programs, provide validation of mature solutions, and demonstrate implementation alternatives for the NAS. A reduction in funding will result in various demonstration projects and programs that provide agility and flexibility in demonstrating alternative technologies, and concepts, while supporting procedure and standards development not to occur.

Detailed Justification for - 1A07 Next Generation Transportation System (NextGen) – System Development (SYSDEV)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 -- Next Generation Transportation System (NextGen) – System Development (SYSDEV)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System (NextGen) – System Development (SYSDEV)	$60,386	$85,000	$61,000	-$24,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Human Factors (Efficiency/Air Ground Integration)	---	$5,000.0
2. New ATM Requirements	---	22,000.0
3. Operations Concept Validation Modeling	---	5,000.0
4. Staffed NextGen Towers (SNT)	---	3,500.0
5. Environment and Energy – EMS and Noise and Emissions Reduction	---	9,500.0
6. Wake Turbulence – Re-categorization	---	1,500.0
7. System Safety Management Transformation	---	7,500.0
8. Operational Assessments	---	7,000.0
Total	Various	$61,000.0

For FY 2013, $61,000,000 is requested to provide for the following:

a. Human Factors (Efficiency/Air Ground Integration)

- Conduct demonstration simulations of integrated ATC workstations showing the phased introduction of NextGen decision support tools and new capabilities
- Determine the information requirements for ATC as UAS are integrated in the NAS in a less restricted manner than is currently used
- Manage safety risk associated with human performance in the NextGen environment
- Develop a tech ops integrated work environment in the NextGen maintenance environment
- Continue development of the Human System Integration Roadmap in support of the human element in the NAS Enterprise Architecture
- Conduct simulations of major air-ground simulation human factors issues

b. New Air Traffic Management (ATM) Requirements

- Weather Transition
- Coordinate NextGen Weather Requirements with the International community (e.g., ICAO, SESAR)
- Conduct policy analyses on FAA/NWS roles and responsibilities
- Conduct requirements allocation and validation with NWS
- Conduct service analysis activities to address operational problems (e.g., Path Based Shear, Ground DeIcing, Time-of-Wind-Return, Terminal Haze)
- Provide weather information demonstration and evaluation support for concept maturity and technology development (CMTD) activities (e.g., Concept of Operations)
- TCAS

  - TCAS/ADS-B Compatibility/Future Requirements
  - Future CAS Logic Development/Future Surveillance Requirements
  - CAS Logic Assessment/Avionics Model
- Airborne SWIM
  - Acquisition planning to support requirements levied on NAS systems by uses of AAtS
- Trajectory Modeling
  - Development of NAS trajectory performance requirements
  - Development of NAS trajectory interoperability requirements
  - Development of NAS trajectory information requirements
  - Trajectory Concepts Alternative Analysis
  - Initial Trajectory information items for Flight Object
- New Radar Requirements (Surveillance and Weather)
  - Deliver initial report on Full-Antenna Aperture Performance Model for Multifunction
  - Deliver report on Industry Solutions for Multifunction Radar Backend Architecture
  - Concepts and Requirements Definition (CRD) Team Kick-off
  - Deliver CRD Plan
  - Deliver Technical/Cost Trade Offs Report

c. Operations Concept Validation Modeling

- Continue process of developing and validating high priority Mid-Term operational concepts and conducting research to reduce the risk of NextGen programs being implemented before flawed operational concepts are identified.
- Simulation and modeling needed to validate concepts described in concept documents and scenarios will occur as dictated by research gaps that exist in programs transitioning to an implementation phase.
- Benefits associated with concepts will also be modeled in 2013 to determine the level of capacity and efficiency benefits that can be attributed to NextGen operations.
- Development of operational requirements for validated concepts

d. Systems Development Staffed NextGen Towers (SNT)

- Program requirements update
- Surface surveillance operational suitability (formerly ASDE-X Certification) documentation
- Initial procedures for surface surveillance operational suitability
- System safety analysis for surface surveillance operational suitability

e. Environment and Energy – Environmental Management System (EMS) and Advanced Noise and Emissions Reduction

- Development and enhancement in provisions of NextGen EMS in coordination with stakeholders
- Advance NextGen EMS framework through pilot studies, data collection for decision support analyses and scope out development of EMS tracking and IT system
- Explore NextGen EMS adoption incentivization options
- Assessment of NAS-wide benefits of NextGen Aircraft and Alternative Fuels Technologies through tests, demonstration and simulation analyses
- Exploration and demonstration of Environmentally and Energy Favorable Operational procedures
- Assessment of NAS-wide benefits of environmental standards and market based measures
- Implement EMS Framework including elements of multi-year activities on analysis of EMS environmental impacts and metrics, EMS communication and outreach, refinement of decision support tools, EMS testing and pilot studies, EMS tracking and IT system, analysis of EMS incentivization and NEPA compliance, EMS prioritization and implementation
- Elements of multi-year activities exploring, environmentally efficient gate to gate operational procedures
- Investigate NAS-wide benefits of potential aircraft CO2 emissions standard metrics aviation specific market based measures.

f. Wake Turbulence Re-categorization

- Begin engineering assessments for incorporating leader/follower pair-wise static wake separation standards into the FAA ATC automation platforms
- Continue to support implementation of six category wake separation standards into the FAA ATC automation platforms

g. System Safety Management Transformation

- SMS - Implement an integrated hazard tracking capability across all AVS services and offices with oversight responsibility
  - SMS DAH capability with hazard tracking oversight software
- SRM - Initiate annual FAA-wide safety risk management (SRM) training requirements, implementation and coordination works
  - RARM Annual FAA-wide safety risk management training
- SSA - Implement and validate the ability to calculate periodic system risk baselines for surface operations (all 35 major airports)
  - Baseline software acquisition and deployment
  - Baseline system wide fatigue modeling
- Implement integrated system risk analysis program and analyze potential impacts of other domestic safety initiatives
  - System safety metrics (all airports)
  - Integrated system risk analysis (System Wide)

h. Operational Assessments

- Develop, evaluate and implement enhancements in AEDT to cover study fidelity for local airport to regional NAS-wide NextGen environmental analysis
- Develop, evaluate and implement enhancements in APMT-Economics for domestic/ regional NAS-wide NextGen environmental analysis
- Refine analysis and assessment of NAS-wide NextGen environmental mitigation and cost-beneficial options for decision support
- Integrate AEDT environmental assessment capabilities with NextGen NAS simulation models
- Update the overall cost estimates for the government's NextGen investment, to reflect the latest technology /procedures development plans and the approved budget
- Update the NextGen avionics costs estimates to reflect the latest industry trends, traffic forecasts, industry costs, and technology readiness
- Continue to modernize FAA's System Wide Analysis Capability (SWAC), a state-of-the-art simulation of the NAS used to estimate the operational benefits of NextGen
- Update the NextGen benefits estimates to reflect modeling improvements, revised development plans. and new traffic and fleet forecasts
- Update the overall NextGen business case, to reflect the updated cost and benefits estimates
- Conduct an operational evaluation of NextGen operational capabilities deployed in 2012

2. What Is This Program?

The FAA operates arguably the safest, most efficient, and most cost-effective Air Traffic Control (ATC) system in the world, while handling more traffic and controlling more airspace than any other Air Navigation Service Provider (ANSP). Yet we endeavor to do more. The goal of NextGen is to provide new capabilities that make air transportation safer and more reliable while improving the capacity of the National Airspace System (NAS) and reducing aviation's impact on our environment. The achievement of these goals will be extremely challenging. The NextGen System Development program provides cross-cutting research, development, and analysis to help achieve these goals, in such areas as human factors research, requirements development, environmental and operational modeling and analysis, and safety research and analysis. The specific activities of the program are described below.

a. Human Factors (Efficiency/Air Ground Integration)

The significant features of this program are the development of a Human System Integration (HSI) Roadmap to complement the other roadmaps in the Enterprise Architecture, the development of a common air traffic workstation to accommodate the various NextGen technologies when providing services, and a series of integrated workstations that deliver the required services using the common workstation. The HSI Roadmap will explain the roles and responsibilities of the actors in the NAS (air traffic controllers, pilots, dispatchers, traffic managers, etc.), their interactions with NextGen technologies, linkage to required changes to staffing, personnel selection, training, and required research and development activities in the human factors area that are needed to realize the NextGen vision.

Research will examine the roles of ANSP and facilities maintenance personnel to ensure safe operations at increased capacity levels and the way the roles would be best supported by allocation of functions between humans and automation. The success of new NextGen technologies hinge upon the actions of air traffic service providers using new decision support tools or automation to achieve the operational improvement. The effectiveness of each of these solutions is contingent upon the proper human engineering of the new capability. This human engineering is not just the visible interface, but the characteristics of the tool and how the tool is used in the context of the work.

b. New Air Traffic Management (ATM) Requirements

The New ATM Requirements Program addresses FAA's goal for capacity and the DOT reduced Congestion Strategic Objective to "Advance accessible, efficient, inter-modal transportation for the movement of people and goods." Furthermore, this program fits the NextGen goal of expanding capacity by satisfying future growth in demand (up to three times capacity) as well as reducing transit time. For FY 2013, new ATM requirements will focus on five areas: Weather Transition, TCAS, Airborne SWIM, Trajectory Management, and New Radar Requirements (Surveillance and Weather).

Weather Transition ensures that weather concepts coming from the Aviation Weather Research Program are matured and technically developed under the FAA guidelines for Concept Maturity Technology Development (CMTD) to a level of appropriate readiness for transition to NAS operational production. Weather Transition will manage appropriate CMTD activities to include the creation, testing and evaluation of prototypes and operational demonstrations for the purpose of defining and refining an appropriate operational use concept. The Weather Transition program will also ensure that any risk inherent in the introduction of a new weather product to the NAS is done so in accordance with ATO Safety Risk Management guidelines.

TCAS had extraordinary success in reducing the risk of mid-air collisions. Now mandated on all large transport aircraft and installed on many smaller turbine powered aircraft, TCAS has been in operation for over a decade and has been credited with preventing several catastrophic accidents. TCAS is a critical decision-support system in the sense that it has been widely deployed (on more than 25,000 aircraft worldwide) and is continuously exposed to a high-tempo, complex air traffic system.

TCAS is the product of carefully balancing and integrating sensor characteristics, tracker and aircraft dynamics, maneuver coordination, operational constraints, and human factors in time-critical situations. Missed or late threat detections can lead to collisions, and false alarms may cause pilots to lose trust in the system and ignore alerts, underscoring the need for a robust system design. NextGen airspace will have increased capacity due to decreased aircraft separation made possible by new technologies and new procedures, such as the increased use of RNAV/RNP routes and Closely Space Parallel Runways operations. As aircraft separation is decreased, it is critical that TCAS be made even more accurate and dependable to ensure continued pilot trust in the system.

Airborne System-Wide Information Management (SWIM) - The current development of SWIM includes a gap in servicing airborne clients. European concepts of SWIM, built by SESAR, cover this. Thus, there is a need for concepts that would harmonize the FAA and SESAR SWIM systems. There is a need to determine if airborne SWIM is a requirement or an optional feature. Airborne SWIM will identify performance and bandwidth requirements for airborne internet capability to support the exchange of ATM information such as weather, aeronautical information and flight information to support Traffic Flow Management. The program will develop standards and publish standards that will ensure harmonization with SESAR SWIM systems.

Trajectory-based operations require multi-domain interaction with aircraft trajectories in the far-term future. As a step towards that end, concepts of use (ConUse) for trajectory operations (TOps) have been defined to focus on the NextGen midterm. The TOps activity defined an initial cross-stakeholder, common view of the utilization of Communications, Navigation and Surveillance (CNS) components related to TOps in the midterm. The Trajectory modeling project will develop NAS-wide trajectory-related requirements for Mid-Term automation systems. System level requirements with then be developed and allocated across the automation systems. The project focuses on defining what trajectory information and exchange methods are required, which trajectory prediction types are required and what is required to achieve trajectory interoperability across multiple domains. . In addition, international collaboration will be an integral part of trajectory based operations, as other regions of the world shift toward the same goal.

New Radar Requirements (Surveillance and Weather) is a concept maturity and technology development initiative in support of the NextGen Surveillance and Weather Radar Capability. The objective of this effort is to identify viable solution implementation alternatives that could provide for FAA's aircraft and weather surveillance radar needs and weather surveillance radar needs of both FAA and NOAA. It will include identifying the technical challenges, evaluating cost models, developing technology approaches and proposed solutions, and concept demonstration through modeling and prototyping. The overall project includes four major areas: Multifunction Phased-Array Antenna Maturation, Engineering Studies – Technology Assessment, Multifunction Radar Backend Definition, and Concept and Requirements Definition. The outcome of this body of work will result in an initial Antenna and Radar Backend specification. The information gained through this effort will support an FAA investment analysis readiness decision (IARD) in 2014 and will provide the government a greater capability of defining specific requirements for a potential joint radar acquisition.

c. Operations Concept Validation Modeling

Operations Concept Validation Program addresses developing and validating future end-to-end (flight planning through arrival) operational concepts with special emphasis on researching changes in roles and responsibilities between the FAA and airspace users (e.g., pilots and airlines), as well as the role of the human versus systems, that will increase capacity and improve efficiency and throughput. It will identify procedures that can decrease workload and increase reliance on automation for routine tasking to increase efficiency of the NAS. This program works toward developing operational methods that will meet the NextGen goal of expanding capacity by satisfying future growth in demand as well as reducing transit time (reduce gate-to-gate transit times by 30 percent and increasing on-time arrival rate to 95 percent).

The research provides an end-to-end NAS Operational Concept and a complete set of scenarios for the mid-term that describe operational changes for NextGen solution sets including: Trajectory Based Operations (TBO); High Density Arrivals/Departures and Airports; Flexible Terminal and Airports; Collaborative Air Traffic Management; and Networked Facilities.

d. Staffed NextGen Towers (SNT)

The Staffed NextGen Tower (SNT) concept provides for a paradigm shift from using the out-the-window (OTW) view as the primary means for providing tower control services to using surface surveillance approved for operational use.

SNTs will provide for improved safety and increased capacity at night and during periods of inclement weather when impaired visual observation from an air traffic control tower results in delays or a reduced level of access to the airport. SNT will also allow the FAA to expand its service to meet projected increases in Air Traffic Control Tower (ATCT) operations.

SNT is planned for high density airports as these airports are likely to have the surveillance infrastructure and most aircraft equipped with avionics that will support SNT operations.

e. Environment and Energy – Environmental Management System (EMS) and Noise Reduction

There are two environmental projects that support this program: Environmental Management System (EMS) and Environment and Energy.

The NextGen Environmental Management System (EMS) will manage NextGen environmental impacts and help to define and identify optimum mitigation actions and assess their benefits in order to achieve NextGen environmental goals. This subprogram will develop, refine and evaluate EMS framework, support implementation as well as communication and coordination strategies, decision support tools, and environmental impacts metrics and analysis approaches.

Environment and Energy - Advanced Noise and Emission Reductions: Three main components of this subprogram are: Evaluate potential NAS-wide environmental benefits of mitigation solutions i.e. new aircraft technologies matured under CLEEN (Continuous Lower Emissions, Energy, and Noise) for reduction in noise, emissions and fuel burn through testing, demonstration and benefits analysis, aviation alternative fuels, potential and viable policy, and environmental standards and market based measures; explore and assess new optimized operational procedures for energy efficiency and improved environmental performance; and identify ways to integrate environmental impacts mitigation options with the NAS infrastructure and demonstrate any NAS adaptation required to implement these solutions and to maximally benefit from NextGen provisions.

f. Wake Turbulence Re-categorization

This program focuses on satisfying the capacity demands of future aviation growth. The last full review of wake separation standards used by air traffic control occurred nearly 20 years ago in the early 1990s. Since then, air carrier operations and fleet mix have changed dramatically, airport runway complexes have changed and new aircraft designs (A-380, very light jets, unmanned aircraft systems) have been introduced into the NAS. The 20 year old wake separation standards still provide safe separation of aircraft from each other's wakes but it no longer provides the most capacity efficient spacing and sequencing of aircraft in approach and en-route operations. This loss of efficient spacing is adding to the gap between demand and the capacity the NAS can provide.

This program is part of a joint EUROCONTROL and FAA program that has reviewed the current required wake mitigation aircraft separations used in both the USA's and Europe's air traffic control processes and has determined the current standards can be safely modified to increase the operational capacity of airports and airspace that will have heavy operational demand in the NextGen era. Associated work is incorporating new aircraft (i.e. Boeing 787, Airbus A-380, Boeing 747-8 and others) in this ongoing development of safe capacity efficient wake separation standards.

The next phase of the Wake Re-Categorization program is now underway. By 2014, this program will develop sets of tailored leader aircraft and follower aircraft pair-wise static wake separation standards whose application would depend on flight conditions and aircraft performance; resulting in being able to get more aircraft into and out of airports and in the same volume of airspace.

g. System Safety Management Transformation

This program provides research leading to a comprehensive and proactive approach to aviation safety in conjunction with implementation of NextGen capacity and efficiency capabilities. The implementation of these capabilities will require changes in the process of safety management, the definition and implementation of risk management systems, and management of the overall transformation process to ensure that safety is not only maintained but improved. A core foundation of the system safety transformation is the introduction of system-wide access and sharing of aviation safety data and analysis tools within the aviation community, providing safety resources that are integrated with operations of aviation industry stakeholders.

Capabilities to merge and analyze diverse sets of aviation information will be provided to expose and track precursors to incidents/accidents, allowing safety analysts within the FAA and aviation industry to understand emerging risks before they become potential safety issues. This research also enables safety assessments of proposed NextGen concepts, algorithms, and technologies and provides system knowledge to understand economic (including implementation) and operational and performance impacts (with respect to safety) of NextGen system alternatives. A demonstration will be conducted at a National Level. System Safety Assessment working prototype that will proactively identify emerging risks as NextGen capabilities are defined and implemented.

h. Operational Assessments

The Operational Assessment project focuses on two areas: Systems and Environmental Analysis.

The transition to NextGen requires NAS operational assessments to ensure that safety, environmental, and system performance considerations are addressed throughout the integration and implementation of NextGen. Such assessments are particularly important as the NextGen program evaluates current airspace design and develops new procedures to be implemented within the NAS. This project will continue to conduct system safety assessments, environmental-specific assessments, system performance evaluations, and risk management activities. This research will include initial NAS-wide assessment of methods to mitigate NextGen environmental impacts and developing cost-beneficial options to support decision making.

This research will also continue to explore integration of advanced performance assessment capability with NAS models for other NextGen programs. This project will contribute to system safety enhancements across the NAS, reducing aircraft emissions and noise, and improving capacity, efficiency, and delay reduction.

The focus of the Environmental program is to enhance local to NAS-wide environmental assessment capability within Aviation Environment Design Tool (AEDT) and within Aviation Environment Portfolio Management Tool (APMT) tools and to integrate environmental assessment capability with NAS design tools, simulation models and performance monitoring systems. It also involves application of NAS-wide environmental assessment models to assess environmental benefits of NextGen NAS-wide mitigation options for decision support. This environmental assessment capability will be used to support Environmental Management System so that evolving environmental state of aviation system can be continually quantified, appropriate targets can be developed and adjusted towards meeting NextGen environmental goals and the effectiveness of mitigation solutions can be quantified in order to develop guidance for adaptations.

NextGen environmental analyses require that external forecasts of operations, such as the FAA Terminal Area Forecast (TAF), be combined with fleet technology assumptions to generate future year fleet and operations sequences. The plan is to develop a fleet and operations sequence (FOS) module that is leveraged for U.S. NextGen analysis and compatible with Aviation Environmental Design Tool (AEDT) Regional and Aviation Portfolio Management Tool (APMT) Economics analysis requirements. This would include compatibility with the FAA TAF U.S. city-pair structure; and, once completed, would support the FAA Aviation Environmental Tools Suite and other aviation analysis tools.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The solution involves four areas of research and development – safety, capacity, human factors, and environment. The safety research includes expanding information sharing and data analysis to identify and mitigate risks before they lead to accidents. The capacity research develops new air traffic management systems to support NextGen measures and NextGen concepts to determine if they can achieve the targets for 2025; and develops flexible airspace categories to increase throughput. The human factors research provides higher efficiency levels in air traffic control and identifies the new role for controllers as more responsibility shifts to the flight crew. The environmental research explores new procedures, and adapts new technologies and fuels into the National Airspace System (NAS) to reduce emissions, fuel burn, and noise; and includes demonstrations, methods to adapt the current infrastructure, and estimates of costs and benefits.

4. How Do You Know The Program Works?

Projects in the Systems Development solution set encompass the entirety of the airspace and airports within the NAS. Since its beginning SYSDEV has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Human Factors (Efficiency/Air Ground Integration

- Completed Integrated NG En Route Workstation - Initial midterm NextGen En Route Workstation Human Factors Requirements
- Completed cross-cutting Automation Requirements - Initial Human Factors Automation Guidelines and Requirements
- Completed development of Initial Air/Ground Integration Simulation Roadmap

b. New ATM Requirements

- Delivered the latest version of FIP Severity and GTG2 to Aviation Digital Data Service (ADDS)
- Investigate the feasibility of ADS-B message content as an input for future Collision Avoidance Systems
- AAtS Final Integrated Operational and Technical Requirements Document

- Trajectory Synchronization Demonstration
- Final Airborne SWIM Concept of Use
- Initial Multifunction Radar Backend Architecture definition

c. Operations Concept Validation / Modeling

- Time Based Flow Management Integrated Research Plan
- Time Based Flow Management (TBFM) Transient Analysis Results on the effectiveness of various alternatives to mitigate the impact of transient events on TBFM
- Final Data Communications Segment 2 Requirements in support of data communications investment decisions

d. Staffed NextGen Tower (Staffed and Autonomous)

- Completion of Field Demo 2 at DFW
- Preliminary Program Requirements
- Updated concept of operations

e. Environmental Management System (EMS) and Advanced Emissions and Noise Reduction

- Application of EMS for NextGen to manage environmental performance and its development in coordination with stakeholders
- Assessment of NAS-wide benefits of aviation environmental standards for aircraft emissions and noise and market based measures
- Demonstration of control algorithms for environmentally and energy favorable gate to gate operational procedures
- Assessment and demonstration of NAS-wide benefits of CLEEN aircraft and alternative fuels technologies

f. Wake Turbulence Re-categorization

- New 6 Category air traffic control wake separation airport capacity enhancing standards submitted to ICAO; and, FAA has initiated the process for implementing them
- Concept for using Leader/Follower Pair-Wise Static air traffic control wake separation standards has been developed – potential additional airport runway capacity increase of 4 percent.

g. System Safety Management Transformation

- SSA - Baseline risk assessments for system-wide risks associated with current operations in (1) terminal area airspace (2) transition airspace or (3) en route airspace
- SMS - Design Approval Holder (DAH) SMS requirements

h. Operational Assessments

- AEDT Integration
- Updated NextGen cost analysis
- Updated NextGen benefits analysis
- Annual NextGen Performance Assessment
- Updated NextGen business case
- Analysis of the potential benefits of Collaborative Air Traffic Management (CATM), using a stochastic NAS-wide model incorporating Traffic Flow Management (TFM) procedures
- Improved modeling capability, incorporating Low Instrument Meteorological Conditions (IMC) representation, dynamic Ground Delay Program (GDP) representation, surface congestion model, and simple weather re-routes

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$61,000,000 is required to allow for continued execution of work within the System Development solution set. The FY 2013 work will support strategies to meet future aviation demand in an environmentally sustainable manner, reduce domestic curb-to-curb transit time by 30 percent and minimize the impact of weather and other disruptions to achieve 95 percent on time performance. System Development provides the research and development required to resolve these potential problems. In addition, an increase in demand could cause an increase in the number of accidents, aircraft noise and emissions, as well as the

ATC workload. With a reduction in funding, achievement of these targets and solving these issues by 2025 will not occur.

Detailed Justification for - 1A08 Next Generation Transportation System – Trajectory Based Operations

1. What Is The Request And What Will We Get For The Funds?

FY 2013 -- Next Generation Transportation System – Trajectory Based Operations (TBO) ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System – Trajectory Based Operations (TBO)	$39,560	$7,000	$16,500	+$9,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Modern Procedures (D - Side and R - Side)	---	$13,500.0
2. Oceanic Tactical Trajectory Management	---	3,000.0
Total	Various	$16,500.0

For FY 2013, $16,500,000 is requested for the following:

a. Separation Management- Modern Procedures

- Continue evolving En Route NextGen Mid-Term Baseline capabilities. Areas of capability research and analysis include:
  - Conformance monitoring for Area Navigation/Required Navigation Performance (RNAV/RNP) flights on RNAV/RNP routes based on the performance criteria adapted for the route
  - Integration of manual trial planning on the radar console

b. Trajectory Management- Oceanic Tactical Trajectory Management

- Tactical Trajectory Feedback/Oceanic Conflict Advisory Trial (OCAT)
  - Support Development of artifacts and transition activities of OCAT to ATO-E
- Controller Enhancements
  - Complete simulations and HITLs
  - Data Collection and Analysis Report
  - Initiate preparation for IARD

2. What Is This Program?

TBO is a shift from clearance-based control to trajectory-based control. Aircraft will fly negotiated trajectories, and air traffic control (ATC) moves to management by trajectory; the traditional role of the pilots/controllers will evolve due to the increase in automation, support, and integration. TBO focuses primarily on en route and oceanic operations, although the effects of TBO will be felt in all phases of flight.

Currently, separation is handled by controllers using radar screens to visualize trajectories and make cognitive operational judgments, with some automation decision support to help identify and resolve future conflicts. With an increasing diversity of aircraft characteristics, using a single set of equipment-based separation standards for all aircraft encounters is becoming increasingly inefficient and limits capacity. This is especially true for aircraft (such as Unmanned Aircraft System (UAS), A380) that may need larger separations to maintain overall airspace safety levels. Human limitations constrain efficiency and expansion of service as sectors have shrunk to the point of diminishing returns in many places. An ability to handle more diverse traffic, with fewer impacts to operator desired performance profiles, while lowering unit costs as needed.

a. Modern Procedures (D-Side and R-Side)

The performance-based concept calls for separation standards to vary according to aircraft capabilities and pilot training. This activity will result in a set of separation standards requirements and algorithms to implement them. This includes changes to automation, procedures, and training. This also funds an analysis of performance-based data processing to see if it is appropriate for lowering separation minima. Performance-based data processing is a way to integrate all information about an aircraft's path and location to provide full situational awareness and predict possible problems.

Developing new automation Conflict Alert (CA) and Conflict Probe (CP) algorithms and changing the controller workstations to support the new information are on the critical path of many NextGen technologies. Completion of this task enables successful completion of other TBO goals, as well as broader NextGen objectives.

Separation Management automation enhancements include concepts and technologies, performance enhancements to existing automation functions identified through development, deployment, and operational use of ERAM and predecessor systems. Pre-implementation activities include operational and technical risk reduction, and acquisition artifact development.

Separation Management includes all ATC automation capabilities that assist controllers in maintaining safe aircraft separation while optimizing use of airspace capacity. This project will apply pre-implementation processes to define, prioritize, sequence, and transition to implementation of the R-Side and D-Side controller capabilities and technology enhancements.

b. Oceanic Tactical Trajectory Management (OTTM)

The Oceanic Tactical Trajectory Management program is a critical NextGen capability that addresses current performance gaps in the areas of capacity, productivity, efficiency, safety, and environmental impacts in the oceanic environment. OTTM represents a shift from clearance-based control to trajectory-based control.

- Aircraft-specific traffic flow management
- Increased management of flows at merge points
- Improved ATM through weather information integrated into decision support tools
- Decision support tools for the controllers resulting in improved efficiency and increased safety

Tactical Trajectory Feedback/OCAT will finish its operational trial and perform data collection and analysis to support the final trial initiative. It will also conduct all work in development of artifacts to transition the initiative to IARD and to ATO-E for implementation. Controller Enhancements will finish work on the HITLs and simulations and will begin the work required for IARD.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Flights are managed in today's system primarily by voice communication. Separation is handled by controllers using radar screens to visualize trajectories and make operational judgments. These judgments are turned into clearances often expressed as vector coordinates - all handled by two-way radio. Decision support tools aid the controller by predicting potential future conflicts and aid in evaluation but there effectiveness is limited by the use of voice – workload and voice limitations on complexity. Separation management remains much as it was when the radar was first introduced into the system. Human limitations constrain efficiency and expansion of service as sectors have shrunk to the point of diminishing returns in many places. A separation management that can handle more, diverse traffic, with fewer impacts to user desired performance profiles, while lowering unit costs is needed.

As demand has grown, especially in the airspace surrounding and between major metropolitan areas, the current fixed airspace routings and large separations limit airspace capacity and tactical management of major flows. En route congestion has become a major constraint on the system as the inflexibility of the system to airspace adjustments makes tactical flow in the face of demand congestion or major weather disturbances difficult. Due to the limitations in automated prediction capability and voice communication, separation standards remain, for the most part fixed and conservative, which restricts capacity to the overall system.
The current flight data management system and the current navigation systems do not support the flexibility that is needed from both a planning and execution perspective. Trajectory management means that true 4-D trajectories can be exchanged and monitored, and the system can support the exchange of multiple alternative trajectories in both separation management and tactical flow. This requires a capability beyond that of the current flight plan which was developed in an era of human only interpretation and planning. Trajectory management and full use of the airspace also requires that aircraft can navigate off fixed routes and that new routes can be developed and published with minimum distances between. Keeping aircraft on historic routings with historic between route separations limits the use of airspace capacity in general and specifically to address weather and congestion limitations.

4. How Do You Know The Program Works?

The TBO solution set encompasses all of the airspace and airports within the NAS. Since its beginning TBO has made great progress expediting the integration of TBO technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Modern Procedures (D - Side and R - Side)

- Deliver Separation Management Concept of Operations
- First Phase (FMC Route Offset, SAC, RA Position, Conflict Probe at Radar Position, Strip-less Non-Radar Operations) Concept of Use
- Phase 1 WJHTC Hardware Demonstration and Acceptance Test for ERAM Evaluation System (EES)

b. Oceanic Tactical Trajectory Management

- Deliver Concept of Operations (CONOPS) for In-Flight Operations Re-Profile Alert capability
- Conduct ADS-C Climb and Descent Procedure (CDP) Ops Trial

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$16,500,000 is required to continue work within the TBO solution set. The FY 2013 work will continue the shift from clearance-based to trajectory-based control. With an increasing diversity of aircraft characteristics, using a single set of equipment-based separation standards for all aircraft encounters is becoming increasingly inefficient and limits capacity, and with a reduction in funding work towards this shift will be greatly impacted. The ability to handle more diverse traffic, with fewer impacts to operator desired performance profiles will not be realized.

Detailed Justification for - 1A09 Next Generation Air Transportation System (NextGen) – Reduce Weather Impact (RWI)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 -- Next Generation Transportation System (NextGen) – Reduce Weather Impact (RWI) ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System (NextGen) – Reduce Weather Impact (RWI)	$21,444	$15,600	$16,600	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Weather Forecast Improvements	---	$14,600.0
2. Weather Observation Improvements	---	2,000.0
Total	Various	$16,600.0

For FY 2013, $16,600,000 is requested to provide the following:

a. **RWI Weather Forecast Improvements**
- Complete NextGen Weather Processor (NWP) Segment 1 document package for Final Investment Decision (FID)
- Obtain NWP FID decision
- Award NWP contract to a Vendor
- Initiate NWP solution development
- Complete NWP Government Furnished Information (GFI) package provided to Vendor
- NWP Solution Implementation activities begin
- Execute Project Management Best Practices
- Maintain 0-8hr convective weather forecast prototype operations (i.e., CoSPA) at selected ATC facilities to support TFM
- Maintain and deliver QMS reports and documentation
- Develop specifications for required input to air traffic management (ATM) Decision Support Tools (DST)
- Develop of international standards for forecast products,

b. RWI Weather Observation Improvements:
- Complete prototype demonstration of Flexible Terminal Sensor Network (FTSN) functionality, a NextGen capability that consolidates output from existing ground based weather observation systems (ASWON, LWAS, RVR, etc.) and increases availability of such observations via SWIM/NNEW
- Begin system engineering activities for FTSN pre-production/qualification systems

2. What Is This Program?

RWI is a planning and development portfolio to ensure NextGen operational weather capabilities utilize a broad range of weather improvements and technologies to mitigate effects of weather in future National Airspace System (NAS) operations. This portfolio has two major elements: weather observation improvements and weather forecast improvements. The RWI portfolio will address many weather problems including, but not limited to, rightsizing the observations network, transition of aviation weather research to operations, development of weather impact metrics, development of weather decision support tools, integration of weather information into operations, weather processor architecture redesign and restructuring and transition planning for legacy systems. RWI will conduct planning, prototyping, demonstrations, engineering evaluation and investment readiness activities leading to an implementation of operational capabilities throughout NextGen near, mid and far terms. The RWI portfolio will leverage the weather infrastructure and access work completed under the NextGen Network-Enabled Weather (NNEW) program, which provides for improved interface and formats with NOAA's 4-D Weather Data Cube for universal common access to weather information.

a. Weather Observation Improvements

A consistent and effective aviation weather observation sensor network is fundamental to NextGen. The existing sensor network is comprised of aging, stand-alone capabilities that were not designed to meet the flexible, open and adaptable needs of NextGen. RWI weather observation improvements will manage the evolution of the existing capability to one that possesses the optimal quantity and quality of ground, air and space based sensors. Initial RWI-WOI activities included assessing the current sensor network capabilities and identifying gaps, with the primary focus on ground based sensors. Technical studies were conducted to identify economical methods to consolidate existing ground based legacy platforms, provide improved capability, and allow sensor outputs to be more universally available. The Flexible Terminal Sensor Network (FTSN) answers these needs and when fielded, will result in a homogenous network of ground sensing equipment that requires fewer resources to maintain and manage and is readily accessible to all NextGen users. Improvements to the aviation weather observation sensor network will be a collaborative effort between the FAA and other NextGen partners to include the National Oceanic and Atmospheric Administration (NOAA), and the Department of Defense (DoD).

RWI-Weather Observation Improvements is one of several complementary and interrelated weather investments that leverage each other to build integrated capabilities for the future. RWI-Weather Observation Improvements will optimize quality and accuracy, while RWI-Weather Forecast Improvements will enhance coverage, accuracy, real-time forecasting techniques, and translation techniques for weather integration support to users and DSTs.

b. Weather Forecast Improvements

The RWI-Weather Forecast Improvements support the need to improve weather decision making and use of weather information in the transformed NAS. The term "forecast" is used in this document to describe the assimilation of National Weather Service (NWS) forecast models into models that forecast the NWS impacts on aviation. RWI-Weather Forecast Improvements includes: 1) integrating weather information tailored for DSTs and systems into NextGen operations; 2) implementing improved flight impact forecasts through research transition of advanced forecast capabilities from aviation weather research; 3) developing and using metrics to evaluate the effectiveness of weather improvements in the NAS; 4) developing probabilistic forecasts of future flight impact that can be effectively used in air traffic and traffic flow management; and 5) determining the most effective solution for a processor architecture to support these capabilities. RWI will propose recommendations for near, mid and far time frames which will include a recommendation for transition of FAA legacy systems.

Collectively, the effect of the NextGen RWI portfolio will address the numerous stand-alone weather displays, eliminate cognitive interpretation of weather and impact assessments; and significantly decrease impact delays. NextGen RWI will redesign weather information to integrate with, and support decision-oriented automation abilities; and human decision-making processes.

DOT Strategic Goal - Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Most of the current sensor capabilities in the NAS are based on 70s-80s technology and have been in the field since that period. While the current observation network performs adequately, it is becoming increasingly costly to maintain. The practice of fielding sensing capabilities to address specific needs (stove pipe approaches) over time has resulted in a sensor network that is overly redundant. For instance in the NAS today there are currently six different types of visibility sensors supporting individual programs. This circumstance forces the FAA to pay to maintain a large inventory of different field replaceable units and provide power, telecommunication, training and other management costs for each sensor platform. Furthermore, information collected from current sensor platforms is tied to specific missions and not openly available to support new, dynamic sensing or advanced forecasting applications. Effective consolidation of today's sensing capabilities into a flexible sensor network will not only save agency resources, but provide the opportunity for improved service. Specifically, the currently fielded observation network lacks the capability to resolve and identify many types of precipitation, especially lacking is the ability to discern the type and intensity of frozen precipitation types. This significantly impacts the efficiency of winter weather/deicing operations. Consolidating and modernizing weather sensing capabilities will support the initialization of weather forecasts and alerts that monitor such hazards and ensure aircraft safety and increased capacity occur in the NextGen environment.

Current weather forecast infrastructure and abilities are inadequate to meet real-time needs of ATM DSTs, operational decision-makers and NextGen. Existing impact forecasts lack spatial resolution and time accuracy needed by users for decisions involving key weather phenomena impacting aviation. Current legacy information is in unusable form for integrated use in ATM DSTs e.g. icing and turbulence indices for the potential impact on aircraft treat the various types and configurations of aircraft differently. Weather forecasts for the same phenomena impacting aviation operations are often inconsistent, redundant, or are not accurate. Current legacy processing closed architectural systems are incompatible with one another. Legacy weather infrastructure is too limited and unable to ingest process and disseminate observation, forecast and modeling data to meet highly quality NextGen eight hour forecast abilities. Data quality and latency of information in Radar Mosaics needs to be improved. Existing legacy software is inefficient, difficult to modify and unable or incompatible to serve users across multiple domains. Current weather infrastructure is not up to an enterprise scale and unable to support NextGen integration requirements and greater societal demand. There are numerous stand-alone weather displays at facilities in the NAS that provide conflicting information.

4. How Do You Know The Program Works?

Capacity will be enhanced through better integration of weather information in operational decision making The combination of optimized weather observations, improved forecasts, probabilistic forecasts and translation into direct airspace constraints, will allow users to identify the best routes to fly for their aircraft type, flight plan and flying preferences, and for traffic flow management to optimize the airspace capacity given the weather constraints and demand. Overall, RWI provides tailored weather data for integration into decision support tools for collaborative and dynamic NAS decision making.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$16,600,000 is required to continue work within the RWI solution set. As stated above, RWI provides improved weather observations, weather impact forecasts, and weather constraint information for integration into decision support tools for collaborative and dynamic NAS decision making. It enables enhanced capacity by making fuller use of weather information for operational decision-making. This supports the optimal selection of usable airspace and precise spacing for arriving and departing aircraft. The increased accuracy of forecasts and improved observations enables the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace.

The FY 2013 work completes the investment analysis of the initial NWP infrastructure to re-host and streamline the current weather processing systems, designed to handle the addition of new weather products to support ATM decision-making; initiates NWP Solution Implementation which includes display consolidation; supports prototype demonstration activities for a flexible terminal sensor network capability for the surface observation network; and development of weather translation techniques to enable capacity and efficiency improvements in the mid-term through other NextGen solution sets including trajectory-based operations and collaborative ATM.

A reduction will impact the initial operating capability of NWP targeted for 2015, force the agency to fund costly support activities to preserve legacy ground sensor platforms, and delay the development and evaluation of weather translation techniques which can be used by ATM decision support tools and users in the mid-term (e.g., Time Based Flow Management, Surface Trajectory Based Operations).

Detailed Justification for - 1A10 Next Generation Transportation System – Arrivals/Departures at High Density (HD) Airports

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Transportation System – Arrivals/Departures at High Density (HD) Airports
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System (NextGen) – Arrivals/Departures at High Density (HD) Airports	$40,221	$12,000	$11,000	-$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Surface Tactical Flow	---	$8,000.0
2. Surface Conformance Monitoring	---	1,000.0
3. Time Based Flow Management (TBFM) Work Package 3	---	2,000.0
Total	Various	$11,000.0

For FY 2013, $11,000,000 is requested to provide the following:

a. Surface Tactical Flow
- Continue support to Terminal Flight Data Manager (TFDM) program AMS effort
- Continue technical transfer of mature surface capabilities to TFDM
- Continue Surface Trajectory Based Operation (STBO) field evaluations at Memphis and Orlando for the Airport Configuration, 2D Taxi Route Generation, and Collaborative Departure Scheduling tools
- Develop STBO Communication, Surveillance, Navigation, and Weather Requirements

b. Surface Conformance Monitoring
- Conduct field evaluation of Surface Conformance Monitoring (2D) at Orlando
- Update ConUse, Requirements, and ATC Procedures for Surface Conformance Monitoring (2D) at Orlando

c. Time Based Flow Management (TBFM) Work Package 3
- Continue to develop and refine concepts for TBFM WP 3
- Develop documentation to support TBFM WP3 acquisition management system requirements towards achieving an Investment Analysis Readiness Decision (IARD) in 2013 and Final Investment Decision (FID) in 2014. This documentation will include, concept of use, preliminary requirements, initial benefits information, initial cost data, and architecture artifacts

2. What Is This Program?

The Arrivals/Departures at High Density (HD) Airports initiative is a program focused on the development of trajectory-based terminal operations and flow management in support of NextGen. The primary goal of the HD initiative is to increase arrivals and departures in areas where demand for runway capacity is high or where there are multiple runways with airspace and taxiing interaction, and for close proximity airports with potential airspace/approach interference. The HD initiative expands on the capabilities of the Flexible Terminal and Airports program by developing traffic flow management (TFM) and metering technology to provide greater throughput. Major areas of focus will include: 1) HD corridors with reduced separation to provide trajectory based transitions to match airport arrival capacity; 2) Enhanced surface technologies to support Surface Trajectory-Based Operations; 3) Parallel Runway Operations with reduced lateral separation; 4) Taxi clearance and conformance monitoring for trajectory-based operations (TBO) and safety; and 5) Expansion of terminal separation procedures throughout the arrival and departure airspace (Big Airspace). HD operations encompass all operations from the gate to the en route structure and from the en route structure to the gate (Surface, Departures and Approaches). HD operations will require higher performance navigation and communication capabilities than those required for Flexible Terminal Airspace. The Flexible Terminal and Airports initiative capabilities includes dynamically configurable airspace (flexible airspace) in conjunction with tailored arrivals and departures, development of "equivalent visual" approach procedures, digital aircraft communication (data link), surface trajectory management, low visibility taxi and departure operations, taxi conformance to enhance safety, and collaborative decision support tools to enhance capacity, safety and efficiency. A major metric of this program will be increased capacity without a corresponding increase in human resources.

In addition to the developmental activities within the Flexible Terminal and Airports, the initiative will also leverage many ongoing FAA programs, including Automated Dependent Surveillance-Broadcast (ADS-B), Area Navigation/Required Navigation Performance (RNAV/RNP), Traffic Management Advisor (TMA), Traffic Flow Management (TFM), System Wide Information Management (SWIM), and future automation interfaces and data communications efforts to provide greater capacity while balancing safety, security and environmental requirements.

a. Trajectory Management – Surface Tactical Flow

The Trajectory Management - Surface Tactical Flow project is focused on the development of trajectory-based surface operations in support of the NextGen initiative. It leverages ongoing FAA research using the Surface Decision Support System prototype platform and provides guidelines for the development of a collaborative Surface Traffic Management (STM) system with tools necessary to achieve a fully collaborative surface environment. This is required to safely improve the use of airport capacity which is necessary to enable trajectory based operations on the airport surface.

The NextGen Concept of Operations, authored by the Joint Planning and Development Office (JPDO), states that "4DTs [four-dimensional trajectories] may be used on the airport surface at high-density airports to expedite traffic and schedule active runway crossings." Achieving this vision will require a series of advances in procedures and supporting automation systems, and collaboration between air traffic control (ATC) and the flight operators.

This project will demonstrate and document requirements for a series of capabilities that build to the NextGen vision for surface trajectory-based operations. Examples include local data exchange, leading to the sharing of flight readiness information and collaboration, which will enable pre-planned runway schedules integrated with airborne trajectory-based operations. Surface flow management will reduce surface engine operating times, resulting in fuel-savings and reduced environmental impacts, and lead to collaborative resource allocation and avoidance of surface gridlock.

The Trajectory Management – Surface Tactical Flow project will require changes to procedures in the flight operator and ATC Tower (ATCT) environments. The concept and requirements development and acquisition process is designed to allow incremental steps toward the complete concept, providing benefits at each step of the way and remaining aligned with the introduction of other NextGen technologies. Testing and extraction of requirements will be realized through several phases.

b. Trajectory Management – Surface Conformance Monitoring

The Surface Conformance Monitoring - Taxi Conformance Monitoring (TCM) effort is designed to show the potential safety and workload benefits that can be achieved through a comprehensive taxi route management and conformance monitoring capability. The end state would allow a precise, unambiguous taxi clearance to be generated by the Air Traffic Controller, communicated to the aircraft via data link and conformance to the clearance monitored by automation in the ATCT. An important consideration is the development and demonstration of user-friendly, minimal-workload methods for the controller to specify the taxi route. Conformance monitoring can be limited to route adherence only, or both route and timing through the incorporation of timed check points. By using a proactive approach to separation on the airport surface, taxiing aircraft can be "de-conflicted" with other aircraft in the taxi, landing, and takeoff phases of flight, resulting in safer ground operations. The reduction in taxi time will support use of Trajectory-Based Operations (TBO) on the airport surface. In the future, Taxi Conformance Monitoring (TCM) concepts can be applied to staffed and automated virtual ATC towers.

The demonstrations and validation activities will:

- Demonstrate and validate procedures for TCM in an ATCT
- Evaluate performance of pre-established taxi routes vs. controller-generated taxi routes in a TCM environment
- Evaluate performance of prototype taxi conformance algorithms
- Demonstrate TBO on the airport surface

c. Time Based Flow Management (TBFM) Work Package 3

Trajectory Management – Time Based Flow Management (TBFM) will continue to modernize and enhance the current Traffic Management Advisor (TMA) System. Traffic Management Advisor (TMA) is a vital part of the NAS and enhances air traffic operations, by reducing delays and increasing efficiency of airline operations. TMA is an automation system currently available that enables the use of time-based metering to optimize the flow of aircraft as they approach and depart congested airspace and airports. TMA is already installed in the 20 Air Route Traffic Control Centers (ARTCC) and adapted for most of the major airports served by those centers.

Time Based Flow Management (TBFM) is an evolution of the Traffic Management Advisor (TMA) Program. This system uses Time Based Metering (TBM) software to optimize the capacity in the NAS. TBFM Work Package 3 will prepare for the follow-on phase, which focuses upon further leveraging time-based metering capabilities to implement NextGen concepts, such as terminal metering, expanding Tower scheduling of departures to additional locations, integrating surface data into TBFM calculations to improve departure scheduling, enabling the opportunity for optimized descents during metering operations, and making TBFM more flexible to accommodate dynamic reroute operations in response to changing weather conditions.

3. Why Is This Particular Program Necessary?

With increasing demand the need grows to achieve peak throughput performance at the busiest airports and in the busiest arrival/departure airspace. Capability improvement via new procedures to improve airport surface movements and improve overall tactical flow management into and out of busy metropolitan airspace is needed to maximize traffic flow and airport usage. Essentially the problem is getting the right aircraft to the right runway in the right order and time to minimize its individual impact on the system and maximize the use of these airports. Operations are conducted to achieve maximum throughput while facilitating efficient arrival and departure. Inefficiencies in any aspect of the operation reduces the total use of the capacity and, because of high demand, causes excessive compounding of delay.

4. How Do You Know The Program Works?

Arrivals/Departures at High Density (HD) Airports focus on the metroplex airports and terminal airspaces within the NAS. Since its beginning HD has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Surface Tactical Flow

- Technical Transfer of documents and associated artifacts of initial STBO capabilities to the FAA implementing organization
- Field Evaluation of Collaborative Departure Queue Management at Memphis
- Field Evaluations of Flight Operator Surface Application Version 2 Interface concept and Collaborative Departure Queue Management Version 2 concept and Weather Data Integration at Memphis and Orlando

b. Surface Conformance Monitoring

- Surface Conformance (2D) HITL Simulation
- Surface Conformance (2D) HITL Simulations – using hold short and give way instructions

c. Time Based Flow Management (TBFM) Work Package 3

- Previous work package completed an FID to implement TBFM, an update of TMA, to improve metering operations in the NAS
- Previous work package deployed coupled scheduling update to TMA software

5. Why Do We Want/Need To Fund The Program At The Requested Level?

For FY 2013, $11,000,000 is required to continue work within the Arrivals/Departures at High Density (HD) Airports solution set. The FY 2013 work will continue with the program's initiative to focus on the development of trajectory-based terminal operations and flow management in support of NextGen. A reduction in funding will slow down the achievement of the primary goal of the high density initiative to increase arrivals and departures in areas where demand for runway capacity is high or where there are multiple runways with airspace and taxiing interaction, and for close proximity airports with potential airspace/approach interference.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 40, 43, 38, 41, Surface

- Complete Surface Trajectory Based Operations (STBO) field evaluations of Collaborative Departure Scheduling and Time-Base Taxi Route Generation Tool at Memphis and Orlando and provide report detailing results of new capabilities

Detailed Justification for - **1A11 Next Generation Transportation System – Collaborative ATM**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Transportation System – Collaborative ATM ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System – Collaborative ATM (CATM)	$55,788	$24,000	$24,200	+$200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Strategic Flow Management Integration	---	$3,000.0
2. Strategic Flow Management Enhancement	---	3,000.0
3. Common Status and Structure Data	---	2,500.0
4. Advanced Methods	---	2,500.0
5. Flight Object	---	7,500.0
6. Integrated NAS Design and Procedure Planning	---	1,700.0
7. Collaborative Information Management	---	2,000.0
8. Systems Development – Information Management	---	2,000.0
Total	Various	$24,200.0

For FY 2013, $24,200,000 is requested to provide for the following:

a. Flow Control Management – Strategic Flow Management Integration (Integration Execution of Flow Strategies into Controller Tools)

- Conduct studies, analysis, high fidelity prototype and operational evaluations to define requirements and risk mitigation for implementation in En Route Automation Modernization (ERAM).

b. Flow Control Management – Strategic Flow Management Enhancement (Enhancing the Strategic Flow Program)

- Deliverables to support artifact development start in FY 2013 to support Investment Analysis Readiness Decision (IARD) in FY 2015
  - Preliminary Program Requirements Document
  - Enterprise Architecture Products and Amendments

c. Flight and State Data Management – Common Status and Structural Data (Separation, Tactical, Strategic Trajectory Management)

- Aeronautical Information Management (AIM) Modernization Segment 2 Final Investment Decision
- Demonstrate limited Airports Data Management capability to collect airport survey information
- Demonstrate limited Special Activity Airspace schedule collection capability

d. Flight and State Data Management – Advanced Methods

- Unified Flight Planning and Filing (UFPF)
  - Conducting engineering analysis to include the UFPF Benefit Justification Report, UFPF Evolution Strategy Report, and Evaluation Platform Plan for Unified Flight Planning and Filing/ Flight Information Exchange Model (UFPF/FIXM) demonstration

    - Conduct a demonstration on UFPF/FIXM capabilities and analysis of demonstration results
    - Update AMS Support – Enterprise Architecture (EA) Products Plan, EA Report, draft Functional Analysis Report
    - Complete Concept and Requirements Definition (CRD) Readiness Decision Products – Independent Evaluation Review, Shortfall Analysis, Preliminary Program Requirements Review, ACAT level request form, ConUse, CRD Plan, recommend changes to EA
- NAS Common Reference (NCR)
    - Conduct demonstration on NCR and UFPF Interoeration in SWIM Environment
    - Conduct demonstration on NCR with Live Data Feed (Special Activity Airspace (SAA) and NOTAMS)
    - Complete Engineering Analysis to include the Concept Validation Plan for NCR and UFPF Interoperation in System Wide Information Management (SWIM) Environment Demonstration, the Concept Validation Plan for NCR with Live Data Feed (NOTAM, SAA) Demonstration, and Long-term Demo Framework Analysis for Demos 4, 5, and 6
    - Complete the Concept and Requirements Definition (CRD) Document
    - Develop NCR ConOps

e. Flight and State Data Management – Flight Object

- Conduct International Flight Object demonstration
- Develop Flight Object Data Dictionary v1.5
- Develop initial version of FIXM (Flight Information Exchange Model), in collaboration with NAS and International partners
- Draft the preliminary Flight Object Requirements Document
- Begin the CRD Decision for Flight Object and complete the IARD products
- Conduct Flight Object Working Group (FOWG) meetings
- Conduct a Flight Object Community of Interest (COI) day
- Complete the Flight Object Exchange System (FOXS) Requirements Document

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning

- Best Equipped Best Served Greenfield Analysis
    - Complete evaluation of new airspace and procedure design
    - Complete transition plan for possible implementation
    - Conduct Operational Trial for selection applications and capabilities
    - Identify sites for Operational Trials to validate the design and modeling results of the airspace and procedures as well as gain operational experience in the Best Equipped Best Served operational environment
- Greener Skies Research and Development
    - Complete transition of research to Greener Skies Design and Implementation team for implementation at the key site

g. Collaborative Information Management

- Research, analyze, and develop Unmanned Aircraft System (UAS) net-enabled applications
- Research, analyze, and develop Automatic Dependent Surveillance Broadcast (ADS-B) net-enabled applications

h. Systems Development – Information Management

- Identify information that needs to be shared to meet NextGen concept
- Develop a standard frame work to capture requirements for the sharing of information including required performance to achieve the expected operational outcome
- Establish an initial shortfall with respect to information management based on this analysis

2. What Is This Program?

CATM covers both the strategic and tactical interactions with the customers to manage demand when the desired use of capacity cannot be accommodated. CATM includes the flow programs as well as collaboration on procedures that will establish balance by shifting demand to less desirable capacity alternatives (e.g., routings, altitudes, and times). The major demand and capacity imbalances will be worked collaboratively between the air traffic managers and flight operators. Critical to enabling this capability is information distributed by System-Wide Information Management (SWIM).

CATM represents an opportunity to evolve towards a fully integrated and tactically managed ATM system exploiting the potential of system support in a closed loop environment, while increasing opportunities for the exploitation of technical systems by human operators.
Furthermore, CATM takes a first opportunistic step in addressing the need to change controller focus to network needs rather than individual aircraft, and airlines need to provide an optimum profile to be followed by the pilot, providing for system stability.

a. Flow Control Management – Strategic Flow Management Integration (Integration Execution of Flow Strategies into Controller Tools)

Flight planners or an operator's flight planning automation interact with a common flow strategy and trajectory analysis service, available to all NAS stakeholders, that enables common situational awareness of current and projected NAS status and constraints. In addition to having common services to understand the potential effects on a trajectory or the effects of a flow strategy, operators and the ANSP can collaborate on the selection of both capacity management and flow contingency management strategies that balance NAS performance objectives with Flight operators goals. All of the parties have a common understanding of overall national goals and desired performance objectives for the NAS. A transparent set of strategies is in place to achieve overall performance objectives, including airspace management to maximize capacity when demand is high and, as required, flow management initiatives to ensure safe levels of traffic are not exceeded when capacity limits are reached.

Strategic Flow Management Integration (Execution of Flow Strategies into Controller Tools) provides funding for the implementation of modifications needed to receive/process the Traffic Management Initiatives (TMI). These improvements include automatic identification to controllers of aircraft affected by Traffic Flow Management (TFM) TMIs, electronic communication of the TMI information in a timely manner to the relevant ATC operational positions, tools that help monitor how well aircraft are conforming to the TMI, and tools that suggest controller actions to achieve the flow strategy.

b. Flow Control Management – Strategic Flow Management Enhancement (Enhancing the Strategic Flow Program)

Currently, flow strategies developed from the various decision support tools used by the Traffic Management Units (TMU) are manually intensive because the tools are not integrated. Traffic Management specialists have to work out the impacts of multiple Traffic Management Initiatives (TMIs), and the solutions may not be optimal because the current tools do not support analyzing the linkages between multiple TMIs. This project would allow TMU specialists to automatically explore various reroute options and the impact of multiple TMIs and how they fit with efforts to accommodate NAS customer preferences. By automating this process, much more rapid flight reroutes can be developed, which would lead to fewer delays and less congestion.

The primary goal of Air Traffic Management (ATM) is addressing demand/capacity imbalances within the NAS. The FAA needs to improve implementing Traffic Management Initiatives (TMI) such as Ground Delay Programs (GDP), Airspace Flow Programs (AFP), Ground Stops (GS), Reroutes, and Miles-In-Trail (MIT). To improve TMIs, more sophisticated modeling capabilities will be used to assess the impact of implementing a combination of TMIs, determine the value of user feedback data, and project the impact of TMIs on overall NAS efficiency. The modeling results will be shared with the aviation community when evaluating these initiatives. Automate and enhance post analysis capabilities can feed the results back to the TMU originating the initiative. This project provides a solution that allows electronic negotiation with aviation users to manage congestion.

c. Flight and State Data Management – Common Status and Structural Data (Separation, Tactical, Strategic Trajectory Management)

The Common Status and Structure program provides the mission analysis and pre-implementation support for developing the aeronautical common service delivering special activity airspace static data and airport information including airport configuration static data.
Common Status and Structural Data (CSSD) will establish the requirements and information flows for the collection, management, and maintenance of aeronautical information in a digital format for machine to machine exchange and develop a business case acquisition packages to support AIM Modernization Segment 2 and Segment 3 Final Investment Decisions.

d. Flight and State Data Management – Advanced Methods

The Advanced Methods objective is to provide well defined and well understood methodologies to enhance Traffic Flow Management (TFM) capabilities. Specifically, two components of Advanced Methods, Unified Flight Planning and Filing (UFPF) and NAS Common Reference (NCR) address the Next Generation Air Transportation System (NextGen) Operational Improvement (OI) number 101102 – "Provide Full Flight Plan Constraint Evaluation and Feedback".

The UFPF integrates flight planning and flight filing through an iterative and continuous process that uses a common foundation of data and functionality. The UFPF enhances strategic flight planning, improve operational performance and reduce air traffic control (ATC) workload. The NCR is a virtual, multidimensional conceptual model that facilitates the storage, management, retrieval, filtering, and presentation of the various types of 3-D and 4-D geospatial and temporal information. The NCR harmonizes and integrates information from disparate systems connecting the data objects to one another via the spatial, temporal, and functional relationships among them, storing only the relationships that associate them to one another.

e. Flight and State Data Management – Flight Object

The Flight Object is a collection of common information elements that describe an individual flight, its capabilities, preferences and constraints

- The Flight Object is intended to be the future medium for capturing and sharing the most up-to-date information on any flight
- The Flight Object will serve as the single common reference for all system information about a flight
- A Flight Object is created for each proposed flight
- An information sharing mechanism, such as the Flight Object, needs to be developed to enable information sharing among various users and stakeholders in the NAS allowing for better coordination, situational awareness, and collaborative decision making

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning

Establish a systematic approach for NAS wide airspace procedure development to support the "Best Equipped – Best Served (BE-BS) Concept of Operations

- Development of the 'Greenfield' BEBS Approach will create airspace and procedures that allow for the operations of high end applications while accommodating legacy aircraft
- Research and development on methods to overcome challenges Performance- Based Navigation (PBN) procedure implementation such as the use of Required Navigation Performance (RNP) routes in conjunction with non-area navigation (RNAV) routes
- Study the use of Wide-Area-Multilateration to enhance the services provided at small non-towered airports

g. Collaborative Information Management

Currently, flight data for Unmanned Aircraft Systems (UAS) during both normal and abnormal flight conditions is not readily available for Air Traffic Control (ATC). Collaborative Information Management (CIM) aims to improve information flows to Air Traffic Control and assess the improvement provided to the controller.

Utilizing enhanced flight data such as aircraft intent and trajectories, as well as advanced airspace coordination concepts, CIM will analyze controller workload and ease of coordination in both normal and abnormal UAS flight conditions.

h. Systems Development – Information Management

Information Management will address issues that arise during the transition from a legacy environment controlled through physical connections and Interface Control Documents into a publish/subscribe using networked environment. It supports the move from data control into managing information from a business usage perspective. To address those issues, the program will:

- Identify information that will be shared in NextGen
- Develop framework to capture information requirements such as Quality of Service
- Create governance structures to manage information from a business perspective
- Analysis to allocate information dissemination responsibilities to the appropriate
- Complete requirements for tools and processes to monitor information performance in NextGen

3. Why Is This Particular Program Necessary?

The current system uses relatively blunt tools to manage demand and capacity imbalances. The tools do not "share" objectives for flights nor do they have a common picture of the structure and status of NAS. While great strides have been made in the management of flow, this lack of common objectives, status and structure constrains improvement. The system needs to minimize the over constraint demand and assure efficient operations once constrained. Constraining flights needlessly costs carriers and the traveling public time and money. On the other hand, failing to accurately forecast constraints and manage demand when they are warranted also generates costs. Users have limited ability to specify their preferred alternatives when a constraint is required; creating a need to allow input from users on resolving imbalance issues.

The overall philosophy driving the delivery of CATM services in NextGen is to accommodate flight operator preferences to the maximum extent possible and to impose restrictions only when a real operational need exists, to meet capacity, safety, security, or environmental constraints. CATM strives to adjust airspace and other assets to satisfy forecast demand, rather than constraining demand to match available assets. If constraints are required, maximizing user opportunities to resolve those constraints, based on their own preferences, is a goal.

4. How Do You Know The Program Works?

CATM encompasses the airspace and airports within the NAS. Since its beginning CATM has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Strategic Flow Integration
Execute risk reduction activities:

- Conduct technology transfer to development contractors the knowledge and experience of storyboard analysis and lab evaluation for risk reduction
- Develop hi-fidelity prototyping and perform operations evaluation to validate requirements for implementation

b. Strategic Flow Enhancement

- Concept and Requirements Definition Readiness (CRDR) Decision Point (DP) 354
- Investment Analysis Readiness Decision (IARD) DP 355

c. Common Status & Structure Data

- Development of Aeronautical Common Services Requirements
- Demonstrations and Test Deployments

- AIM 2 OMB-300 Package

d. Advanced Methods

- UFPF Evaluation Model Platform Plan
- NCR Demonstration

e. Flight Object

- Flight Object Data Dictionary
- Flight Object Data Model and XML Schema
- Flight Object Evaluation Platform and Model
- Flight Object Engineering and Requirements
- Flight Object Industry & International Collaboration

f. Integrated NAS Design and Procedure Planning

- Best Equipped Best Served Performance Assessment Plan
- Best Equipped Best Served 'Green Field' Approach Analysis
- Green Skies Independent Approach Feasibility Analysis for Phase 1 of approach into SeaTac
- ADS-B Interval Management Flight Trials

g. Collaborative Information Management

- AAI Shadow Unmanned Aircraft System (UAS) Flight Management System (FMS)/4D Trajectory Based Operations (TBO) Capability Integration and Upgrade in NIEC/UAS M&S Suite
- Integrate and Test NIEC/UAS M&S Capabilities with Standard Terminal Automation Replacement System (STARS) Laboratory
- AAI Shadow Human in the Loop (HITL) Simulation
- Shadow "Dry Run" Simulation for Live Flight
- Shadow Live Flight at Warren Grove, New Jersey
- Test Plan for Flight Demo 7
- Publish Draft Concept of Operations (CONOPS) of Net-Enabled UAS Applications
- Publish Draft Demonstration Plan of Net-Enabled UAS Operations

h. Information Management

- Program has not started

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$24,200,000 is required to continue execution of work within the CATM solution set. The FY 2013 work continues to cover both the strategic and tactical interactions with the customers to manage demand when the desired use of capacity cannot be accommodated. CATM will continue to execute flow programs as well as collaborate on procedures that will establish balance by shifting demand to less desirable capacity alternatives. If funding in CATM is reduced, the opportunity to evolve towards a fully integrated and tactically managed ATM system will be slowed.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 35, Cruise, 7b, 8, 46, 47, Integrated ATM

- Demonstrate prototype Special Activity Airspace Editor
- Conduct studies, analysis, high fidelity prototype and operational evaluations to define requirements and risk mitigation for implementation in ERAM
- Investment analysis readiness decision (IARD) for CATMT Work Package 4

Detailed Justification for - **1A12 Next Generation Transportation System – Flexible Terminals and Airports**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Transportation System – Flexible Terminals and Airports ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Next Generation Transportation System – Flexible Terminals and Airports	$57,372	$33,300	$30,500	-$2,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Wake Turbulence (Departures)	---	$4,000.0
2. Wake Turbulence Mitigation for Arrivals	---	1,000.0
3. Surface/Tower/Terminal System Engineering	---	9,000.0
4. Future Communication Infrastructure	---	1,000.0
5. Approaches, Ground Based Augmentation System	---	3,000.0
6. Closely Spaced Parallel Runway Operations	---	2,000.0
7. Approaches, NextGen Navigation Initiatives	---	1,500.0
8. Alternative Positioning, Navigation, and Timing	---	4,000.0
9. Trajectory Mgmt - Arrivals	---	3,000.0
10. Reduced Runways Visual Range	---	2,000.0
Total	Various	$30,500.0

For FY 2013, $30,500,000 is requested to provide for the following:

a. Wake Turbulence Mitigation for Departures (WTMD)

- Completion of benefit and safety assessment documentation
- Completion of evaluation report and documentation for investing in seven additional WTMD airports
- Support to change over to WTMD Implementation design
- Develop additional sites for weather data analysis and wind forecast algorithms performance
- Continued support for WTMD Implementation design changes and integration into four additional airport operations
- Develop simulation environments for the next four WTMD candidate airports – with controller familiarizations
- Regional installation and checkout for WTMD at three ATCTs
- Develop WTMD controller and technician training package for four WTMD airports and conduct training
- Setup T1 lines for four additional airports
- Provide regional planning the next three airports

b. Wake Turbulence Mitigation for Arrivals (WTMA)

- Engineering development of WTMA information displays, NAS interfaces and associated IRDs
- WTMA Weather data analysis and wind forecast algorithms performance, use of aircraft wind data
- Finalize WTMA-Procedural (WTMA-P) Automatic Terminal Proximity Alert (ATPA) software, procedures, and Noise Compatibility Program (NCP) for candidate airport
- Begin operational use of WTMA-P at candidate airport

c. Surface/Tower/Terminal Systems Engineering (TFDM)

- Continue with prototype development, demonstration, and acquisition of the Terminal Flight Data Manager (TFDM) system
- Achieve a successful Final Investment Decision (FID) for the core TFDM system
- Perform evaluation of TFDM prototype at a 2nd site
- Demonstrate TFDM enhancements derived from DFW demonstrations
- Demonstrate adaptability of TFDM at atIAD
  - Demonstrate ASDE-X Surface Surveillance data, enhanced displays and alerts integrated with flight data
- Demonstrate 2-Way Flight Data exchange between TFDM and ERAM
- Demonstrate TFDM in an operational Air Traffic environment with live data
- Perform Technology Transfer of initial Surface Trajectory-based Ops Decsions Support Tools (DSTs) into TFDM prototype and acquisition
- Validation plans, procedures, and results for TFDM Core functions and near term DSTs
- Document requirements validation result for transfer to production contractor resulting in validated detailed TFDM requirements (algorithmic, performance, etc)

d. Future Communications Infrastructure

- Develop Investment Analysis Documentation
- Investigate Flexible Airborne Architecture

e. Approaches, Ground Based Augmentation System (GBAS)

- Testing of commercially developed Radio Frequency Interference (RFI)-Robust GBAS Category III Prototype Ground System
- Requirements development for RFI-Robust GBAS Category III prototype avionics
- Review of System Design Approval (SDA) artifacts by the GBAS technical team, leading toward Non-Federal GBAS CAT III approval in FY 2016

f. Closely Spaced Parallel Runway Operations (CSPO)

- Deliver RNAV/RNP (GPS) Interim Report
- Deliver WAAS/LAAS Interim Report
- Deliver SAT/NAV/ILS w/ High Update Radar (HUR) Interim Report
- Update Modeling & Simulation Toolset
- Deliver Triple/Quad Approach Interim Report
- Continue Simplified Aircraft-Based Paired Approaches (SAPA) algorithm development
- Deliver SAPA interim report

g. Approaches, NextGen Navigation Initiatives

- Advanced NextGen Navigation
  - Business Case Analysis
  - Alternatives Analysis
  - DME Testing Analysis
- Terminal RNAV DME-DME
- Business Case Analysis
- Alternatives Analysis
- DME Testing Analysis
- Perform Operational Site Testing and Demonstrations
- Update the National Standards
- Acquisition Management System (AMS) Process
- Surface Navigation
- Business Case Analysis
- Alternatives Analysis
- DME Testing Analysis
- Performance Requirements and Finalization of Alternative Analysis/Historical Data Review
- In-house Prototype development

h. Alternative Positioning, Navigation, and Timing

- Update operational assumptions for PNT needs in the NextGen future environment

- Define basic alternatives for further research to include Enhanced DME, Wide Area Multilateration (WAM), and Pseudolite
- Update coverage predictions, identify shortfalls, assess potential accuracy, integrity, availability, continuity and time-to alert (TTA)
- Assess security technology, common time reference, future radio frequency interference (RFI) environment
- Award study contract(s) to develop prototypes for all three alternatives
- Prepare Shortfall Analysis, functional analysis, TBO scenarios, preliminary performance requirements, and operational concept scenarios
- Prepare operational safety analysis (OSA), safety requirements for integrity, continuity, and TTA, top-level designs, estimate performance and cost for full scale development

i. Trajectory Management – Arrivals

- Complete evaluating the ability of aircraft to accurately meet vertical constraints and required time of arrival
- Complete evaluating the advantages and disadvantages associated with imposing vertical constraints and required time of arrival in different congestion scenarios from the aircraft operator and ATM perspectives
- Complete evaluating DataComm for aircraft messaging for Required Time of Arrival (RTA), reroutes, and waypoint verification data integrity
- Evaluate ground merging and sequencing tools that will employ control by time of arrival (identify enabling requirements)
- Human factors analysis shifting to control by time of arrival through controller-in-the-loop simulations and field trials
- Analysis of human factors and flight deck automation requirements to minimize errors and provide integrity assurance
- Seek certification approval of initial TBO procedures/scenarios
- Draft Plan for limited implementation (includes new RNAV/RNP route requirements if needed)

j. Trajectory Mgmt - Reduced RVR Minima

- Analyses of all qualifying runways in NAS
- Single Thread Airports
- SA Cat II Service APs
- RVR1800

2. What Is This Program?

Flexible terminal airspace and airports encompasses the majority of the terminal operation areas and airports within the National Airspace System (NAS). It is anticipated that all high-density terminals and airports will be capable of flexible operations when demands warrant. At terminals and airports where traffic demand decreased from high-density to a lower density, the operations will "flex" or transition to lower density operations. Lower density operational requirements are not as stringent as high-density operations affording greater access to a wider class of users, while still maintaining equivalent levels of safety and efficiency. Both trajectory-based and classic operations may be conducted within flexible terminal and airports. It is anticipated that a significant number of airports will not change from their current operation.

Flexible Terminals and Airports include activities to improve both pilot and controller situational and the general use of Area Navigation/Required Navigation Performance (RNAV/RNP) routings. Operations within flexible terminal airspace and airports are a mix of Instrument Flight Rule/Visual Flight Rule (IFR/VFR) traffic with aircraft types ranging from airline transport to low-end general aviation. Airports in these areas are towered and non-towered, depending on the traffic demand. In the future, many of these airports will experience higher traffic demand due to a migration of air traffic to smaller satellite airports in high population areas in the effort to avoid traffic congestion. In addition, there is a renewed interest in personal transportation including the increase in personal aircraft for pleasure and business and the emergence of on-demand air taxi services utilizing very light jets (VLJs). The Flexible Terminal and Airports initiative will meet the requirements of both the high and non-high density terminals and airports. It is anticipated that some low density/low complexity (usually class C and D) airports will remain classic.

a. Wake Turbulence Mitigation for Departures (WTMD)

The WTMD decision support tool will enhance Air Traffic Organization (ATO) wake mitigation separation service capabilities. Air traffic control's (ATCs) wake turbulence mitigation procedures are a major constraint on the departure operations at airports which use their closely spaced parallel runways for departing Boeing 757 and "heavy" category aircraft. Presently, aircraft must wait a minimum of two minutes to depart after the departure of a Boeing 757 or "heavy" category aircraft on the adjacent closely spaced parallel runway and must wait a minimum of three minutes if the departure thresholds of the closely spaced parallel runways are staggered more than 500 feet. Wake research has shown that if a favorable cross wind is present, the wakes from aircraft departing on the downwind closely spaced parallel runway cannot transport over into the path of aircraft departing on the upwind closely spaced parallel runway. The WTMD decision support tool will provide tower controllers' notification when they can safely allow departures on an airport's closely spaced parallel runways without the mandatory two to three minute wait time following a Boeing 757 or "heavy" category aircraft departures on the adjacent runway.

The WTMD program is being accomplished in two phases. The first phase is developing an operationally mature WTMD prototype and installing it in the air traffic control towers (ATCTs) of George Bush Intercontinental/Houston Airport (IAH), Memphis International Airport (MEM) and San Francisco International Airport (SFO) for operational use and evaluation. The WTMD evaluations at the these airports will be completed in FY 2013 and based on its performance as an airport capacity enhanced tool, a decision will be made to further deploy the WTMD capability to the remaining seven candidate airports; which would be the second phase of the WTMD Program and is funded by this budget request.

b. Wake Turbulence Mitigation for Arrivals (WTMA)

This program will evaluate air traffic control decision support tool concept feasibility prototypes as possible enablers to safely meet the predicted NextGen demand for additional flights in the nation's air transportation system. If these prototypes are successful, more flights can be accommodated in airport approach corridors because the required wake mitigation separations between aircraft can be safely reduced. This program is taking the results of technology research and development and new wake separation concept modeling and simulation efforts; and, evaluating the resulting concept feasibility prototypes for flight safety and impact on the NAS capability for meeting the demand for more flights.

Evaluation of the prototype WTMA decision support tool, based on predicted and monitored winds along the approach corridor, will complete in FY 2013 and requirements for implementing the WTMA capability will be developed. The WTMA tool would be used by controllers in reducing wake separations imposed on aircraft following behind Boeing 757 or "heavy" category aircraft when landing on an airport's set of closely spaced parallel runways (runways less than 2,500 feet apart). Research is ongoing in Europe for developing a similar solution for aircraft landing directly behind each other on a single runway. An evaluation of that capability will be accomplished by this program in future years.

c. Surface/Tower/Terminal Systems Engineering (TFDM)

The primary goal of this activity is to provide engineering analyses, operational field evaluations and benefit assessments that will support Terminal NextGen capabilities. Concept engineering analysis of proposed Terminal Radar Approach Control (TRACON), Tower and Surface traffic management capabilities will be performed to determine which concepts are most beneficial to improve efficiencies, reduce controller workload, enhance situational awareness, to safely increase capacity, reduce traffic delays, lower costs and reduce impact on the surrounding environment. As a result, a new automation platform, Terminal Flight Data Manager (TFDM), will be introduced in the tower environment, integrating flight data, surveillance data, controller traffic manager decision support tools, data exchange with airports, airlines and traffic management, and consolidating existing tower equipment.

The expected outcome of these efforts will result in enhanced capabilities that provide more efficient, safer movement and control of air traffic in the Terminal domain. This will also ensure smoother transition into and out of the Terminal airspace in support of consolidation of airspace and provide guidance for implementing projects as part of the NextGen Concept of Operations.

In previous years, the enabling technologies/information was assessed and methods developed for gathering data, integrating information (i.e. Flight data, clearance (taxi/takeoff) information, surveillance information, user (aircraft/pilot/AOC/airport operators)) and receipt/acceptance of that data. Based on these capabilities, a series of decision support tools were identified. These tools, integrated into the TFDM platform, will enhance/optimize airport surface traffic management efficiency, mitigate risk of safety related incidents, and significantly improve the overall movement of air traffic in the Terminal environment.

d. Future Communications Infrastructure

The Future Communications Infrastructure contains communications projects in both the C and L bands. The C-band program of Future Communications is planning to evaluate selected mobile and fixed applications of the aeronautical mobile airport communications system (AeroMACS) communication network in the NASA-CLE airport test bed for future provisioning of both safety critical and advisory services. The program also plans to validate that the proposed AeroMACS can provide the required capabilities for a selected mobile application (e.g. loading FMS at the gate), and a fixed application (e.g. migration of point-to-point links to the AeroMACS). Other activities encompassed within the C-band communications include the following:

- Investigate the network capabilities required for the AeroMACS to comply with SWIM Oriented Architecture (SOA) requirements to support Net Centric applications
- Augment the C-Band channel plan for allocation of safety and regularity of flight services via the AeroMACS within the additional 30 MHz of AM(R)S spectrum to be proposed by the U.S
- Validate that the proposed AeroMACS complies with interference requirements for the US proposed additional 5,000-5,030 MHz band allocation
- Provide the interference models and data to support US position requesting additional AM(R)S spectrum at World Radio Communications Conference in 2012
- Conduct safety/certification analyses to support appropriate infrastructure implementation decisions by the FAA
- Support International Standards approval process at ICAO
- Investigate a Flexible Airborne Architecture Concept including a Software Defined Radio

The plans for L-Band Communications include collaboration with EUROCONTROL on technical assessment of L-DACS to ensure that proposed solutions meet potential US needs beyond the capabilities of the FAA's Data Communications program. L-Band also plans to establish an operational capability to characterize the performance of the L-DACS prototype and conduct services demos/trials. Lastly L-Band will develop recommendations for joint FAA/EUROCONTROL standards for L-DACS option for potential augmentation to future US en route air/ground communications capabilities.

e. Approaches, Ground Based Augmentation System

The Local Area Augmentation System (LAAS) is the United States implementation of internationally accepted standards for Ground Based Augmentation System (GBAS) Cat I (GAST-C) services. GBAS is intended as an alternative to ILS with multiple technical, operational, and maintenance advantages over ILS. GBAS is intended to augment the current Global Positioning System (GPS) service for Category I/II/III precision approaches. LAAS, however, was determined not to be a cost effective replacement for FAA Category I ILS. A GBAS CAT I design, the Honeywell SLS-4000 was subsequently approved in September 2009 as a non-Fed system for use within the NAS. While an SLS-4000 was being installed at Newark New Jersey, radio frequency interference (RFI) on GPS was encountered, preventing the operational use of this system as intended. Subsequently the FAA and GBAS vendor has deployed an upgraded version of SLS-4000 (Block I) at Newark to mitigate RFI caused by personal GPS jamming devices. The FAA is supporting system testing of the upgraded system at Newark with CAT I operational approval at Newark planned for summer 2012.

A CAT III SATNAV solution is still desired worldwide, and led to the development of ICAO standards for CAT III GBAS, which have been published and are in the validation phase. The CAT III GBAS was designed for CAT III from the start, with the CAT I system design and approval completed as a stepping stone toward CAT III approval. The FAA work being completed leverages the CAT I design and will be used to validate the ICAO GBAS CAT III requirements.

An FAA-owned SLS-4000 installed in Atlantic City International Airport (ACY) will continue to be used as an interim platform to develop and validate Category III requirements under this project. Support will be provided for non-Fed services providers at Newark NJ and Houston TX. Alternative architectures for potential development and procurement to provide future GNSS Category II/III services will be investigated during this work. Modifications will be investigated to produce a system that will operate with minimized interruption during periods of GPS interference.

The project goal is to support development of a commercial prototype of a CAT III GBAS capability for validation testing with an option of the vendor to seek a CAT III non-Fed approval using the developed baseline.

The Department of Defense (DoD) also plans to implement GBAS - Technology in their Joint Precision Approach and Landing System (JPALS) program. Civil interoperability is a "Key Performance Parameter" to this DoD system. The FAA will support DOD developments, facilitating technology transfer as applicable.

f. Closely Spaced Parallel Runway Operations

The Separation Management - Closely Spaced Parallel Runway Operations (CSPO) initiative will accelerate activities to provide increased arrival, departure and taxi operations to airports with closely spaced parallel runways in all weather conditions. This initiative will enhance procedures that allow dependent operations to closely spaced parallel runways or converging approaches to runways closer than 2,500 feet, as well as supporting independent operations to parallel runways between 2,500 feet and 4,300 feet.

g. Approaches, NextGen Navigation Initiatives

This program supports NextGen goals related to maintaining/improving capacity during instrument meteorological conditions (IMC), and focuses on improvements supporting both the terminal and approach phases of flight as well as improving situational awareness on the airport surface. There are two main program elements addressing each of these areas.

The first program element supports the use of Distance Measuring Equipment (DME) - DME area navigation (RNAV) down to 1,000 feet above ground level (AGL) without the need for an inertial reference unit (IRU). Implementation of performance-based navigation is a NextGen goal. The success of this work will allow fuller implementation of RNAV including aircraft other than air carriers and high end business jets. Current research and testing may lead to significant changes to the National Standard for DME usage within the United States, last updated in 1982. Today, to implement DME-DME RNAV requires the spectrum office to perform a case-by-case work on each runway to plan out expanded service volumes. The results of this work could allow each DME to have an expanded service volume over what is possible today, greatly enhancing the NAS capability. Research and testing is focused on determination of what technical issues are required to allow for DME-DME RNAV without IRU. Work with Systems Operations may lead to a better definition of airspace, with the potential to increase the airspace volume around certain airports.

The second program element is focused on improving situational awareness on the airport surface. Improving situational awareness for aircraft on the taxiways and runways will increase traffic flow and is also a NextGen goal. This program element will leverage the capabilities of existing systems to the extent possible and explore how new pilot-avionics interfaces may be used to deliver service to the cockpit. Systems to be leveraged include: Automatic Dependent Surveillance-Broadcast (ADS-B), Airport Surface Detection Equipment, Model X (ASDE-X), Global Positioning System (GPS) augmentation systems i.e. the Local Area Augmentation System (LAAS) and Wide Area Augmentation System (WAAS), and other systems providing RNAV and RNP. This program element will also coordinate with existing efforts by the surface movement working group.

h. Alternative Positioning, Navigation, and Timing (APNT)

Many of the NextGen operational improvements (OIs) depend on position, navigation, and timing (PNT) services to enable area navigation (RNAV), and required navigation performance (RNP). This means there is a greater dependence on GPS-based PNT. National Policy requires (National Policy HSPD-7/NSPD-39) that the FAA to provide a backup in the event of a Global Positioning System (GPS) interference event or outage to maintain safety and security and preclude significant economic impact.

Today's APNT consists of legacy VOR, DME, TACAN systems that will not fully support RNAV and RNP or TBOs. The NextGen APNT project will investigate three alternatives to provide a backup for GPS. It will investigate Enhanced DME, Wide Area Multilateration (WAM), and Pseudolites (PL).

i. Trajectory Management- Arrivals

The enablers for Trajectory Management which are - RNAV/RNP with 3D and Required Time of Arrival program will ensure that the safe and efficient transition of aircraft from en route to terminal airspace with appropriate sequencing and spacing. Several key mechanisms such as RNAV/RNP procedures with vertical constraints and required time of arrival will greatly improve the precision of the transition. Metered times at key merge points will be used by air traffic managers (as used today in Center-TRACON Automation System Traffic Management Advisory (CTAS TMA) systems. For this type of operation, an aircraft's meter point time (MPT) is assigned to determine when it enters into the TRACON airspace so it can be efficiently routed to the assigned runway. Metering will take into account runway load balancing and will serve to reduce (not eliminate) the need for delay absorption needed for aircraft inside the TRACON airspace.

As the FAA transitions to NextGen, aircraft will increasingly be assigned to RNP/RNAV routes and have modern avionics that include Flight Management Systems (FMS) capable of executing Required Time of Arrival (RTA) instructions. The RTA capability provides a time-based control mechanism that supports the trajectory-based operations concept. In particular, RTAs will be used for the management of arrival traffic to an airport. Time-based metering can be used for managing arrivals at an arrival-oriented waypoint (such waypoints could be established for top-of-descent, an arrival fix during the descent, or arrival at the runway threshold). The use of RTAs will take advantage of existing capabilities expected to become more widespread throughout the fleet. The FMS in the aircraft computes the most efficient change to the original trajectory to meet the RTA. In addition, the FMS can "independently self deliver" to the RTA, thus reducing significantly the coordination needed between the user and ATC. Finally, since the FMS actively and directly "controls" the aircraft to meet the RTA, very accurate arrival is possible with minimal human intervention.

j. Trajectory Management - Reduced RVR Minima

The NAS incurs numerous flight delays and schedule interruptions due to weather each year. Weather conditions create low visibility conditions that require Instrument Flight Rules (IFR) to go into effect. Even for those aircraft with suitably trained crew and equipage, conditions may worsen, causing flight diversion, flight cancellation, or flight delays -- each of which can result in a cascading ripple effect that can spread throughout the NAS, even to areas where weather is not an issue. There are periods of low visibility when the aircraft cannot takeoff or land at their desired airport resulting in the following conditions.

- Decreased numbers of arrivals/departures at high density airports
- Increased flight delays, cancellations, and/or diversions under IFR low visibility conditions
- Decreased capacity for airlines to schedule flights in marginal weather conditions (since both the primary and alternate routes must be approved within the flight plan)
- Decreased flexibility/potential congestion in the terminal environment
- Under-utilization of alternate airports (airlines have indicated they could use these more if the alternate airports had increased capability)

These problems can limit or prevent access to airports in IFR conditions, resulting in congestion and delay in the NAS. Even under Visual Flight Rules (VFR) access to airports and utilization of airspace can be made more flexible, particularly in the terminal environment. Therefore, lowering required RVR minima will improve capacity during low visibility operations by allowing runways that would otherwise be unusable to continue to support airport operations.

Benefits are related to increased access to airports in low visibility conditions for Category I, Category II, and Category III. This work is reflected in the Navigation Roadmap, a component of the FAA's Enterprise Architecture. It is also tracked as part of Operational Improvement (OI) 107119, Expanded Low Visibility Operations Using Lower RVR Minima. This work is part of the effort to bring improved capabilities through the prudent lowering of the RVR requirement by acknowledging benefits provided by cockpit equipment and crew training. Other benefits of Special Authorization Category II capability is increased continuity of service during unexpected outages. Additionally, provision of SA Category II can be achieved with great savings on the lighting systems (nominally $5-6 million per site if new systems are being put in). Navigation Services support is required when additional RVR work is required to support these operations at a specific runway. Navigation Services and Flight Standards are coordinating closely on these efforts.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Flexible terminal operations are a mix of IFR/VFR traffic with aircraft types ranging from airline transport to low-end general aviation. Airports in these areas are towered and non-towered, depending on the traffic demand. In the future, many of these airports will experience higher traffic demand due to a migration of air traffic to smaller satellite airports in high population areas in the effort to avoid traffic congestion. In addition, there is renewed interest in personal transportation including the increase in personal aircraft for pleasure and business and the emergence of on-demand air taxi services utilizing very light jets (VLJs).

Inflexible airspace structures, reservations and routes have resulted in the inefficient use of airspace and the airports themselves. The continuing growth of aircraft air and ground movement is projected to exceed the capacity of the system, causing serious delays and gridlock. This has required the need for improved terminal area management.

4. How Do You Know The Program Works?

The Flexible Terminal Environment encompasses the majority of the terminal operation areas and airports within the NAS. Since its beginning FLEX has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities that have and will continue to improve the overall operations within the NAS.

a. Wake Turbulence Mitigation for Departures

- Prototype of WTMD demonstration system completed at William J. Hughes Technical Center
- Deliver WTMD demonstration to first site (IAH)
- Deliver WTMD training package for controller to first site (IAH)
- Deliver WTMD demonstration to second site (SFO)
- Deliver WTMD demonstration to third site (MEM)

b. Wake Turbulence Mitigation for Arrivals

- Complete initial WTMA feasibility prototype evaluation using implementation on chosen simulated automation system
- Complete initial wake vortex analysis at selected airports (SFO, ATL, JFK) for WTMA study

c. Surface/Tower/Terminal Systems Engineering

- DFW Prototype Demonstrations
  - Successfully completed the DFW Prototype Demonstrations on Schedule in 2010-2011
  - TFDM Prototype Development transitioned from FFRDC to industry partner
- Second site Prototype Site Evaluation
  - IAD prototype Installation on track for 2012
- TFDM Initial Investment Decision (IID)
  - Received an Investment Analysis Readiness Decision (9/2010)
  - Established a positive cost/benefit Ratio
  - Currently on track for an IID in FY 2012
- Previous Research results
  - Completed Human In the Loop (HITL) simulations over multiple years
  - Technology transfer from Surface Trajectory-Based Ops FAA program
  - Additional Technology Transfer from NASA
  - Implemented similar technologies internationally

d. Future Communications Infrastructure

- AeroMACS Demonstration Performed
- AeroMACS Profile Developed
- AeroMACS Interference Analysis Conducted

e. Approaches, Ground Based Augmentation System

- Completion of Preliminary IARD artifacts
- Commercial CAT III Ground Prototype development
- CAT III Avionics Prototype development
- RFI-Robust Commercial CAT III Ground Prototype development
- GAST-D SARPS Validation
- GAST-D (CAT III) Non Fed System Design Approval (SDA)

- RFI Mitigation Investigation Airport Assessment
- SLS-4000 Block I Change Non Fed SDA
- Newark GBAS RFI Modification Report
- RFI Detection System Test Report: Newark
- Operational Approval at Newark
- Operational Approval at Houston

f. Closely Spaced Parallel Runway Operations
- Deliver RNAV/RNP (GPS) Interim Report
- Deliver WAAS/LAAS Interim Report
- Deliver SAT/NAV/ILS w/ HUR Interim Report
- Update Modeling and Simulation Toolset
- Deliver Triple/Quad Approach Interim Report
- Continue SAPA algorithm development
- Deliver SAPA interim report

g. NextGen Navigation Initiatives
- Special Authorization CAT II Business Plan
- Terminal RNAV DME-DME test and validation
- Surface Navigation Shortfall Analysis

h. Alternative Positioning, Navigation, and Timing (APNT)
- Program has not started

i. Trajectory Management – Arrivals
- RTA proof-of-concept Field Trial
- RTA Human in the Loop Simulation
- Conduct engineering and analysis necessary to support the development of the mid-term RTA capability
- AIR 4D TBO Gap Analysis and Recommended Changes

j. Trajectory Mgmt - Reduced RVR Minima
- Identified project demand for services

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$30,500,000 is required to continue the execution of work within the Flexibility in the Terminal Environment (FLEX) solution set. The FY 2013 work continues to cover activities to improve both pilot and controller situational and the general use of RNAV/RNP routings. With a reduction in funding the Flexible Terminal and Airports initiative will not meet the requirements of both the high and non-high density terminals and airports in the future.

This funding is required to fulfill FAA NSIP commitments made in response to RTCA Task Force 5 recommendations pertaining to Surface data sharing and automation, and will reduce risk to the acquisition of the Terminal Flight Data Manager (TFDM) system, an ACAT 1 acquisition identified on the FAA's NAS Enterprise Architecture (EA) automation roadmap.

The requested funding is intended to support operational demonstration of key TFDM data sharing and Air Traffic Control (ATC) Decision Support Tools (DSTs) capabilities, as identified in the following RTCA TF5 recommendations:

- #43/38 (AP3) 2012-2014 Work with the Surface Collaborative Decision Making Team and the Tower Flight Data Manager development team to define interoperability standards for surface operational data exchange.
- #43/38 (AP4) 2013-2015 Conduct interoperability testing between FAA and Flight Operations Centers
- #43/38 (AP5) 2014-2016 Execute field implementation of surface operation data sharing
- #41 (AP1) 2010-2014 Leverage existing R&D activities and development plans to field integrated airport surface standards, processes and Decision Support Tools by 2018

Detailed Justification for - **1A13 Next Generation Air Transportation System (NextGen) – System Networked Facilities (FAC)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – System Networked Facilities (FAC)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
System Networked Facilities	$23,340	$5,000	$11,000	+$6,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Integration, Development and Operations Analysis	---	$3,000.0
2. Test Bed/Demonstration Sites	---	8,000.0
Total	Various	$11,000.0

For FY 2013, $11,000,000 is requested to provide for the following:

a. Integration Development and Operations Analysis Capability
- NextGen Integration and Evaluation Capability (NIEC) upgrades and enhancements
- Modifications for NextGen R&D projects
- NIEC operations, maintenance, and engineering
- Modification and Implementation Plan for NIEC

b. Test Bed/Demonstration Sites
- Enable Remote Connectivity to Partner Sites
- Test Bed Capability Expansion Strategy
- Test Bed System and Facility Enhancements and Tech Refresh
- Test Bed Operation, Maintenance & Engineering

2. What Is This Program?

NextGen introduces evolutionary and revolutionary concepts of operation and new technologies into the air traffic system. As a result of this, implementation of NextGen requires extensive work in the area of early evaluations, concept development, and/or demonstration in a real-time environment without being encumbered by the fidelity of the NAS infrastructure. NextGen System Networked Facilities includes multi-discipline laboratories and test beds to support NextGen requirements development and risk-mitigation efforts.

DOT Strategic Goal – Economic Competitiveness
- Maximize economic returns on transportation policies and investments.

a. Integration, Development, and Operations Analysis Capability (NIEC)
This program continues the integration, development, and operations analysis capability to provide a real-time and flexible environment for the development and validation of the broad framework of concepts, technologies, and systems introduced by NextGen. It provides for the ongoing conduct of early evaluations,

concept development, and/or demonstrations in a flexible, real-time NextGen integrated environment that is unencumbered by the NAS infrastructure. It also provides the capability for these activities to be developed and validated in parallel to ongoing NAS activities and research. The program enables the FAA to assess technologies and mature concepts in an integrated environment that supports medium to high fidelity exercises. The integration, development, and operations analysis capability uses a rapid prototyping environment that interfaces with a high-fidelity capability in a controlled environment. The operations analysis capability emulates information flow and system performance characteristics, and is adaptable to illustrate and assess NextGen human-machine-interface concepts. An ongoing capability is required to conduct early concept validation and maturation, alternatives analyses, and requirements development.

For FY 2013, the program will continue the development of the integration, development, and operations analysis capability. It will integrate systems required to support human-machine studies. The operations analysis capability will provide an infrastructure required to evaluate concepts and alternatives. The capability will measure and validate human performance, usability, workload, and safety indications in a flexible integrated environment supporting the design and conduct of experiments. The program will include the development and validation of system prototypes and system analyses capabilities to define requirements while researching candidate solutions. The program will provide additional software development and system integration to enhance capabilities. As capabilities are integrated, processes will be developed for the operations and maintenance of the operations analysis capability.

b. Test Bed/Demonstration Sites

The demonstrations at the NextGen Test Bed/Demonstration Sites are envisioned to facilitate development and implementation of NextGen. NextGen procedures and technologies are intended to transform air transportation by the year 2025. These new procedures and technologies are associated with solution sets and capabilities, which include:

- High Density Airports
- Networked Facilities
- Reduced Weather Impact
- Collaborative Air Traffic Management (ATM)
- Flexible Terminal and Airspace
- Safety, Security, Environment
- UAS NAS Interoperability
- New emerging technologies, as they are developed, will be tested and demonstrated to allow the FAA to meet the NextGen mid-term goals and objectives

Established as a scalable, expandable, cost-effective and repeatable process and architecture, the Test Bed sites are envisioned as a single thread or non-redundant automation, communications, and display system and facilities for the surface, terminal, en route and oceanic domains that mirror the current NAS and enable the transition toward NextGen.

During FY 2013, this Test Bed/Demonstration Site program will continue building upon the infrastructure and systems established in prior years. More specifically, the Florida NextGen Test Bed, located at the Daytona Beach International Airport (DAB) in Florida, will be enabled to interact with other key sites, including NASA NTX, located near the Dallas/Fort Worth Airport (DFW), and WJHTC located near Atlantic City, NJ. Also in FY 2013, the Test Bed/Demonstration Sites are envisioned to be established as key nodes on the FAA's R&D Domain that enables controlled information sharing among NextGen stakeholders and partners. This activity will enable direct industry participation to facilitate industry innovation and collaboration, and allow for increased government – industry partnership on the road to NextGen.

3. Why Is This Particular Program Necessary?

Today's air traffic system was built around 1960's radar technology and is constrained by its limitations. This geo-dependent model (communication constraints, hardware/software limitations, and available data distribution capabilities) dictated how many facilities were needed and their location. As a result of these limitations, the number of terminal and en route air traffic control facilities has grown to over 500. Security concerns, including location-based risks, distributed infrastructure constrained by legacy architecture, and disparate automation platforms, further challenge the air traffic control infrastructure. This results in operational inefficiencies, including capacity limitations and less than optimal business continuity planning (BCP) strategies. In addition, many of these facilities have aged to the point where repair and remediation would be financially unsound.

NextGen facilities must handle increased traffic in the future while managing costs, improving and expanding services, and transforming FAA en route and terminal facilities to facilitate NextGen operational improvements. The current system has built-in limitations in flexibility, cost of service delivery, and continuity of operations. Some smaller airports have limited service due to cost of service; creating a need to increase service in these locations, while reducing costs.

4. How Do You Know The Program Works?

Networked Facilities (FAC) encompasses the majority of the terminal operation areas and airports within the NAS. Since its beginning FAC has made great progress expediting the integration of new technologies within these domains. Below are examples of such successes and planned activities, which have and will begin to improve the overall operations within the NAS.

a. Facilities Integration, Development, and Operations Analysis

- Initiate the integration of SWIM Segment 1
- Automate and synchronize NIEC Audio and Video recording capability
- Improve laboratory capabilities and integrate new tools and systems to support Phase 1.75 and Phase 2 of the SNT Study

b. Test Bed/Demonstration Sites

- Completed a Near-Term Florida Test Bed Strategy
- Completed Florida Test Bed Segment 1 Initial Operating Capability (IOC)
- Provide additional Florida Test Bed Infrastructure to enhance demonstration capabilities
- Connect to 1st Regional Location
- Provide Florida Test Bed Facility Development and Quality Control Plan

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$11,000,000 is required to continue work within the Networked Facilities solution set. The FY 2013 work will maintain focusing on delivering an infrastructure that supports the transformation of air navigation service delivery unencumbered by legacy constraints. With a reduction in funding Networked facilities will not be able to provide for expanded services; service continuity; and optimal deployment and training of the workforce.

Detailed Justification for - 1A14 Next Generation Air Transportation System (NextGen) Future Facilities Investment Planning

What Do I Need To Know Before Reading This Justification?

- The NextGen Future Facilities program office obtained its Segment 1 Initial Investment Decision (IID) on November 16, 2011. Segment 1 Project 1 Final Investment Decision (FID) is expected in the first quarter FY 2013.
- The program has been engaged with National Air Traffic Controllers Association (NATCA) and Professional Aviation Safely Specialists (PASS) representatives in evaluating alternatives and eliciting requirements. Union representatives are fully engaged in the overall planning of the program.
- FY 2013 is the first year this program is requesting funding other than planning. The FAA has accepted the recommendations of OST, OMB, IG, and GAO and formed an executable program plan where the first project can begin by the end of FY 2013.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Future Facilities Investment Planning
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Future Facilities Investment Planning	$0	$15,000	$95,000	+$80,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Business Case Decision Activities/Products – Segment 1 Planning	---	$3,300.0
2. Program Management, System Engineering	---	21,500.0
3. Site Selection and Acquisition	---	19,000.0
4. Construction Contract Award/Long Lead Items	---	51,200.0
Total	Various	$95,000.0

For FY 2013, $95,000,000 is requested to cover critical pre-construction contract award activities for Segment 1 Project 1 Integrated Control Facility (ICF), designated as the Liberty Integrated Control Facility (ICF), and to prepare for construction contract award in FY 2014. $43,800,000 of this request will cover continuous Segment 1 planning, engineering, design, site evaluation, site selection, land acquisition, and environmental assessment for Liberty ICF in FY 2013. $51,200,000 of this request will be available for the construction contract award depending upon the size or phasing of the project.

2. What Is This Program?

NextGen Future Facilities Investment Planning

The NextGen Future Facilities program is responsible for defining FAA's long-term strategy and approach to facility and service transformation. The program's charter and activities are aligned to the goals of the Air Traffic Organization (ATO), the Federal Aviation Administration (FAA), Department of Transportation (DOT) and pending FAA Reauthorization language germane to FAA facilities.

The NextGen Future Facilities program seeks to upgrade and transform air traffic control facilities and sites to make them flexible, scalable, and maintainable. It focuses on delivering an infrastructure that supports the transformation of air navigation service delivery unencumbered by legacy constraints. NextGen transforms the national air transportation system by establishing enhanced and expanded services through new technologies, policies, procedures, and methods of operation to meet future demand and avoid gridlock in the sky and at the airports. This includes the allocation of staffing and facilities to provide expanded services; service continuity; best deployment, management, and training of the workforce; and the use of more cost-effective and flexible systems for information sharing and back-up. Air traffic facility optimization is essential. The future facilities will enable operational improvements by optimizing the use of NextGen technologies and capabilities, facilitating cultural integration across the FAA and rightsizing the scope and number of facilities.

The overall NextGen program will redesign the air traffic control systems and break down the geographical boundaries that characterize air traffic control and lead to a more seamless view of traffic, organized not by geographically oriented sectors, but by aircraft trajectories. Infrastructure, automation, equipage, procedures, and regulations are designed to support this seamless operational concept and must evolve from a geographical focus to a broader air traffic management concept. Since requirements for facilities are no longer geo-dependent and do not define proximity of air navigation services to the air traffic being managed, facilities will be sited and occupied to provide for more efficient air traffic management facility operations. This may include integrating several facilities (e.g., air route traffic control centers (ARTCCs) and terminal radar approach control (TRACONs) within a single facility.

The program office will coordinate with other agency initiatives to evaluate alternatives for new facilities as well as alternatives for retrofitting existing facilities. The program office will develop business cases for construction of new facilities and/or retrofit existing facilities, and create transition and implementation plans. The program office will design FAA facilities that meet the needs of the future and leverage technologically advanced NextGen capabilities. The program has been structured to achieve this transformation in multiple segments, with several projects (facilities) planned within each segment.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The NextGen Future Facilities program will deliver a facilities infrastructure that supports increased traffic in the future while managing costs, improving and expanding services, and transforming FAA en route and terminal facilities to facilitate NextGen operational improvements. The current system has built-in limitations in flexibility, cost of service delivery, and continuity of operations.

The scope of the program includes 20 En Route centers (largest FAA facilities), which house hundreds of employees and equipment to control aircraft flying in the En Route airspace; and 155 TRACON facilities that control traffic departing and arriving at airports. Security concerns, including location-based risks, distributed infrastructure constrained by legacy architecture, and disparate automation platforms, challenge the air traffic control infrastructure. This results in operational inefficiencies, including capacity limitations and less than optimal business continuity plans. In addition, many of the FAA's air traffic control facilities have exceeded their useful lives and their physical condition continues to deteriorate. Although the FAA has made significant strides to reduce the maintenance backlog, the agency needs a comprehensive strategy to drive decisions regarding facility and infrastructure improvements.

A recent DOT Inspector General Report titled "FAA's Management and Maintenance of Air Traffic Control Facilities," Report Number AV-2009-12, and dated December 15, 2008, cited 59 percent of the current U.S. air traffic control facilities exceeding 30 years of age.

The NextGen Future Facilities program supports the optimization of FAA's air traffic service provider resources. It considers infrastructure alternatives and associated benefits such as that of a geo-independent service delivery model to optimize air traffic service, improve workforce security, and ensure continuity of service. Future facilities will provide for increased cost effectiveness through better matching of assets to demand and reduce the need for local surge buffers in personnel and equipment. Additional benefits include the following:

- Air traffic control environments that support NextGen operational changes
- Business continuity is built into the system and provides for a more resilient infrastructure, better contingency operations, and a higher degree of service
- Seamless information exchange that increases flexibility and air navigation service provider (ANSP) agility to respond to demand
- Improved work environment and increased opportunity for career progression
- Reduced time and cost to train controllers and other ANSP personnel
- Facilities that meet Department of Homeland Security guidelines
- Reduced overall air traffic service provider costs while increasing the level of service
- Cost-effective management of air traffic facilities

4. How Do You Know The Program Works?

The NextGen Future Facilities program is developing a comprehensive process for planning, designing and implementing facility transformations within each of the proposed six segments. Each segment will be managed as a portfolio of programmatic and operational decisions aligned to optimize our service delivery model. Transition risk management will be a paramount concern in this approach. In addition, the segmented approach will help mitigate operational, budgetary, technical, political, and economic risks, as lessons learned from implementation of earlier segments will be applied to later segments. This approach is consistent with the rigorous analysis that large transformational programs of this magnitude deserve and aligned with the US Government requirement for capital investment plans.

For the Initial Investment Decision (IID) on November 16, 2011, the NextGen Future Facilities program submitted its initial benefits findings to the JRC. The identified benefits included cost avoidance, operational benefits and qualitative benefits. The most substantial component of the operational benefits story centers upon the airspace redesign effort in the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area.

In September 2007, the FAA issued a final decision to approve the project to redesign the airspace in the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area. The FAA selected the Environmental Impact Statement (EIS) mitigated Preferred Alternative, known as the Integrated Airspace Alternative with Integrated Control Complex (ICC). The selected project would consolidate many sectors of airspace under one facility. The ICC uses of the three nautical mile separation criteria for flights in terminal airspace rather than the standard five-mile criteria for en route airspace over a larger geographic area and up to 23,000 feet above mean sea level in some areas.

The basic Integrated Airspace alternative combines the New York TRACON airspace with portions of the surrounding ARTCC airspace. The EIS stated that the Integrated Airspace Alternative could be accomplished either with existing standalone facilities or in a consolidated facility. The key component of the Integrated Airspace alternative was the use of a common automation platform. Using existing facilities, airspace would be reallocated among the facilities in order to facilitate a more seamless operation. At the time the Airspace Redesign project issued its Record of Decision (ROD), the FAA had not yet specifically defined what an ICC concept would entail. In October 2011, the FAA defined an ICC as a single ICF that would be capable of housing the air traffic controller positions required to optimally implement NY/NJ/PHL Metropolitan Area Airspace Redesign and enhance the operational benefits.

The delay savings used in the EIS for the project were developed from detailed fast time simulation modeling using the Jeppesen Total Airspace and Airfield Model (TAAM). The TAAM modeling was done for all the alternatives, including the Integrated Airspace Alternative, that were considered as part of this environmental review. The TAAM modeling provided a detailed report that factored in many of the variables responsible for airspace delay. These benefits for using an ICC were computed from the EIS.

The new state-of-the-art ICF and integrated airspace will deliver benefits to the aviation industry, taxpayers, and local communities through:

- Reducing delays and delivering over $133 million of annual savings to airspace users
- Enhancing service and business continuity in the event of natural and man-made disasters
- Reducing lifetime infrastructure sustainment costs
- Decreasing costs of implementing future technologies in the field
- Addressing the requirement for TRACON replacement in PHL due to construction of a new runway
- Providing a platform for optimization of the NY/NJ/PHL Airspace Redesign Record of Decision

During Final Investment Decision (FID), the program office will develop analyses that will determine the operationally-preferred boundary for the Liberty Integrated Control Complex (ICF), the core volume of airspace to be housed in the new ICF. Within a single facility, controllers have many venues to coordinate their activities. Controllers can use voice communication, data entries in the automation system and/or face-to-face conversation. Maximum efficiency results from these types of intra-facility coordination. Coordination by controllers between facilities does not have as many coordination venues available to them. Inter-facility coordination requires some form of electronic/voice communication, which have multiple points of failure. Safeguards against these types of system failures are created in the form of letters of agreement (LOA). These LOAs specify rigid procedural restrictions between facilities. Exceptions to procedural restrictions can be negotiated on a case by case, but in some instances this may take more time to coordinate than the flights will spend under the control of the facility. Flow management between facilities is generally done strategically, with spacing restrictions put in place for proscribed lengths of time.

Segment 1 Project 1 will optimize the implementation of the New York/New Jersey/Philadelphia airspace, and therefore, the benefits from this effort, as detailed in the NextGen Integrated Basis of Estimate dated November 2011. These benefits are derived solely from Project 1 for the purpose of this analysis and will be refined for each additional project in subsequent final investment analyses.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The FAA is facing significant budget constraints in the F&E capital budget.

Any reduction in the required funding will result in further delay in the realization of FAA's goals for facility improvements. Funding at the required level will allow the continued improvement of work conditions for FAA employees, and the realization of critical infrastructure investments to enable the realization of NextGen benefits. Funding reductions will adversely affect the investment interdependencies of the FAA portfolio and its ability to meet the goal to align NextGen operational capabilities with facilities requirements, and ensure the safe transition between legacy and future services as stated in the FAA's NextGen Implementation Plan (March 2011.)

Detailed Justification for - **1A15 NextGen Performance Based Navigation (PBN) – Optimization of Airspace and Procedures for Metroplexes (OAPM)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen Performance Based Navigation (PBN) – Optimization of Airspace and Procedures for Metroplexes (OAPM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
NextGen Performance Based Navigation (PBN)- Metropex Area Navigation (RNAV)/Required Navigation Performance (RNP)	$0	$29,200	$36,200	+$7,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Optimization of Airspace and Procedures for Metroplexes (OAPM)	---	$19,500.0
2. NextGen Safety	---	6,700.0
3. Navigation Procedures Implementation Plan (NAV Lean)	---	10,000.0
Total	Various	$36,200.0

For FY 2013, $36,200,000 is requested to provide for the following:

- Complete analysis and studies, through established OAPM Study Team processes, at two Metroplex locations (Chicago and Phoenix) focusing on expedited integrated PBN procedure development coupled with airspace design to optimize benefits.
- Based on the output of the earlier analysis and study stage, begin OAPM design work at four Metroplex locations (Southern California, Florida, Chicago, and Phoenix)
- Begin OAPM pre-implementation/evaluation activities at three Metroplex locations (DC, Northern Texas, and Houston)
- Provide Safety Analysis, simulations, environmental evaluations and policy development to support Performance Based Navigation development and initiation of implementation by the end of the fiscal year
- Improve and streamline all processes used to request, prioritize, develop and implement instrument flight procedures (IFP). This initiative, known as the *Navigation Procedures Implementation Plan (*NAV Lean), will accelerate OPAM projects and NextGen by improving efficiency and production time for all IFPs.

a. Optimization of Airspace and Procedures for Metroplexes (OAPM)

Funds will be used to continue implementation of OAPM deliverables in the Metroplex that were recommended by the RTCA Task Force 5. In response to RTCA's recommendations, funds will be used to conduct studies to compile and assess data from select sites. Using the results of these studies, Design and Implementation Teams will integrate airspace and procedure design to optimize operations at select Metroplex sites based on the information provided by the studies. OAPM work also includes procedural design and implementation in the high altitude structure to improve Metroplex ingress/egress to and from a given site as well as efficiency between sites.

b. NextGen Safety

With optimized airspace and procedures, additional safety analysis will need to be performed. All changes to the National Airspace System (NAS) require safety analyses and documentation. Funding will be used to increase efficiency in the NAS by developing guidance material such as Orders, Notices, and Advisory Circulars. The guidance material will provide industry and Aviation Safety (AVS) field offices information to safely implement/certify new technologies and develop more efficient flight procedures, improving safe operation within the NAS. The funding will update standards to better accommodate modern aircraft capabilities. Training material will be developed to transition the program to operations oversight. This will include course development, video production, maintenance, and course implementation. Funding in FY13 will provide safety risk analysis and studies, flight simulation and data collection. Using the information from the data collection and analysis, updates to PBN instrument flight procedure criteria and guidance materials will begin, with estimated completion by 2015.

c. Navigation Procedures Implementation Plan (NAV Lean)

The Navigation Procedures Implementation Plan (NAV Lean) was published in June, 2011, in response to the Navigation (NAV) Procedures Project Final Report, September 2010, containing 21 recommendations to streamline the IFP development process. Funding will facilitate implementation of the recommendations to include a streamlined version of the current core process (request, design and development, approval, implementation, and maintenance). It will also explain the intersection of auxiliary processes, such as Safety Management System (SMS), environmental, and operational approval. The process will be better managed by having all IFP requests submitted through an authorized Web-based portal established as the entry point into a system for processing, tracking, and managing the IFP development life cycle. This will be accomplished by consolidating/ upgrading the current databases and amending the current policies and guidance.

The NAV Lean recommendations and specific activities that will be funded include:

- Recommendation 1: Amend policy to allow expedited processing and clear definition of minor revisions to IFPs.
- Recommendation 5: Establish standardized databases with custodianship and data stewards.
- Recommendation 6: Provide access to, and mandate use of, a single set of data for all IFP providers.
- Recommendation 7: Allow electronic transfer of data.
- Recommendation 8: Standardize software and data formats.
- Recommendation 18: Establish and implement a Web-based request and access portal for IFPs.
- Recommendation 20: Develop an outreach/communication plan to educate users on use of IFP portal.
- Recommendation 21: Establish a Web-based Operations Approval entry portal and a Web-based work package to accommodate the needs of LOBs.

2. What Is This Program?

The Airspace Optimization Group will integrate airspace design and associated activities, including traffic flow analysis and facilitated design and procedures optimization. This will lay the framework for accelerating PBN initiatives, taking a systems approach for airspace design and procedure implementation. Airspace and procedure integration provides an important systems view that: utilizes additional transition access/egress points not tied to ground-based navigation aids; considers concurrent development and implementation of arrivals and departures, ensuring an integrated approach to procedural optimization; decouples operations between primary and secondary/satellite airports serviced by complex terminal airspace; and develops high altitude routes through congested airspace better connecting major metropolitan areas. Implementation of RNAV and RNP routes and procedures will continue to address the RTCA Task Force 5 recommendations, maximizing benefits, and accelerating NextGen concepts.

Airspace redesign and procedure development will be accomplished with a Metroplex focus, targeting specific Metroplex areas that have been designated as high priority using quantitative and qualitative metrics. Results from Study Teams will be used to implement those improvements yielding the highest benefits and lead to design work that will include analyses and simulations, assessments of alternatives, and modeling of projected airspace and procedures benefits.

The program integrates the safety requirements, through all phases of implementation, to ensure successful implementation.

NAV Lean will allow participants in the process to obtain up-to-date information concerning an IFP status, exchange information with other system users, and will provide an archive function and audit trail. This system will also serve as a gateway to the consolidated databases required for IFP design and development, applicable publications, and forms and templates. Consolidation and standardization of the databases will provide improved data integrity and improved process management. Use of this system will facilitate early screening of requests to ensure completeness and prioritization of requests, and will provide transparency for users. It will also promote and ensure that safety, airspace, operational approval, and environmental aspects are all considered early in the process. Use of this common portal will also facilitate the early recognition of potential requirements for new or modified criteria.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments

3. Why Is This Particular Program Necessary?

Optimization of Airspace and Procedures facilitates an operationally integrated view of NextGen implementation. The OAPM will expedite delivery of key efficiencies for the nation's busiest metropolitan areas. OAPM will help to address the major operational issues faced in today's Metroplexes: flow congestion, inefficient routing and altitudes, airports in close geographical proximity, and other limiting factors such as environmental constraints. Through OAPM, we are implementing new routes and procedures that leverage emerging aircraft navigation capabilities, including PBN, and redesigning airspace to improve flight efficiency. The implementation of these procedures includes the safety oversight of the procedures themselves, and the approval of aircraft and operators to conduct these procedures.

NAV Lean Implementation of the future IFP process is expected to significantly reduce the average time required to implement IFPs and will position the FAA to meet the increased demand for instrument flight procedures that are the cornerstone for NextGen. Achieving this optimal future process and all of its benefits will require full implementation of all recommendations.

4. How Do You Know This Program Works?

In September of 2010, the FAA initiated two "prototype" study teams for the Washington, DC and North Texas metropolitan areas. Those prototype study teams were used to exercise the study team approach and provide lessons learned to be considered as the full initiative begins in early 2011. Leveraging the study team approach at those two sites, the Optimization of Airspace and Procedures for Metroplexes initiative is expected to be a multi-year activity that will have addressed twenty-one metroplex areas when completed.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$36,200,000 is requested to fund key operational efforts that serve as the foundation to the transition to NextGen. Funding will allow for expedited development and implementation of PBN procedures. A reduction in the requested level of funding will slow down the delivery of these necessary procedures, thereby slowing implementation of NextGen capabilities at a number of high priority Metroplexes. It will also reduce the FAA's ability to process aircraft and operator applications to conduct PBN operations, resulting in delays in applications and deferred benefits.

Funding for NAV Lean is required at the specified levels to ensure full implementation in a timely manner. Full implementation is imperative to fulfill expectations of FAA stakeholders. Recommendations include a streamlined version of the current core process (request, design and development, approval, implementation and maintenance); auxiliary processes (Safety Management System (SMS), environmental and operational approval); and data base consolidation (inability to electronically transfer data efficiently).

The overall process will be better managed by having all Instrument Flight Procedure (IFP) requests submitted through an authorized Web-based portal established as the entry point into a system for processing, tracking and managing the IFP development life cycle.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 32a, 29 Metroplex

- Deliver one Design and Procedure proposal

Detailed Justification for - 2A02 En Route Automation Modernization (ERAM) - D-Position Upgrade and System Enhancements

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – ERAM D-Position Upgrade and System Enhancements
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
ERAM D-Position Upgrade and System Enhancements	$4,990	$0	$10,000	+$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Program Management and Data Position Upgrade	---	$10,000.0

For FY 2013, $10,000,000 is requested for ERAM D-Position Upgrade and System Enhancements. With this funding, initial system engineering of the D-Position Upgrade will commence. Specific ERAM D-Position Upgrade and System Enhancements capabilities include: system engineering for the hardware and operating system changes for the D-position upgrade; system engineering for the software development for the initial D-Position Computer Human Interface (CHI) redesign and new display views; and procurement of new D-Position hardware for development labs. After completion of the system engineering, the D-Position upgrade activities will span three years for initial capability development through contractor testing.

2. What Is The Program?

The ERAM D-Position Upgrade and System Enhancements Work Package effort is shown on the Enterprise Architecture National Airspace System (NAS) Automation Infrastructure roadmap between the "ERAM Program Baseline" and the future evolutionary enhancements of the "En Route Automation NextGen Mid-Term Work Package." The ERAM D-Position Upgrade and System Enhancements effort will increase efficiency and add capacity benefits over those established by the baseline ERAM program. It will also build the foundation for incorporating NextGen technologies that mature during the ERAM D-Position Upgrade and System Enhancements timeframe.

The ERAM program baseline includes three releases. ERAM Release 1 contains the capabilities and performance required for acceptable operational suitability and effectiveness. ERAM Releases 2 and 3 contain maintenance upgrade software releases. Releases 2 and 3 will also begin to incorporate NextGen transformational program infrastructure into ERAM including Automatic Dependent Surveillance – Broadcast (ADS-B) and infrastructure capabilities of Segment 1 of the System Wide Information Management (SWIM) that are consistent with ERAM architecture.

ERAM Release 4 is not included in this program as it is externally funded by other NAS programs for new functionality and by ERAM baseline for operational (maintenance) software fixes.

This program upgrades the D-side displays, associated CHI, and associated processors at all Air Route Traffic Control Centers (ARTCCs) which currently are near maximum capacity both in viewable area as well as processing ability. System engineering will be accomplished in FY 2012 and FY 2013 with software development and hardware purchases starting in FY 2014; deployment is planned for FY 2015 and FY 2016 to be completed in calendar year 2016. Software enhancements such as non-radar control will be accomplished in FY 2015 and FY 2016. This program includes ERAM software release 5 and release 6. This ERAM D-Position Upgrade and System Enhancements program supports

- Implementation of functional capabilities and performance enhancements for improved operational efficiency and Air Traffic system performance. These improvements may complement NextGen initiatives, but they are also uniquely critical to ERAM
- Hardware replacement and associated software to increase the D-Position display size and increase processing capacity. These performance enhancements are necessary because the hardware will reach utilization thresholds due to the cumulative effects of adding ERAM D-Position Upgrade and System Enhancements, DataComm and ADS-B requirements

The ERAM D-Position Upgrade and System Enhancements program effort began in FY 2011 with AMS documentation and planning to support a Final Investment Decision and initial system engineering tasks associated with scoping and defining the software release projections, and work on the initial hardware performance upgrade implementation planning. In addition, the program will undergo acquisition and investment analysis review in FY 2013.

Other programs will fund ERAM capabilities for implementation during the ERAM D-Position Upgrade and System Enhancements development timeline. Costs for those efforts are not included in this baseline program, although the planning for each of the ERAM D-Position Upgrade and System Enhancements software releases allows for necessary software development bandwidth to accommodate externally funded requirements. This program does not duplicate any efforts budgeted and documented in other programs' Capital Investment Plans (CIPs).

Software development and implementation begins in 2014 and completes in 2019. Hardware upgrades start in 2014 with the initial hardware engineering for the D-Position infrastructure upgrade. The benefits of the ERAM D-Position Upgrade and System Enhancements initial increment will be justified by a business case analysis. This activity is expected to be completed by 2013.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The ERAM system is the foundation of the FAA air traffic control (ATC) environment. The system receives processes, coordinates, distributes, and tracks information on aircraft movement throughout the domestic and international airspace. The ERAM system is the key to the FAA's ability to implement new services, concepts, and traffic flows to users.

Current requirements documents addresses the supportability of En route and Oceanic facilities and the architecture needed to support projected air traffic growth. They incorporate sustainment and enhancement activity that reflects the FAA goals and objectives in the mission areas of safety, capacity, security, industry vitality and efficiency, and FAA business practices and productivity. They also address inefficiencies in the current systems that impacts FAA's mission in these areas.

Many of these inefficiencies are being corrected under the initial ERAM acquisition baseline, which focused on consolidating existing legacy capabilities on a modern platform upon which enhancements could be built. The ERAM D-Position Upgrade and System Enhancements program will address many of these enhancements and some new opportunities.

As traffic levels and the need to allow more fuel efficient flight profiles increase, the Air Traffic Controllers' ability to maintain safe separation becomes a limiting factor, often resulting in the imposition of airspace structure and traffic restrictions that limit airspace capacity utilization. There is a need to provide new and enhanced automation assistance in the NAS in order for Air Traffic personnel to handle traffic growth without increasing restrictions and delays.

In addition to the need to handle increasing traffic levels, there is a need to address deficiencies in existing ATC automation functions. These identified operational deficiencies and shortfalls include:

- Increased information requirements at the Radar Associate position
- Automation deficiencies that exist in providing separation services including

- Unacceptable levels of missed and false alerts from tactical and strategic conflict alerting functions
- Inability to take full advantage of aircraft performance-based navigation
- Insufficient coordination of tactical and strategic information among controllers
- Priority "extensible" requirements identified in the ERAM baseline requirements document that will not be completed when the baseline development efforts end in 2011

4. How Do You Know The Program Works?

ERAM D-Position Upgrade and System Enhancements is a new program baseline. It will build upon the deployed ERAM baseline to harness ERAM's full potential for operational effectiveness. Many of these capabilities have been prototyped in the research and development pipeline prior to being included in the ERAM D-Position Upgrade and System Enhancements baseline. These improvements may complement NextGen initiatives, but they are also uniquely critical to ERAM.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The ERAM system will be operational at all 20 CONUS Air Route Traffic Control Centers (ARTCCs) by FY 2014. However, once operational, a program is needed to implement En Route driven capability improvements to the ERAM baseline. Lack of enhanced automation assistance in ERAM will impact the ability of Air Traffic personnel to handle traffic growth without increasing restrictions and delays. In addition, current ERAM infrastructure will not fully accommodate an interface and/or integration with other FAA Enterprise Architecture elements (Data Communications, Aeronautical Information Management, System Wide Information Management, Tower Flight Data Manager, Traffic Flow Management, International, Oceanic, and Weather). The ERAM D-Position Upgrade and System Enhancements program is intended to bridge the gap between final implementation of the base ERAM program and the introduction of new capabilities under a NextGen Mid-Term acquisition baseline.

Beginning in FY 2013, ERAM will upgrade the controller Radar Associate (Data Position) infrastructure needed to implement other NAS program technologies. It will lay the foundation for implementation of NextGen capabilities, implement En Route enhancements that will address the deficiencies described above, and address the priority requirements not implemented in the base ERAM program.

Detailed Justification for - 2A12 System-Wide Information Management (SWIM)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – System-Wide Information Management (SWIM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
System-Wide Information Management (SWIM)	$89,121	$66,350	$57,200	-$9,150

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Segment 1:		
1. Traffic Flow Management Data Publication	---	$2,900.0
2. Terminal Data Distribution System Publication	---	4,300.0
3. SWIM Core Services	---	13,100.0
4. Flight Data Publication Service	---	12,700.0
5. Independent Operational Test and Evaluation (IOT&E)	---	200.0
Total	Various	$33,200.0
Segment 2:		
6. Common Support Services – Phase 1 - Weather	---	$23,800.0
7. Independent Operational Test and Evaluation (IOT&E)	---	200.0
Total	Various	$24,000.0

For FY 2013, $33,000,000 is requested for Segment 1 efforts, $23,800,000 for Segment 2 Common Support Services, and $400,000 for IOT&E.

2. What Is This Program?

The SWIM program is an information management and data sharing system for Next Generation Air Transportation System (NextGen). SWIM will provide policies and standards to support data management, secure its integrity, and control its access and use. SWIM is being developed incrementally. The initial phase of SWIM, which is referred to as Segment 1, includes capabilities that were selected based upon the needs of various data communities, maturity of concepts of use, and the ability of existing programs to accommodate development of these SWIM capabilities within their existing program plans. Future segments will be defined in a similar manner and will include additional capabilities that move the FAA toward the data sharing required for NextGen.

SWIM will reduce the number and types of unique interfaces, reduce redundancy of information and better facilitate information-sharing, improve predictability and operational decision-making, and reduce cost of service. The improved coordination that SWIM will provide will allow for the transition from tactical conflict management of air traffic to strategic trajectory-based operations. In addition, SWIM will provide the foundation for greatly enhanced information exchange and sharing with other agencies.

Weather will be the first instance in the first phase of a NAS Common Support Services capability to disseminate aviation weather and aeronautical information in a network enabled and global environment utilizing SWIM Segment 2 enterprise services/infrastructure. Establishing and utilizing open standards and developing the software necessary to support universal access to this information will provide an enhanced method of making aviation weather information available to NextGen stakeholders. It will utilize Service

Oriented Architecture (SOA) architecture to enable common, universal access to aviation weather data. It will develop the standards, procedures, and field the system capabilities necessary to support these functions. Common Support Services, Phase 1 - Weather is a key contributor to an effort to provide quick, easy, and cost-effective access to weather information for all users of the National Airspace System (NAS).

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Today's hard-wired infrastructure and systems cannot readily support the addition of new data, systems, data users, and/or decision makers as NextGen requires. In general, they are connected directly to support yesterday's decision-making needs. Each of these interfaces is custom designed, developed, managed, and maintained individually at a significant cost to the FAA. NextGen relies upon a new decision construct that brings more data, systems, customers, and service providers into the process. Data will be needed at more places, for more purposes, in a timely manner, and in common formats and structures to ensure consistent use. These new "data customers" need to be accommodated by providing the governance and policy that tells them how to connect to existing, open interfaces instead of designing, developing, testing, and implementing new ones from scratch. Network technology and data management software must use commercial equipment and current industry standards, to reduce developmental and upgrade cost and simplifying maintenance. Today's point-to-point architecture does not support these goals. This situation represents a performance gap that must be bridged for NextGen to be successful.

SWIM is vital to the achievement of national, DOT, and FAA strategic plans and the future evolution of air transportation management in the nation because it will provide vital infrastructure to the NAS, replacing inefficient and costly information exchange currently in use. The current FAA systems and operations cannot support NextGen in part because they are not network-enabled, but are instead characterized by rigidly configured systems (communications lines, computers, and software applications).

SWIM contributes to meeting these NextGen objectives:

- Expand System Capacity - The projected increase of demand on the air traffic system exceeds current or projected growth in FAA resources. Information management is a key to providing increased capacity and efficiency in the NAS. SWIM will enable information to be readily shared and used by all NAS participants. With more widespread use of better data, SWIM will improve strategic planning and trajectory management to allow better use of existing capacity en route.
- Increase Predictability - SWIM will improve coordination to allow transition from tactical conflict management to strategic trajectory-based operations. SWIM will also provide the potential to increase machine-to-machine interchange supporting and disseminating decisions rather than the current man-to-man interactions. SWIM increases the likelihood that similar decisions will be consistent by enabling them to be based on the same data.
- Reduce Costs for Aviation - SWIM will help to reduce infrastructure costs by reducing the number and types of interfaces, systems, and potentially, facilities. Initially, SWIM will provide a common network capability, reducing operation and maintenance costs of the hundreds of current interfaces. New systems will interface with SWIM, saving future development costs. Ultimately, redundant sources of data will no longer be needed and can be decommissioned.
- Shared situational awareness - SWIM will help to provide shared situational awareness so that all appropriate parties are privy to the same complete set of information.

- Collaborative Decision Making - SWIM will enable collaborative decision-making, by providing all parties access to the same information where they can make real-time decisions and reach agreements quickly.

Delays in the NAS are primarily attributable to weather. Over the last five-year period, more than 70 percent of delays of 15 minutes or more, on average, were caused by weather, based on Aviation System Performance Metrics and Operations Network data. Weather also impacts safety. Between 1994 and 2003, weather was determined to be a contributing or casual factor in over 20 percent of all accidents. In today's NAS, most decision tools, manual and automated, do not utilize weather information effectively or at all.

This condition is partly due to gaps in today's weather dissemination system. The current weather dissemination system is inefficient. Information gathered by one system is not easily shared with other systems. This results in different decision makers having access to different weather information. This lack of a common situational awareness results in inconsistent decision making across the NAS. Rather than sharing pictures of weather systems, we will now utilize open international data standards and instantiate the first phase of the NAS Common Support Services capability so that weather data can be more easily integrated into Air Traffic Management systems.

4. How Do You Know The Program Works?

SWIM represents the steps that FAA is taking to reduce costs while providing better service to:

- Change system interfaces to support network messaging, reducing the cost of testing and maintaining each individual interface (currently a major cost driver and resource load for NAS systems).
- Provide the flexibility to provide information to new systems and locations without adding custom interfaces. This will significantly reduce the marginal cost of adding new system interfaces. Among other metrics, SWIM measures the cost of developing an application-to-application interface.
- Provide common interfaces that facilitate spontaneously adding new users and applications, for purposes of continuity of operations.

Common Support Services, Phase 1, Weather has entered Initial Investment Decision (IID), and is scheduled to establish a baseline at FID, planned for FY 2013. During this timeframe, a 2013 limited operational capability is planned. It will establish a baseline from which to measure performance as improvements are implemented through the NextGen weather Initial Operational Capability (IOC) time frame. That baseline would determine the capacity in adverse weather provided by the legacy system data accessed by the current user set. A comparison will be made to the change in capacity metrics which ensue due to the availability of the improved data to a wider set of users for common situational awareness. In addition, allowing a universal access method for weather data is anticipated to save on communications bandwidth costs.

Open international standards are being used to format and exchange digital weather data to ensure harmonization and ease of future enhancement and implementation. Also, it is building a prototype for conducting test and evaluations of the developed capabilities to determine how effectively the new capabilities perform. The FAA is also leading the world with EUROCONTROL in developing the Weather Exchange Model (WXXM), which is the emerging worldwide standard for the exchange of weather data. The goal is to provide access to weather data tailored to each user's needs. This enables access by all decision support tools and trajectory-based operations.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$57,200,000 is required for the development of Segment 1 and Segment 2.
Efforts in FY 2013 include implementation of several Segment 1 capabilities and continuation of core oversight activities. For FY 2013, SWIM funding will:

- Provide for operational status on the Terminal Data Distribution System Capability
- Provide for operational status on the Traffic Flow Management, Flow Information Publication and continue work on the Runway Visual Range Capability
- Continue to operate the NAS Service Registry/Repository, COTs Repository, the SWIM Developer WIKI
- Buy required SOA licenses (FUSE) to develop, test, and operate SWIM-compliant capabilities
- Continue to provide governance of the Segment 1 SWIM Implementing Programs (SIPs)

Under Common Support Services, Phase 1, Weather, $24,000,000 is required to provide for a 2013 limited operational capability as an initial contribution to NAS common support services development; to refine software development for the reference implementations; refine security development in the network enabled environment, to acquire hardware, software and communications, and complete documentation necessary for a final investment decision. Included in the request is funding for Program Management and NextGen Systems Engineering, and Interdependent Operational Test and Evaluation (IOT&E).

$400,000 is required for IOT&E support.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 40, 35, Surface

- Publish data for:
  - Pilot weather report
  - Traffic Flow Management
  - Flight Data
  - Runway Visual Range
- Provide terminal data distribution capability
- Provide flight data services with publish/subscribe
- Provide flight data publication host air traffic management data distribution system/flight data input/output and AIM Special Use Airspace client

Detailed Justification for - 2A13 ADS-B NAS Wide Implementation

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – ADS-B NAS Wide Implementation
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
ADS-B NAS Wide Implementation	$175,748	$285,100	$271,600	-$13,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Segment 1:		
1. Solution Development	---	$43,600.0
2. Implementation	---	40,300.0
3. In-Service Program Management	---	179,700.0
4. In-Service Engineering	---	7,100.0
5. Independent Operational Test and Evaluation (IOT&E)	---	900.0
Total	Various	$271,600.0

For FY 2013, $270,700,000 is requested to continue the ADS-B NAS Wide implementation program. Also requested is $900,000 for IOT&E efforts.

2. What Is This Program?

Automatic Dependent Surveillance – Broadcast (ADS-B) is an advanced surveillance technology that provides highly accurate and more comprehensive surveillance information via a broadcast communication link. ADS-B is a surveillance technique in which aircraft provide, via a data link, flight data derived from on-board position-fixing and navigational systems. Aircraft determine their position (longitude, latitude, altitude, and time) using GPS, internal navigational reference system, or otherwise. The aircraft's ADS-B equipment function processes this position information, along with other aircraft-derived flight parameters, into a periodic broadcast transmission, typically once a second, of the aircraft's position. Any airborne or ground-based ADS-B capable receiver, within range of broadcast, may receive and process the surveillance information for a variety of functions or uses.

The greater positional accuracy and ability to provide aircraft-derived, additional flight parameters (flight objects or flight data message elements), in addition to position data, defines ADS-B as "enhanced surveillance." The aircraft provides unique flight parameter information with the broadcast of its surveillance position. These other parameters, such as identification, directional vector, velocity, next waypoint, and other data are limited only by the equipment's capability, the communication link capacity, and the receiving system's capability. Additionally, ADS-B equipment may be placed on ground vehicles or obstacles to allow for locating and identifying these items. The FAA's ADS-B system is based primarily on providing three fundamental broadcast services to support the ADS-B enabled applications:

- **ADS-B**: This service provides highly accurate, aircraft-derived ADS-B reports that contain identification, state vector, and status/intent information about the aircraft. The information will be used for surveillance applications. ADS-B information is broadcast by the ADS-B equipped aircraft, received and processed by the ADS-B on-board avionics, and displayed on the aircraft's multi-function display.

- **TIS-B:** Traffic Information Services provide ADS-B equipped aircraft with a more complete "picture" in situations where not all aircraft are equipped with ADS-B. TIS-B is a service that provides ADS-B equipped aircraft with surveillance data about non-ADS-B equipped aircraft. TIS-B comprises surveillance information provided by one or more surveillance sources, such as secondary or primary surveillance radar. The surveillance information is processed and converted for use by ADS-B equipped aircraft. TIS-B can also be used in ADS-B implementations involving multiple ADS-B data links to provide a cross-link or gateway between ADS-B equipped aircraft using the different data links. This TIS-B sub-function is identified as Automatic Dependent Surveillance – Rebroadcast (ADS-R). Two communication link protocols have been approved for ADS-R use; Universal Access Transceiver (UAT), used mostly by general aviation aircraft, and the 1090 extended squitter, which broadcasts but does not receive signals, normally used in commercial transport aircraft.
- **FIS-B:** Flight Information Services provide ground-to-air broadcast of non-control, advisory information which provides users valuable, near real-time information to operate safely and efficiently. FIS-B products include graphical and textual weather reports and forecasts, Special Use Airspace Information, Notices to Airmen, and other aeronautical information.

FY 2012 Base:

- Continuation of National Airspace System (NAS)-Wide deployment of ADS-B
- ADS-B software development will occur for the Advanced Technologies and Oceanic Procedures (ATOP) automation platform
- Continued development of future applications, including:
  - Ground-Based Interval Management - Spacing development and deployment
  - Flight Deck Based Interval Management - Spacing flight trials
  - In Trail Procedures Operational Evaluation
  - Traffic Situation Awareness with Alerts flight tests

Concurrent to the deployment and implementation of ADS-B, the agency has signed agreements with several airlines (JetBlue, United and US Airways). These agreements are set up to demonstrate the benefits of advanced ADS-B applications and procedures during revenue service. The operational evaluations will give the agency detailed cost and benefit data, and encourage airlines to equip early to capitalize on ADS-B benefits.

The FAA has also tasked an Aviation Rulemaking Committee (ARC) to provide recommendations for moving forward with the implementation of high value ADS-B applications that would require a cockpit display installed in the aircraft. The ARC is slated to make its final report to the FAA by September 30, 2011, and detail recommended next steps by June 2012.

Anticipated FY 2013 Accomplishments:

- Completion of an Initial Operating Capability (IOC) of All Remaining Sites - Colorado Wide Area Multilateration Phase 2
- Completion of IOC for En Route Automation Modernization Release 3 Air Traffic Control Separation Services at 17 Sites
- Completion of IOC for Surface Advisory Services for at least 12 Sites
- Completion of Critical Services Implementation Service Acceptance Testing at 89 Service Volumes
- Completion of IOC for Terminal ATC Separation Services at 52 Sites
- Completion of Critical Services Implementation Service Acceptance Testing for at least 33 Service Volumes
- Validation of Minimum Operational Performance Standards (MOPS) for In Trail Procedures
- Validation of Flight Deck Interval Management MOPS
- Validation of Traffic Situational Awareness with Alerts MOPS

ADS-B NAS Wide Implementation supports the FAA mission and helps accomplish agency goals to increase economic competitiveness and safety. The En Route and Oceanic Directorate's activities influence the performance metrics for Average Daily Airport Capacity and NAS On-Time Arrivals. The enabling technologies provided by ADS-B also facilitate transition to Next Generation Air Transportation System (NextGen) capabilities.

3. Why Is This Particular Program Necessary?

The completion of the initial sites and approval of separation services enabled the FAA to release the Final Rule for avionics, published on May 27, 2010. FAA promised industry that the ADS-B service implementation would be completed by the end of 2013, providing stakeholders with an adequate amount of time (approximately seven years) to equip aircraft. Failing to complete ADS-B service implementation as promised would reduce the business benefit of the investment. Moreover, it is anticipated that industry would challenge the rule to equip if the ADS-B schedule were to slip. Final Rule is summarized below.

On January 1, 2020, when operating in the airspace designated in 14 CFR § 91.225 (outlined below) aircraft must be equipped with ADS-B Out avionics that meet the performance requirements of 14 CFR §91.227. Aircraft not complying with the requirements may be denied access to this airspace.

Under the rule, ADS-B Out performance will be required to operate in:

- Class A, B, and C airspace.
- Class E airspace within the 48 contiguous states and the District of Columbia at and above 10,000 feet Mean Sea Level (MSL), excluding the airspace at and below 2,500 feet above the surface.
- Class E airspace at and above 3,000 feet MSL over the Gulf of Mexico from the coastline of the United States out to 12 nautical miles.
- Around those airports identified in 14 CFR part 91, Appendix D.

To give stakeholders time to equip aircraft, FAA agreed to complete implementation of the ADS-B infrastructure so that operators would have adequate time (approximately seven (7) years) to equip thousands of aircraft that will operate in the airspace designated in 14 CFR § 91.225. Failing to complete the ADS-B infrastructure implementation as promised would result in a loss of business benefits that were originally identified as part of the ADS-B business case. Stakeholders would delay equipping aircraft, resulting in further reductions in benefits.

While current surveillance is generally adequate for today's environment, it will not support the anticipated growth in aviation without loss of efficiency within the NAS. As the request for additional services – including traffic demand – increases, system inefficiencies will increase in the form of delays and restrictions across the NAS. Surveillance methods used in today's environment will not support continued aviation growth. Additionally, the current surveillance systems do not take advantage of new technologies in navigation, communication, and flight management. Expansion of surveillance coverage is essential to support air traffic control modernization efforts. Any improvements FAA makes to surveillance capabilities must sustain or enhance the current levels of safety, capacity, and efficiency.

According to the Joint Government and Industry Roadmap for Surveillance Modernization, the Air Traffic environment of the future will be increasingly dependent on more accurate and timely information being available to Air Traffic Service providers and aircraft operators. Information pertaining to a variety of airspace conditions and accurate position data, including aircraft intent, will be necessary.

With ADS-B, pilots for the first time see what controllers see: displays showing other aircraft in the sky. Cockpit displays also pinpoint hazardous weather and terrain, and give pilots important flight information, such as temporary flight restrictions.

ADS-B reduces the risk of runway incursions with cockpit and controller displays that show the location of aircraft and equipped ground vehicles on airport surfaces – even at night or during heavy rainfall. ADS-B applications being developed now will give pilots direct warnings of potential collisions.

ADS-B also provides greater coverage since ground stations are so much easier to place than radar. Remote areas without radar coverage, like the Gulf of Mexico and parts of Alaska, now have surveillance with ADS-B.

Relying on satellites instead of ground navigational aids also means aircraft will be able to fly more directly from Point A to B, saving time and money, and reducing fuel burn, noise and emissions. The improved accuracy, integrity and reliability of satellite signals over radar means controllers eventually will be able to safely reduce the mandatory separation between aircraft and increase capacity in the nation's skies.

4. How Do You Know The Program Works?

Surveillance and Broadcast Services (SBS) includes a number of services and applications. The Essential Services (which include TIS-B, FIS-B and ADS-R) have been tested in the factory, in operations, and through independent tests to verify performance. The Essential Services have been approved for national deployment. The Essential Services In-Service Decision was approved in November 2008. The Critical Services (which is ADS-B used for Air Traffic Control separation services) have been through factory and site testing. The four key sites Juneau, Philadelphia, Louisville, and Gulf of Mexico all underwent significant testing and evaluation to support the requirements. All sites have achieved operational readiness through IOC as of April 2010. The completion of the sites and approval of separation services enabled the FAA to release the Final Rule for avionics, published on May 27, 2010. An In-Service Decision for Critical Services was approved on September 23, 2010. While safety is shared between multiple programs, a comparison of equipped and non-equipped aircraft should provide benefits unique to the program. Low altitude Gulf of Mexico benefits are unique to the program.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

In FY 2013 NAS Wide deployment of ADS-B will continue with subscription services for surveillance across the NAS and for weather in the Gulf and Alaska. The national deployment of nearly 800 stations will be complete by the end of 2013. Achieving this milestone will serve as the entrance criteria for stakeholders to accelerate the installation of ADS-B Out avionics that meet the performance requirements of 14 CFR §91.227. This will allow for the ADS-B capability to deliver the benefits identified in the business case.

Additionally, ATOP automation platform ADS-B software development will occur in FY 2013. Interval Management conceptual development will be ongoing and may include software development. Implementation of Wide Area Multilateration for surface surveillance will continue. Finally, further development of future applications including Air Traffic Control and Cockpit Applications is planned.

If funded at less than the $271,600,000 level the program office would have to extend the ADS-B schedule. A funding reduction would negatively impact the program schedule and cause a slip in application development putting the NextGen program at risk. The long-term impact can affect the national roll-out for the ADS-B implementation in the NAS and subsequent avionics equipage. Moreover, industry stakeholders will challenge the ADS-B out avionics rule if FAA does not maintain the agreed-to schedule of ADS-B services deployment. This will decrease equipage rates and the identified program baseline benefits.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendation # 28, NAS Access

- Complete NAS-wide deployment of ADS-B, Traffic Information Services–Broadcast (TIS-B) and Flight Information Services–Broadcast (FIS-B)
- Provide initial operating capability for surface alerting

Detailed Justification for - 2A15 Collaborative Air Traffic Management Technologies Work Package 2 and Work Package 3

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Collaborative Air Traffic Management Technologies ($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Collaborative Air Traffic Management Technologies (CATMT) WP2 and WP3	$35,828	$41,500	$34,420	-$7,080

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. CATMT Work Package 2 (WP2)	---	$21,100.0
2. CATMT Work Package 3 (WP3)	---	13,320.0
Total	Various	$34,420.0

For FY 2013, $34,420,000 is requested, of which $21,100,000 under WP2 will add four new capabilities and $13,320,000 under WP3 will add two new capabilities to the TFM system.

2. What Is This Program?

Traffic Flow Management (TFM) is the nation's primary source for disseminating flight information across the aviation community. The automation and communication mechanisms provided by the TFM system support the decision-making process used to adjust flight schedules and/or routes as necessary. When the National Airspace System (NAS) is impacted by severe weather, congestion, and/or outages, the TFM system has unique capabilities to predict chokepoints and facilitate the collaboration and execution of mitigation initiatives with stakeholders, using common information displays and tools, to minimize NAS delays.

CATMT Work Package 2 will add four new capabilities to the TFM System:
- Arrival Uncertainty Management (AUM)
- Weather Integration (WxInt)
- Collaborative Airspace Conflict Resolution (CACR)
- Airborne Re-Route (ABRR)

Each user requested new capabilities will help continue to reduce the traffic delay impacts of severe weather, excess demand, and NAS equipment outages on the aviation community.
CATMT Work Package 3 will add two new capabilities to the TFM System:

- Collaborative Information Exchange (CIX)
- TFM Remote Site-Re-Engineering (TRS-R)

CIX will eliminate the need to manually input airspace use data into the TFM system by automating its incorporation from the System Wide Information Management (SWIM) network. TRS-R will help reduce the cost of maintaining the TFM remote sites and provide greater ease of use to the traffic management users. These new additions will help continue to reduce the traffic delay impacts of severe weather, excess demand, and NAS equipment outages on the aviation community.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Flight operations are approaching pre-9/11 levels, and aviation trends indicate that air traffic demand will continue to increase. Domestic, regional and commuter patterns and compositions are changing. Despite this growth, the economic viability of many commercial carrier airlines is uncertain. The TFM portfolio of tools and capabilities is the only part of the national airspace system designed to help the aviation community reduce delays, improve operations, and succeed economically. However, the system cannot accommodate the anticipated growth in demand for services.

CATMT WP 2 will bring newly developed algorithms and technologies to the traffic management community. Its four new components represent state of the art enhancements intended to aid in the reduction of traffic delays due to severe weather, excess demand and NAS equipment outages.

CATMT WP 3 will streamline TFM operations and make the tasks less manually challenging. Its two new components represent state of the art enhancements intended to aid in the reduction of traffic delays due to severe weather, excess demand and NAS equipment outages.

4. How Do You Know The Program Works?

CATMT WP 2 started in FY 2010 and CATMT WP 3 started in FY 2011, as such neither has delivered any of their enhancements as of yet. Metrics are being put into place to measure the contribution of both efforts to the NAS.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$34,420,000 is required for CATMT WP 2 and WP 3. These funds are required to keep the efforts on their pace to complete during FY 2015. A reduction would impact the overall schedule and we will not be able to complete during FY 2015.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 47, Integrated ATM

- Deploy CATMT Work Package 2 capabilities to include:
  - Arrival uncertainty management
  - Weather integration
  - Collaborative airspace constraint resolution
  - Airborne reroute execution

Detailed Justification for - 2A16 Colorado ADS-B WAM Cost Share

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Colorado ADS-B WAM Cost Share
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Colorado ADS-B WAM Cost Share	$0	$3,800	$1,400	-$2,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
In-Service Program Management	---	$1,400.0

For FY 2013, $1,400,000 is requested for the following activities:

- Denver, CO (ZDV) based Air Traffic Control Separation Services supporting operations in and out of the Montrose; Gunnison; Telluride and Durango Airports

2. What Is This Program?

The State of Colorado Department of Transportation (DOT), Division of Aeronautics has determined that a lack of surveillance is one of the main reasons behind economic losses as a result of reduced capacity during Instrument Meteorological Conditions (IMC). The problem is compounded by mountainous terrain, single instrument runway airport configurations and limited ramp space. The base of existing radar coverage is most often at or above 9,000 feet. The lack of more comprehensive surveillance forces controllers to use procedural separation standards for the Instrument Flight Rules (IFR) arriving/departing aircraft. This is a safe means of providing the service, but it is not efficient enough to provide for Colorado's air traffic services' needs.

Normally, many arrivals into Colorado Mountain airports are conducted under Visual Flight Rules (VFR). IMC which reduces acceptance rates for mountain airports from 12-17 flights per hour to four per hour. From November to April, when the Special Traffic Management Program (STMP) is in effect, the Colorado DOT estimates 75 aircraft per airport, per day are delayed or diverted, creating daily revenue loss for the state. Delays and denied service during IMC at mountain airports cause additional traffic to be diverted to the north and south within Denver Center airspace. This results in an additional multi-modal burden on the Colorado DOT due to the large number of people traveling by other means to their original destination. The availability of ADS-R, ADS-B and Multilateration surveillance services integrated with the En-Route Automation Modernization (ERAM) should allow arrival acceptance rates to be maintained with air traffic control support. This will enhance public safety, increase capacity of the FAA NAS system, and provide increased services and economic benefit to the identified four Colorado Mountain Communities.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investment.

3. Why Is This Particular Program Necessary?

Over the last 15 years the Ski Country of Colorado has become an increasingly popular recreational destination. The corresponding increase in air traffic volume has resulted in increased numbers of delays and denied service at mountain airports, especially during bad weather. The FAA has established a reservation system known as the STMP during the peak travel months in an effort to regulate and systematically meter the traffic to the airports. This solution keeps the traffic volume manageable for the Denver ARTCC, but produces extended delays and, in some cases, diversions or denial of Air Traffic Control (ATC) services. The airports and communities of Colorado are losing large amounts of revenue that would be generated by visitors arriving by aircraft. The program will permit radar separation standards to be employed for aircraft in areas not currently covered by existing radars and provide an option in the NAS for a WAM service capability.

4. How Do You Know The Program Works?

Prior to declaring the Initial Operating Condition (IOC) of the En Route Automation Modernization (ERAM) services supported with ADS-B and WAM surveillance the verification and validation of performance will follow a multi-stage testing process established by the FAA's Acquisition Management System. This process includes the successful testing of all critical requirements and a successful safety risk assessment of the system and the supported air traffic operations. Once an IOC is achieved the evaluation of the system will continue with an OSD performed by air traffic controllers and technical operations personnel. The OSD will continue until the system meets all necessary requirements for operation in the NAS.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Funding is required for the purchase of ADS-B/WAM surveillance services to support the Denver ARTCC separation services into and out of the Durango, CO; Gunnison, CO; Montrose, CO; and Telluride, CO airports. A reduction in funding would cause a loss of surveillance services to one or more of these airports. The program will create additional airport revenue from accommodating additional flights and enhanced search and rescue capabilities at these four Colorado airports.

The requested funding is also intended to support the following RTCA Task Force 5 recommendations in FY 2013 through the mid-term:

Task Force Recommendations # 28, NAS Access

- Deploy phase 2 system that includes WAM and ADS-B at Durango, CO (DRO), Gunnison, CO (GUC), Montrose, CO (MTJ) and Telluride, CO (TEX)

Detailed Justification for - 2A17 Time Based Flow Management (TBFM)

What Do I Need To Know Before Reading This Justification?

- Traffic Management Advisor (TMA) is currently, deployed and operational at 20 ARTCCs, 27 TRACONs, and 33 ATCTs (27 of the Nation's busiest airports).
- The Time Based Flow Management (TBFM) Program is the continuation and support of Traffic Manager Advisor (TMA) which is at the end of its lifecycle.
- Final Investment Decision Approval received for Implementation of the System Re-Architecture and NextGen and Operational capabilities (2010-2014).

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Time Based Flow Management (TBFM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
TBFM - Work Package 2	$0[1]	$38,700	$12,900	-$25,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
TBFM Work Package 2	---	$12,900.0

For FY 2013, $12,900,000 is requested to continue the NextGen and Operational enhancements of the TMA system as follows:

- Support the work to replace the existing hardware and reduce the logistical footprint at the current sites by re-architecting the current system and also work to expand TMA to other sites so additional sites can benefit from the efficiency of time based metering
- Support the design and development of NextGen and Operational initiatives such as Integrated Departure and Arrival Capability (IDAC), display convective weather, and Extended Metering - which will push any arrival delay farther into the En-Route flow therefore providing better fuel burn and predictability along the route of flight
- Support the deployment of automation of the RNAV procedures, and sharing of the TMA information with other National Airspace Systems (NAS)

2. What Is This Program?

Traffic Management Advisor (TMA) is a vital part of the NAS and enhances air traffic operations, by reducing delays and increasing efficiency of airline operations. Currently, TMA is in daily use throughout the NAS. TMA is the only NAS deployed decision support tool currently available for implementation of time-based metering. TMA has been field-tested over the past 10+ years and is already installed in the 20 Air Route Traffic Control Centers (ARTCC) and adapted for most of the major airports served by those centers.

Time Based Flow Management (TBFM) is an evolution of the Traffic Management Advisor (TMA) Program. This system uses Time Based Metering (TBM) software to optimize the capacity in the NAS. TBFM will improve upon TMA and directly address Solution Sets within the 2009 NextGen Implementation Plan.

[1] $20,000,000 was enacted in FY 2011 under NextGen BLI 1A11

Specifically, TBFM will improve the management of traffic flow throughout the cruise phase of flight through point-in-space metering or extended metering, resolve the issue of TMA hardware obsolescence, increase airspace capacity utilization through flexible scheduling, share metering data with other tools/stakeholders, enable more accurate Area Navigation/Required Navigation Performance (RNAV/RNP) routes, enable more efficient departure operations with the integrated departure and arrival concept, and increase traffic manager awareness of severe weather within their area of responsibility. The design, development and deployment of these concepts will be occurring during the 2010-2014 timeframe. These enhancements support the current NextGen OI (Operational Initiatives)

- Current Tactical Management of Flow in the En Route domain for Arrivals/Departures (104115) - TMA displays are used for situational awareness in the current tactical flow management process
- Integrated Arrival/Departure Airspace Management (104122) – Integrating and automating the departure capability with the TMA system
- Point-in-Space Metering (104120) - Extended Metering – adding additional meter points for more efficient Time Based Metering
- Time-Based Metering Using RNAV/RNP Route Assignments (104123) – automating the use of RNAV procedures in the Terminal environment for a more efficient modeling of an aircraft's trajectory

TBFM will develop and deliver on the operational needs such as flexible scheduling that will take advantage of the partial slots that currently causes a loss of efficiency in capacity constrained areas and the need for a system re-architecture which will reduce the logistical footprint of the TMA system. For each airport that is time based metering – there are two monitors, two keyboards and two mice – all of this hardware takes up space and makes it inefficient to run TMA at all needed airports. The reduction will help to continue the expansion of the TMA system to other airports and the expansion of Time Based Metering. All of the work will bring the TMA system into the NextGen future.

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The NAS suffers significantly degraded performance during periods of severe weather, limited visibility, volume spikes due to seasonal traffic or special events, and other causes, specifically needing solutions in the following areas:

Reducing under-delivery of capacity at affected airports
- Increasing equity of delay assessed to flights
- Improving prediction of demand
- Decreasing unnecessary traffic flow management restrictions
- Decreasing abnormal delay
- Decreasing avoidable delay

4. How Do You Know The Program Works?

The current TMA is an effective and well-tested decision support tool that allows air traffic management units to schedule and optimize the arrival load for major airports. That scheduling and optimization algorithm, however, generally is confined to the area within about 200 miles of the controlling center. Since TMA is installed at all the centers the algorithms that optimize traffic flows could be expanded, so schedule data can be exchanged and a larger planning horizon developed for more strategic planning.

The TMA program has delivered measured savings by reducing delays and increasing efficiency of airline operations. TBFM is the next step in TMA evolution, providing further delay reductions. While analysis has predicted savings from TBFM implementation, metrics are being put into place to measure its actual contribution once its components are deployed.

TBFM capabilities provide automation, communication and decision support tools to continue and expand the following capabilities:

- Increased efficient use of existing capacity
- Reduced manual workload
- Increased common situational awareness
- Reduced delay in the terminal and en route airspaces

TBFM capabilities provide additional residual benefits in the way of environmental benefits.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$12,900,000 is required to keep the program on schedule to be completed during FY 2015. Funding at this level will enable TBFM to develop functions that integrate data into TMA from external systems such as Traffic Flow Management System (TFMS) and new weather systems. This will increase the efficiency of arrivals and departures, RNAV/RNP route selection data, and international traffic data. Also, deliver the re-architected TMA system to enhance the current system to support the development of NextGen initiatives and Operational enhancements; and continue the deployment of the FAA TBFM system to continue the efficiency of the system.

Detailed Justification for - 2B13 National Airspace System Voice System (NVS)

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – National Airspace System Voice System (NVS)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
National Airspace System Voice System (NVS)	$4,192	$9,000	$10,250	+$1,250

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$800.0
2. Engineering Support	---	1,500.0
3. Contract Award	---	7,700.0
4. Independent Operational Test and Evaluation (IOT&E)	---	250.0
Total	Various	$10,250.0

For FY 2013, $10,000,000 is requested to fund the contract awarded at end of FY 2012. Segment 1 of the contract will consist of acquiring test systems to achieve the objectives of: (1) demonstrating NextGen capabilities (e.g., resource sharing, load balancing, and enterprise management); and (2) having a production-ready system for deployment to the any of the target environments. Segment 2 will consist of deploying NVS systems to operational NAS facilities. Initial deployments for Segment 2 will focus on Terminal and NextGen future facilities.

An additional $250,000 is requested for Independent Operational Test and Evaluation (IOT&E) efforts.

2. What Is This Program?

NVS will provide voice communications services to Air Traffic Control Specialists (ATCS), supervisors, and ancillary Air Traffic Control (ATC) operators in support of continuous ATC operations in the Terminal and En Route domains of the National Airspace System (NAS). Voice communications connectivity will be provided to aircraft flight crews and Unmanned Aircraft System (UAS) operators through Air to Ground (A/G) radio circuits or equivalent network connections. Voice communications connectivity between ATCS, supervisors and traffic managers will be provided through access to intra-facility and inter-facility G/G voice circuits or equivalent network connections.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The current switch technology deployed in the NAS will not support the expected future NextGen concept of operations for either: networked facilities, or such concepts as dynamic re-sectorization and off-loading during non-peak operations. These capabilities require that lines connected to a controller's workstation can be changed to add or eliminate lines as the geographical boundaries of the sector change. The NVS will support current and future ATC operations as envisioned by both government and industry forecasters. In addition, the current voice switch system is aging and needs to be modernized to mitigate obsolescence.

4. How Do You Know The Program Works?

Voice switching and radio controls that are in the NAS today are providing aircraft separation capabilities. The NVS program will replace the voice components that are becoming obsolete and will provide NextGen capabilities. This program will allow the FAA to achieve voice switching modernization objectives such as a network-based infrastructure as well as evolve toward a flexible communications routing architecture that supports dynamic re-sectorization, resource reallocation, airspace redesign and the NextGen vision (e.g., improving flow capacity).

This program maps to the FAA goal of increased airport capacity to meet reductions in the projected operating costs by: reducing the number of equipment components needing to be inventoried, by reducing the number of switch types; reducing acquisition, training, and maintenance costs by reducing the number of voice-switch designs; improving equipment availability and related inventory issues by reducing obsolete equipment; and reducing potential costs to users from air traffic delays due to projected outages of the existing systems and increased user demand.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$10,000,000 is required to:

Demonstrate the introduction of new capabilities into the ATC environment including:
- Current NextGen features and operational concepts
- Future NextGen features and operational concepts
- NextGen features, future (requirements or functions) into a operational system

Design, engineer and integrate NVS pre-production systems in preparation for Factory Acceptance Test. An additional $250,000 is required for Independent Operational Test and Evaluation (IOT&E).

A reduction from the FY 2013 baseline funding would delay demonstration of NextGen capabilities and delay pre-production test readiness.

Detailed Justification for - **2B18 Next Generation Transportation System – Flexible Terminal Environment - Terminal Flight Data Manager (TFDM)**

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Next Generation Transportation System – Flexible Terminal Environment - Terminal Flight Data Manager (TFDM)
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Terminal Flight Data Manager	$0	$0	$37,600	+$37,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Prime Contractor/Solution Implementation	---	$31,300.0
2. Program Management	---	2,000.0
3. Systems Engineering	---	3,300.0
4. Second Level Engineering Support		500.0
5 Test Support	---	500.0
Total	Various	$37,600.0

For FY 2013, $37,600,000 is requested to award the prime contract for TFDM system development and implementation.

2. What Is This Program?

The TFDM program is an integrated approach to maximize the efficient collection, distribution, and update the data and improve access to information necessary for safe and efficient control of air traffic. The system will collect and portray terminal flight data, as well as traffic management tools, on an integrated display, and will be connected to information and decision support tools.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Controllers currently rely on several data management systems in Air Traffic Control Towers (ATCTs) to provide flight data and traffic management tools in the terminal environment. These systems include, but are not limited to , Airport Resource Management Tool (ARMT), Flight Data Input Output (FDIO), Tower Data Link Services (TDLS), Integrated Display System (IDS), Electronic flight Strip Transfer System (EFSTS), and Advanced Electronic Flight Strip (AEFS). In order to achieve the modernization of the NAS envisioned by NextGen, it is necessary to develop in integrated Terminal Flight Data Management (TFDM) platform that provides the functionality currently available to controllers as well as emerging capabilities anticipated in the modernization of the NAS such as Electronic Flight Strip (EFS) and Terminal Data Display System (TDDS). The first phase of TFDM is designed to integrate the functionality of the existing terminal flight data systems and decision support tools in order to facilitate increased capacity in the terminal environment and reduce ATO operating costs.

4. How Do You Know The Program Works?

TFDM is in the Investment Analysis (IA) Phase. During IA, the Program Office will identify various alternatives to provide the capabilities to meet the TFDM requirements. The FAA will select the most cost beneficial alternative for acquisition and implementation. The Program Office plans to complete the IA and receive approval in FY 2013 to begin acquisition design and development of the selected alternative. Prototype and Human In The Loop simulation activities were conducted under Next Generation Transportation System – Flexible Terminals and Airports Surface/Tower/Terminal Systems Engineering to validate the TFDM concepts and those activities will continue in order to reduce development and implementation risks during TFDM investment analysis and solution implementation. The TFDM system acquisition will also include a comprehensive test and provisioning program to verify the system operates properly in the NAS and is supportable through the life cycle.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

$37,600,000 is required to award the prime contract for TFDM system development and implementation and conduct program management and engineering support activities.

TFDM is a key ground infrastructure program for NextGen mid-term operations in the areas of flight planning; push back, taxi and departure; descent and approach; and landing, taxi and arrival. TFDM supports NextGen mid-term Improved Surface Operations as the primary contributor to the NextGen Operational Improvement (OI) 104209: Initial Surface Traffic Management.

A funding reduction will delay the implementation of TFDM.

Detailed Justification for the – 3A11 Aviation Safety Information Analysis and Sharing (ASIAS)

What Do I Need To Know Before Reading This Justification?

For FY 2009 through FY 2012, ASIAS was part of and received funding from the Systems Safety Management Transformation (SSMT) program (1A08G). For both FY 2011 and FY 2012, $7.85M was included in SSMT for ASIAS. There are no funds included in SSMT for FY 2013.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aviation Safety Information Analysis and Sharing (ASIAS)

($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aviation Safety Information Analysis and Sharing (ASIAS)	$0	$0	$15,000	+$15,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$750.0
2. Integration of GA Digital Flight Data into ASIAS	---	500.0
3. Acquisition/Mgmt of Data/ASIAS Architecture Enhancement	---	7,800.0
4. Advancement of ASIAS Analytical Capabilities	---	5,200.0
5. Visualization Capabilities for ASIAS Analytical Methods	---	750.0
Total	Various	$15,000.0

For FY 2013, $15,000,000 is requested for the following:

- Developing ASIAS capabilities to include enhancements that build upon and extend existing capabilities for managing and processing aviation performance data. As new data sources become available, technical requirements will be developed and added to the existing ASIAS Data Management Plan and they will be integrated into ASIAS and fused with others. For FY 2013, the activities include:
  - Expanding ASIAS to include National Airspace System Facility Performance Data as part of the query system, allowing ATO users to merge their operational data with the rest of data available through the ASIAS portal
  - Expanding ASIAS to include General Aviation (GA) digital flight data
- Developing tools that convert both textural and numeric data into information, and creating visualization capabilities that aid causal/contributing factor analyses and risk assessment. For FY 2013, the activities include:
  - Initiating the capability to query multiple operational and safety databases from a single entry point and using a single query

2. What Is This Program?

The ASIAS program is an information safety analysis and data sharing collaboration involving industry and government to proactively analyze broad and extensive data to advance aviation safety. The primary objective of ASIAS is to provide a national resource for use in discovering common, systemic safety problems that span multiple airlines, fleets and regions of the global air transportation system. ASIAS leverages internal FAA datasets, airline proprietary safety data, publicly available data, manufacturers' data and other data. ASIAS fuses these data sources in order to identify safety trends in the National Airspace System (NAS), leading to a comprehensive and proactive approach to aviation safety in conjunction with implementation of NextGen capacity and efficiency capabilities. This program enables NextGen by reducing the fatalities rate commensurate with the increases in capacity. By FY 2015, this program element will provide system knowledge to enable early identification of event precursors allowing intervention strategies to avoid accidents and incidents and to mitigate potential operational safety impacts of NextGen system alternatives.

The ASIAS program directly supports the Safety Strategic Goal of the DOT Strategic Plan FY 2010 – FY 2015, in particular:

- Outcome 1 - Reduction in transportation-related fatalities
- Outcome 2 - Reduction in transportation-related injuries

ASIAS focuses on the DOT's aviation safety strategy of working with domestic stakeholders, including carriers, to stimulate cooperation for the open reporting of safety concerns.

DOT Strategic Goal - Safety

- Reduction in transportation related injuries and fatalities

3. Why Is This Particular Program Necessary?

This research includes expanding information sharing and data analysis to identify and mitigate risks before they lead to accidents. New automated processes are required to facilitate advanced analysis of comprehensive data which will unlock new insight about potential safety risks in both the current NAS and as the NAS evolves to NextGen. ASIAS is developing the only industry-wide integrated analytical, forecasting, and decision support capabilities to address NextGen evolutionary procedures. Analyses, using these advanced safety analytical capabilities, can be performed that would not be available to individual stakeholders performing similar analysis. Safety information discovered through ASIAS analytic activities will be used across the FAA and industry to drive improvements and support Safety Management Systems (SMS). ASIAS supports both the safety risk management and safety assurance functions of SMS by providing the data, technology and actionable results to enable the FAA and ASIAS users to optimize SMS safety risk management performance. Safety insights from ASIAS analysis will be communicated to the ASIAS users. Stakeholders will leverage insight to identify risk-reducing alternatives or changes to operations or processes. Implemented changes will prevent would-be accidents.

The ASIAS approaches will be instrumental in detecting the impacts of system performance anomalies around the NAS. Without the ASIAS program, manual processes would be required for detection of safety-significant events. Many of these events would grow in severity before they are detected, since some of the data that ASIAS collects cannot be manually processed, such as Flight Operational Quality Data (FOQA) and surveillance data from radars, and therefore precursors would go undetected. Integration of the impacts of NextGen changes on safety likewise would not be facilitated using current methodology within FAA.

4. How Do You Know The Program Works?

During the early development, ASIAS has discovered potential safety issues in the NAS that should be addressed in the near-term through procedural and airspace design. These issues have been provided to the NextGen program office to assist in prioritization of NextGen systems to mitigate risk. Coordination efforts have ensured that throughout the NextGen evolution planning process ASIAS results can be integrated into the airspace and design process and inform design tools. Below are examples of such successes that have and will continue to improve the overall operations within the NAS.

- Results of analyses of TCAS and TAWS events were transmitted to the Commercial Aviation Safety Team (CAST) for the development of safety mitigations
- CAST developed and approved two safety enhancements for TCAS and four safety enhancements for TAWS, designed to mitigate safety issues identified

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$15,000,000 is required to continue work in ASIAS in FY 2013. As ASIAS expands in terms of participants, data sources, and analytical capabilities, the ability to conduct meaningful and complex analyses must advance. The supporting elements for achieving the ASIAS vision of identifying and mitigating safety risks include:

- Integration of new analysis capabilities developed under the R,E&D program, such as data fusion, data mining, and vulnerability discovery methodologies, into the next generation of ASIAS architecture and demonstrating the capabilities offered from the new architecture. The development of analytical capabilities supporting ASIAS analyses will require close coordination with existing vendors for eventual technology transfer to those vendors, and to the extent needed, integration of vendor capabilities into the ASIAS prototype.
- Development of data standardization and integration capabilities for new aviation communities, such as helicopter, general aviation, corporate aviation and military to enable the support of national-level analysis. Anomaly and risk detection approaches that work well for commercial jet aircraft may not apply for the other types of aircraft in these communities.
- Development of in-depth and comprehensive perspectives of operational risks that exist and that could be introduced through changes in air traffic management procedures, airspace design changes (i.e., sectors and routes), area navigation (RNAV) procedures, airport use, avionics, and fleet mixes.

Analyses, using advanced safety analytical capabilities, can be performed that would not be available to individual stakeholders performing similar analysis. These advanced safety capabilities will support analysis of comprehensive data which will provide new insights about potential safety risks in both the current NAS and as the NAS evolves to NextGen. With a reduction in funding, achievement of these targets and solving these issues by 2025 will be delayed.

Detailed Justification for - 4A09 Aeronautical Information Management Program

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Aeronautical Information Management Program
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Aeronautical Information Management Program	$18,263	$20,200	$2,000	-$18,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$200.0
2. Software Design and Development	---	1,500.0
3. Telecommunications	---	100.0
4. System Development and Analysis	---	200.0
Total	Various	$2,000.0

For FY 2013, $2,000,000 of funding is requested for Segment 2 to leverage planning efforts in the Next Generation Air Transportation System (NextGen) Common Structure and Status Data (CSSD) program (Part of the Collaborative ATM solution set) to baseline and implement suitably mature AIM technologies and tools for Aeronautical Information exchange comprising the infrastructure for the Aeronautical Common Service and the provision of special activity airspace and airport data. These data feeds through the ACS will deliver information across the NAS using standard SWIM compliant protocols and meet objectives for NextGen in delivering ON Demand NAS Information and RTCA Task Force 5.

2. What Is This Program?

The purpose of the AIM Modernization program is to provide aviation users with digital aeronautical information that conforms to international standards and supports Next Generation Air Transportation System (NextGen) objectives and meets the needs of AIM's customers, both in the short term, and in the longer term. Digital aeronautical data enables the timely processing of data to improve mapping, flight planning, and the timeliness and accuracy of air traffic control instructions. The program will re-engineer the business processes for the management and provision of key aeronautical information using digital technology that is consistent with FAA and international architecture standards.

Following a July 2006 ATO Executive Council Investment Analysis Readiness Decision (IARD), the AIM group was organized, and it was assigned the responsibility for developing a system for managing the generation, processing, storage and distribution of aeronautical information to internal and external aviation customers. This began with the analysis of current system capability, and process deficiencies, and led to the planning, development and implementation of solutions to address identified deficiencies consistent with FAA goals, objectives and targets identified in the Flight Plan.

Segment 2 will build on pre-implementation efforts in the NextGen CSSD program (Part of the Collaborative ATM solution set) to baseline and implement suitably mature AIM technologies and tools for Aeronautical Information exchange.

- ACS will improve workflows for SAA management with web services using a Service Oriented Architecture (SOA) to allow for communication of SAA relevant information among stakeholders. Digital

management of SAAs will also facilitate calculation of metrics, analysis of SAA usage, integration with industrial partners, and scheduling automation.
- ACS will provide critical information about airports including airport mapping and configuration information and a variety of applications for using this data.

Results obtained in CSSD planning phase during FY 2010 include:
- Formed the AIM Community of Interest to foster critical relationships and agreements with the stakeholders for the flow of aeronautical information
- Developed concept of operations for the aeronautical common service
- Developed a National Special Activity Airspace (SAA) Concept of Operations and Enterprise Architecture consistent and integrated with the NASEA
- Demonstrated web services and visualization for the provision of airport data
- Demonstrated capability to aggregate and visualize facility equipment data in context with AIM managed aeronautical data
- Demonstrated capability to provide a standardized, consistent, and managed digital special activity airspace definitions describing the airspace within the NAS for use by external and internal air traffic systems
- Demonstrated capability for digital data capture of taxi routes and runway configuration definitions found in facility standard operating procedures and letter of agreement and data distribution using AIXM and industry standards for information exchange

Based on the projected work plan, products that will be developed in FY 2011 include:
- Deploy new operational sites and deliver NOTAM system disaster recovery site
- Progress towards an In-Service Decision for AIM Modernization Segment 1
  Continue implementing AIM Modernization - Segment 1
- Continue transitioning from legacy AIM systems to AIM Modernization - Segment 1
- Begin phased AIM Modernization Segment 1 deployment
- Perform the investment analysis and develop acquisition package for the final AMS decisions supporting AIM Modernization - Segment 2
- Continue solution development for the ACS and the capabilities for airport data provision and SAA that were demonstrated in FY 2010

DOT Strategic Goal - Safety
- Reduction in transportation related injuries and fatalities

3. Why Is This Particular Program Necessary?

AIM Modernization Segment 2 is in the process of developing quantitative benefits during the investment analysis phase. It targets enhancements and new functionality to improve and expand AIM services. The segment will improve the accuracy and timeliness of Special Activity Airspace and Airport information management and flow through the development of the Aeronautical common service, a NextGen common service identified in the NextGen segment implementation plan to support multiple NextGen Operational improvements.

Standardizing and centralizing aeronautical data within the NAS will contribute to meeting the FAAs safety performance goals and will enhance the safety of FAA air traffic control systems. NAS safety depends upon the timely and accurate exchange of information between internal and external users.

4. How Do You Know The Program Works?

The capability to enhance and expand standardized and integrated aeronautical information flow was demonstrated in the Common Status and Structure Program in FY 2010 focusing on several key operational threads including provision of special activity airspace information, digital data capture of information found in standard operating procedures and letters of agreement, provision of airport data, and aggregation and visualization of facility equipment information combined with AIM managed Aeronautical information using FAA and industry standards for information exchange. Demonstrations at the AIM Community of Interest session were well received and provided excellent feedback from key stakeholders for refinement of the capabilities.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

$2,000,000 is required for AIM Modernization Segment 2 to build on efforts in the NextGen CSSD program (Part of the Collaborative ATM solution set) to baseline and implement suitably mature AIM technologies and tools for Aeronautical Information exchange. This includes the development of infrastructure to support the ACS and services for the provision of SAA information and airport data.

Detailed Justification for – 5A01 Personnel and Related Expenses

What Do I Need To Know Before Reading This Justification?

- This program funds the personnel, travel and related expenses of the Federal Aviation Administration (FAA) Facilities and Equipment (F&E) workforce.
- The FAA F&E workforce includes electronic, civil and mechanical engineers; electronics technicians; quality control and contract specialists; and flight inspection personnel.
- There is active oversight on the expenditure of these funds throughout the FAA.

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – Personnel and Related Expenses
($000)

Activity/Component	FY 2011 Actual	FY 2012 Enacted	FY 2013 President's Request	Difference from FY 2012 Enacted
Personnel and Related Expenses	$474,050	$475,000	$480,000	+$5,000

For FY 2013, $480,000,000 is requested to pay the personnel, travel and related expenses for the FAA F&E workforce performing work critical to FAA's efforts to modernize the National Airspace System (NAS). Following is a table that reflects the request:

	FY 2012 Enacted	Change	FY 2013 Request
Personnel Compensation and Benefits	$422,000	+$3,200	$425,200
Travel	36,800	+1,800	38,600
Other Objects	16,200	0	16,200
Total	$475,000	+$5,000	$480,000

2. What Is This Program?

This program sustains the current Facilities and Equipment (F&E) workforce and related expenses.

3. Why Is This Particular Program Necessary?

The F&E workforce ensures that new system enhancements, such as the Next Generation Air Transportation System (NextGen), contribute to the overall efficiency, safety, and reliability of the NAS. Civil, mechanical and electrical engineers are required to provide technical support for design reviews, perform site preparation and installation, conduct technical evaluations, and provide systems integration and in-service management.

4. How Do You Know The Program Works?

The F&E workforce succeeds in delivering F&E programs on specification and in ensuring that programs are completed successfully.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

For FY 2013, the agency requests an increase of $5,000,000 to support NextGen implementation and to maintain the NAS infrastructure. The increase includes $3,200,000 in increased pay requirements with $1,580,000 for the 2013 pay raise and $1,620,000 for one additional compensable day.

A program increase of $1,800,000 is requested to cover increased travel requirements driven acceleration of various navigation-related activities, such as NAVLEAN and OAPM (Metroplex). Aviation Safety personnel will accelerate activities related to operator and pilot certification for new procedures. By the end of fiscal 2013, OAPM activities will undergo the following transitions: from evaluation to implementation in Washington DC, North Texas, and Houston; from design to evaluation in Charlotte, NC, Northern California, and Atlanta; from study through design to implementation in Southern California, and from study to design in Florida. Additionally, studies will begin in Chicago and Phoenix and move into the design phase in 2013. Because other program travel requirements will remain undiminished in 2013 (ERAM implementation will continue through 2013), additional travel funds are being requested for OAPM in FY 2013 above the 2012 levels.

Finally, of the total 3,181 positions and 2,907 FTEs requested in FY 2013, up to 257 positions and 216 FTEs are dedicated to NextGen programs, including new positions to support the OAPM/NAVLEAN acceleration proposal included in this budget request.

Detailed Justification for
A11.m NextGen – Alternative Fuels for General Aviation

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – NextGen – Alternative Fuels for General Aviation

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A11.m NextGen – Alternative Fuels for General Aviation	$998,000	$2,071,000	$1,995,000	-$76,000

For FY 2013, $1,995,000 is requested for NextGen – Alternative Fuels for General Aviation. Major activities and accomplishments planned include:

- Complete initial study regarding the use of high aromatic additives for octane enhancement
- Complete initial study determining the assessment criteria for use of bio-mass derived fuels.
- Establish capability to measure lead emissions from piston aircraft engines operating on ultra-low lead and low-lead fuels.
- Complete testing to characterize the impact of fuel-system and combustion chamber lead deposits on unleaded fuel detonation performance.
- Complete durability study and lubricating oil analyses test on proposed high-aromatic component in a high-compression engine.

Research will support the R&D roadmap and framework being developed by the newly formed Unleaded Aviation Gasoline Transition Aviation Rulemaking Committee (UAT-ARC). The post-ARC R&D framework will involve government and industry cooperative guidance and/or research to safely transition the fleet to an unleaded aviation gasoline. Research will focus on the safety impact from deviation from the current leaded aviation fuel specification properties from use of a new unleaded fuel. Supporting research to address feasibility or impact of reducing high-octane lead additives in aviation gasoline and how that will impact fleet performance and certification. Test data and laboratory analyses of high aromatic fuels will be used to determine the certification and safety impact of reducing lead in aviation fuel as a temporary measure to reduce ambient lead emissions. This research will include the investigation of fit-for-purpose safety critical performance metrics from increased aromatic limits in the low-lead fuel for octane enhancement

The assessment of the impact on safety and operating performance from the use of the traditional 100Low Lead (100LL) avgas without lead will continue. Research will also continue on evaluating high-octane, quasi-drop-in fuels.

Research will continue to support the development of test methods needed to evaluate the performance, safety, durability, and operability of unleaded avgas containing high aromatic or biomass derived compounds. This work will supplement the unleaded fuel and additives specification development protocol task force at ASTM international. This task force was set up to develop guidance to a potential fuel or additive sponsor for performing the necessary specification property and fit-for-purpose properties research to obtain an ASTM fuel or additive approval specification.

Research will also address performance and safety from use of high aromatic fuels throughout the full operating envelope for a high-output turbocharged fleet representative engine. Development of new engine, rig, and laboratory test methods necessary to evaluate fuels which differ from traditional hydrocarbon, refinery based fuels. The data from that testing will be used to support the update of FAA guidance materials for detonation testing and fuel and lubricants approval.

Testing to address the capability to measure lead emissions and bulk gas exhaust emissions from general aviation (GA) engines will be performed. Additionally, research will also examine the impact to safety and operational changes from technologies that could be used to modify the GA legacy piston engines to run on significantly reduced octane unleaded fuels.

2. What Is This Program?

This program will provide data and support to update or create new certification standards and Advisory Circulars (ACs) that promote continued airworthiness of aircraft engines, fuels, and airframe fuel management systems. The Agency also publishes information and sponsors technology workshops, demonstrations, and other means of training and technology transfer related to alternative fuels for GA aircraft, and reviews the specifications and practices recommended by recognized technical societies like ASTM International and SAE International.

The intended outcome is to provide data and research to support the safe transition of the fleet to an unleaded aviation gasoline and lessen aviation environmental impacts to air and water from operation of GA aircraft by enabling the industry to provide safe, secure, and renewable fuels.

The NextGen - Alternative Fuels for General Aviation Program works with the following industry and government groups:

- Unleaded Aviation Gasoline Transition Aviation Rulemaking Committee and the follow-on post-ARC government and industry framework.
- Aircraft Safety Subcommittee of the Research, Engineering and Development Advisory Committee (REDAC) – representatives from industry, academia, and other government agencies annually review the program's activities.
- Technical Community Representative Groups – FAA representatives apply formal guidelines to ensure the program's research projects support new rulemaking and development of alternate means of compliance with existing rules.
- The Coordinating Research Council (CRC) Unleaded Aviation Gasoline Development Group – representatives from ExxonMobil, ConocoPhillips, Chevron, BP, Cessna, Hawker Beechcraft, Teledyne Continental Motors, and Lycoming Engines facilitate two-way transfer of technology between government and industry to benefit all participants.
- Environmental Protection Agency (EPA).
- Aerospace manufacturers.
- Aerospace repair stations and maintenance organizations.
- Aerospace industry associations, such as the General Aviation Manufacturers Association (GAMA) and the National Business Aviation Association.
- Aircraft user groups, such as the Aircraft Owners and Pilots Association and the Experimental Aircraft Association.
- Private, commercial, government, and military operators.
- International airworthiness authorities.
- Standards development groups, such as ASTM International and Society of Automotive Engineers (SAE).
- Academia and national laboratories.

Partnerships include:

- Unleaded Aviation Gasoline Transition Aviation Rulemaking Committee and the follow-on post-ARC government and industry framework.
- CRC Unleaded Aviation Gasoline Development Group – includes ExxonMobil, ConocoPhillips, Chevron, BP, Cessna, Hawker Beechcraft, Teledyne Continental Motors, and Lycoming Engines; this

group facilitates two-way transfer of technology between government and industry to benefit all participants.

- ASTM International Standard Practice for Evaluating the Compatibility of Proposed Fuel or Additives with Aviation Otto Cycle Fuels and ASTM TF –the group is developing the alternative aviation piston fuel guidance protocol for unleaded fuel and additive (ASTM) specification approval.
- Cooperative Research and Development Agreements with engine, airframe, and fuel OEMs and enabling technology developers.

In FY 2012, major activities and accomplishments planned include:

- Evaluated the performance of a fleet representative, naturally aspirated engine on ultra-low lead fuels.
- Evaluated the impact based on approved fuels on the GA fleet from the reduction and eventual removal of lead from aviation gasolines.
- Evaluated the safety and performance of high compression engines on unleaded, mid-octane aviation alkylate fuel.
- Completed a flight-test plan for in-flight detonation and performance safety evaluation of turbocharged fleet representative engine using unleaded, high-octane fuel.

The NextGen – Alternative Fuels for General Aviation Program supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation. The FAA will work with the GA community and the Environmental Protection Agency to evaluate the safety, environmental impact, and performance of alternatives to conventional GA fuel. Near-term research will evaluate the safety and performance of reduced lead and drop-in unleaded fuels and provide data and research to support the development of qualification and certification methodologies for those fuels.

Longer term research will evaluate the safety and performance of quasi-drop-in and biomass derived alternative fuels and provide data and research to support the development of qualification and certification methodologies for those fuels. Longer term research includes full-operating envelope and emissions investigation of biomass derived and high aromatic based fuels. Longer term research will also focus on providing data and a knowledge base to industry stakeholders and certification officials on the effects to the safety of the legacy fleet from deviation of the current specification and fit-for-purpose fuel properties. This research will also evaluate new technologies to ensure safe operation on significantly reduced octane fuels by the legacy fleet. The goals of the focused research endeavors are:

- By FY 2014, complete feasibility assessment criteria for the use of high aromatic additives for octane enhancement and assessment of the use of biomass derived fuels regarding the impact on GA aircraft and engine safety, performance, certification methodologies.
- By FY 2014, establish capability to measure lead emissions from piston engines operating on ultra-low lead and low lead fuels.
- By FY 2015, complete analyses to extrapolate lead emissions over GA fleet.
- By FY 2015, develop methodology and acquire tools for full-operating envelope capability to enhance existing capabilities to evaluate high-output, turbocharged engine performance across the entire operating envelope, including high altitude, high and low temperature, and high and low humidity conditions.
- By FY 2016, complete testing to be used to update FAA guidance and regulatory materials regarding detonation testing and fuel and lubricant approval.
- By FY 2017, develop engine and fuel test methods to evaluate the performance, safety, durability, and operability of unleaded avgas.
- By FY 2018, complete test engine emission evaluation of existing biomass derived and high-aromatic, high-octane fuels.
- By FY 2018, determine feasibility of engine technologies to enable high-compression engines in legacy fleet to safely operate on significantly reduced octane fuels.

3. Why Is This Particular Program Necessary?

While energy efficiency and local environmental issues have traditionally been primary drivers of aeronautics innovation, the current and projected effects of aviation emissions on our global climate is a serious long-term environmental issue facing the aviation industry. Aside from their associated health and welfare impacts, aviation emissions are a considerable challenge in terms of community acceptance of aviation activities and this challenge is anticipated to grow.

In the GA piston engine arena, there is a growing need to find a replacement for current leaded avgas (100LL). Recently, there have been significant actions by the Environmental Protection Agency to reduce ambient air lead emissions. General Aviation now accounts for 45% of all ambient air lead emissions.

The replacement fuel should perform as well as 100LL in GA piston engines. This unleaded high octane replacement fuel must not cause any accidents and should be a seamless, transparent change to the GA community. Unleaded fuel suggestions for replacing the current leaded aviation gasoline have focused on removing the lead and using alkylate, to adding specialty chemicals to as much as half the fuel volume. Both of these proposed solutions will have significant safety impact to the existing fleet. Simply removing lead additives from aviation gasoline would leave a fuel with substantially reduced octane resulting in significant safety impact to the current fleet, with a large percentage of the fleet being unable to be utilized. Attempts to replace the octane that the current lead additive provides have resulted in the need to use very high percentages of specialty chemicals. Use of these specialty chemicals, often as much as 50% of the blend, has resulted in the new fuel being unable to meet the many other safety critical specification and fit-for-purpose properties for which the fleet was designed.

Research will evaluate and characterize new alternative fuel formulations that will have maintained the current level of safety and protected the environment while sustaining growth in air transportation. Research will also evaluate the safety of potential technological additions to aircraft to allow safe operation on fuel with significantly reduced octane.

4. How Do You Know The Program Works?

Recent FAA engine and fuel test data have been used to pass the inclusion of a very-low-lead aviation gasoline specification at ASTM to help states comply with the recent EPA reduction in lead NAAQS. FAA data has been used extensively by the Coordinating Research Council to develop unleaded fuel octane model response matrices to predict full-scale engine behavior of a sub-class of unleaded fuels to its octane value.

Almost all of the work is planned and directed toward the development and improvement of current FAA regulations and guidance for approval of unleaded fuels. Further, the NextGen – Alternative Fuels for GA program will publish reports and present findings at peer reviewed councils and standards bodies.

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A reduction in funding for the NextGen - Alternative Fuels for General Aviation Program could delay the empirical testing and assessments needed to produce data to determine the certification impact and safety assessment of whether the near term reduction in lead content of aviation gasoline could meet the estimated EPA target. More specifically, the EPA's October 2008 90% reduction in National Ambient Air Quality Standard (NAAQS) for allowable ambient air lead inventory included specific regulatory requirements for lead monitoring at and around airports. By Jan 2017 all states have to be in compliance with the new NAAQS regulations. Very recently a major environmental group in California announced their intent to sue every distributor and retailer of leaded aviation gasoline in California, including major oil producers and small airports. Sited for the suit was a 2008 EPA report on the negative health and welfare effects from leaded avgas. Slight reductions in funding will delay the completion of significant testing that is foundational for follow-on research. As an example, lack of funding to complete the lead memory testing to address the real impact of combustion lead deposits on unleaded fuels will result in significant increases to certification, cost, schedule, and testing burden to the aviation community.

Moderate to Severe budget cuts will result in a significant impact to the industry as the safety research will not be completed to support the necessary development and modification of existing regulatory guidelines for recertification of the entire fleet on a new unleaded aviation gasoline. This would likely push the completion of this necessary research past the Jan 2017 lead NAAQS deadline and result in significant curtailing of aviation operations. Due to the economic benefit of general aviation to our country this could have measureable employment and economic impact.

Detailed Justification for – A12.a Joint Planning and Development Office

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – Joint Planning and Development Office (JPDO)

Activity/Component	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	Difference from FY 2012 President's Budget
A12.a Joint Planning and Development Office	$13,792,000	$5,000,000	$12,000,000	+$7,000,000

For FY 2013, $12,000,000 of funding is requested for the JPDO to provide the following activities:

National Goals for UAS Integration
- Formulate the strategic National program plan for UAS integration
- Refine NextGen partner agencies' requirements for UAS operation
- Conduct cost, benefit and risk assessments using modeling and simulations of relevant scenarios to establish possible transition steps and milestones
- Analyze policy options and implications for UAS integration

Interagency Data Exchange Definition and Policies
- Continue to identify information data sharing requirements, processes, and applications that can be applied within specific functional areas (such as surveillance) which can then be shared for use by all NextGen partner agencies.
- Utilize the virtual interagency test environment to address the UAS information sharing and infrastructure requirements, policies, and standards of all agencies (Federal, Local, and State) without impacting the operational environment upfront.

NextGen Research Priorities
- Continually identify, define and coordinate research gaps related to UAS and Trajectory Based Operations (TBO)
- Review technology developments and innovation to recommend opportunities for technology transfer among Federal entities and/or industry
- Apply program management and integration to ensure research content (needs and priorities) is updated within the Joint Planning Environment, a database framework that supports interagency decision-making and plans

Public/Private Partnerships
- Engage industry stakeholders via the NextGen Institute
- With the Institute, continue to develop, test, review and document stakeholder perspectives on NextGen concepts and analyses including the Trajectory Based Operations (TBO) safety case, weather and harmonization of global implementation of air transportation
- Define and conduct a series of stakeholder engagement forums to formulate the UAS program plan across Federal entities
- Convene the Senior Policy Committee (SPC) for the Secretary of Transportation

Federal Requirements for Surveillance Data and Sensors (Integrated Surveillance)
- Define and conduct a series of forums to identify independent activities of the surveillance mission partners that should be synchronized.
- Conduct technical and policy analyses to support governance of joint surveillance capabilities
- All of the above activities will ultimately result in Federal surveillance systems that communicate with each other thereby ensuring common situational awareness that avoids conflicting efforts and costs

2. What Is This Program?

The JPDO executes collaborative processes to ensure efficient coordination between all Federal partners whose decisions impact NextGen, namely the Federal Aviation Administration (FAA), NASA, and the Departments of Defense, Homeland Security and Commerce. The JPDO provides a National "big-picture" perspective that encompasses a broad Federal view of NextGen. The Office is developing a framework for NextGen planning and development, identifying and prioritizing key multi-agency concerns, and driving consensus in the development of investment choices and decisions thereby improving efficiencies, ensuring cross-Federal compatibility, and reducing costs.

In the completion of its work, the JPDO conducts and disseminates a wide variety of studies including cost, benefit and risk assessments; policy analysis; modeling and simulation; and program management and integration. The JPDO was established in 2003, when Congress enacted NextGen under Vision 100 – Century of Aviation Reauthorization Act (P.L. 108-176). Maintaining the NextGen vision and facilitating a public/private partnership to manage critical collaborations needed to make NextGen a reality are among the JPDO's responsibilities.

The JPDO convenes the SPC to provide strategic policy guidance for NextGen. For example in FY 2011, SPC direction enabled the JPDO to engage more than 60 experts from five agencies to initially describe the current, Government-wide research plan for UAS. The SPC is chaired by the Secretary of Transportation and its members include the heads of the participating departments and agencies, as well as the Director of the Office of Science and Technology Policy and the Office of the Director of National Intelligence (ex officio). In support of the SPC, the JPDO governance structure has a Board, chaired by the JPDO Director, whose members are executives from each department/agency who meet quarterly and work continuously to resolve issues directed by the SPC.

The JPDO is comprised of employees from FAA and the other Federal partners. This ensures that all the partners may benefit from a multi-departmental perspective when developing future plans, contract requirements, technical specifications, etc. The JPDO workforce actively facilitates and engages researchers, program managers and executives from among the partner agencies to formulate the interagency view.

The private sector is also an integral part of JPDO's work. In 2006, the NextGen Institute was established as an alliance of major aviation stakeholder communities to ensure industry engagement. The Institute, together with nine government/industry Working Groups, helped formulate the vision for NextGen. Today, the Institute continues to host public/private forums and to bring the right experience and range of viewpoints to inform NextGen analyses. With the Institute, the JPDO has taken steps to ensure NextGen will work seamlessly with other global aviation systems focusing on stakeholder priorities.

The JPDO work directly links to the DOT Strategic Goal of Economic Competitiveness and the FAA's "Destination 2025" goals.

Activities and planned accomplishments for FY 2012, representing a significantly de-scoped research plan for the JPDO compared to prior years, include:

- Formulate the national program planning approach for UAS integration into NextGen emphasizing interagency requirements and gap assessment.
- Leverage NASA resources to conduct cost, benefit and risk assessments directed toward UAS, weather and information data sharing.
- Refine interagency concepts for surveillance sensors and data (called Integrated Surveillance) that will ultimately lead to cost-effective acquisitions addressing civil aviation, defense and homeland security missions.
- Archive all net-centric test bed prototypes that demonstrate how aviation data can be securely accessed by all agencies in the conduct of their missions and promote best practices across Government. Some mature activities will be transitioned for single-agency leadership.

- Streamline stakeholder engagement under the NextGen Institute by replacing standing working groups with an efficient "study team" model. Complete and document existing working group activities in areas such as security, net-centric operations, environment, aircraft certification and operations while continuing TBO safety case planning and weather customer forums under the new structure of study teams and workshops. Our study team model ensures that all points of view are considered and stakeholder priorities are known at the inception of strategic concept definition.

For FY 2013, activities will build on the FY 2012 transition.

1. National Goals for UAS Integration

UAS play an increasing role in both federal and civil missions including homeland security, national defense, law enforcement, weather monitoring and surveying. To date, analysis has focused on identifying and defining research programs to address the technical barriers to their interoperation with manned vehicles in the NAS. In FY 2011, the JPDO partner agencies collaborated on the development of a UAS Research and Development Roadmap. With all partner agencies contributing expertise, the JPDO produced and delivered to OMB a comprehensive roadmap which identified the research gaps and opportunities for UAS integration in the NAS.

In FY 2013 with $3,149 thousand, the JPDO will undertake a new effort and lead the NextGen partner agencies in the formulation, development and tracking of a program plan that identifies National goals for UAS integration into the NAS. This program plan will include agency requirements, transition steps, coordinated activities and milestones in order to accelerate strategic decision making on UAS implementation issues.

2. Interagency Data Exchange Definition and Policies

Information data sharing among federal networks and systems is critical for the transition to NextGen. Full NextGen capabilities cannot be realized without ensuring that the right parties have the right information at the right time. The JPDO has facilitated the development of an information sharing approach that focused on shared understanding, incorporating technical components and leveraging existing interagency infrastructures. The JPDO has developed the NextGen Information Sharing Environment (NISE) which is a holistic and cyclical framework to identify the common set of requirements the community will use to facilitate information sharing across the enterprise.

In FY 2013, with $1,687 thousand, the JPDO will use its interagency collaboration best practices to maintain the management role and governance of the NISE. This role will facilitate the continued development of communities of interest, define enterprise information sharing support agreements, direct configuration control of the environment and sustain shared understanding development. This effort will result in cost savings to the Nation by reducing duplicative efforts in information sharing activities.

3. NextGen Research Priorities

Trajectory based operations (TBO) is a king pin to achieving the ultimate NextGen vision. TBO will provide additional capacity and increase flexibility through precision performance against agreed to and predictable flight paths that are managed by automation to ensure safety. Automation will monitor aircraft performance against a known flight path and detect and resolve potential conflicts, freeing the human from detecting and correcting these situations as they arise. The automated nature of this approach will enable more predictable flights thereby increasing capacity.

The JPDO and its partner agencies recognize the potential benefits of TBO and are simultaneously executing various efforts. In FY 2012, the JPDO deferred refinement of long-term research priorities for trajectory based operations, including human systems integration, air/ground automation, software verification and validation and cyber-security unless they are directly related to UAS integration in the NAS.

In FY 2013 with $1,316 thousand, the JPDO will lead the effort with the partner agencies to identify the necessary research priorities needed to recognize a full TBO environment. The JPDO will provide an overall map with associated interagency budget requirements identifying where activities are required and develop an interagency TBO program plan for execution. This interagency TBO program plan will indicate required research items, policy issues, requirements for implementation and cross organizational agreements. By documenting this interagency TBO program plan, the partner agencies can address issues before they become impediments to progress. The interagency TBO program plan will be incorporated into the Joint Planning Environment.

4. Public/Private Partnership

In FY 2013 with $1,592 thousand, will continue to forge private/public partnerships, most notably, convening the Senior Policy Committee (SPC) for the Secretary of Transportation. JPDO staff will organize the Committee's agenda, apply technical knowledge to prepare briefings for Committee Members, document actions and carry out those actions that are fully interagency in nature.

Also notable, the NextGen Institute will continue to provide a mechanism for private sector engagement in the definition of NextGen though study teams, workshops, information sharing forums and potentially, funded tasks. To support the JPDO's FY 2013 activities, the private sector will likely be asked to participate in UAS workshops on refining capability maturity, TBO Safety study teams or workshops to define gaps in TBO safety related issues, a TBO Concept of Operations definition effort, and forums related to weather and harmonization of global implementation of air transportation. Other activities may be added as they are determined.

5. Federal Requirements for Surveillance Data and Sensors (Integrated Surveillance)

Individual departments and agencies need data and sensors to see all aircraft (cooperative and threats) to meet its own mission. The JPDO led the development of the Integrated Surveillance Support Office (ISSO) at the direction of the SPC. The ISSO acts as the dedicated technical support capability for the governance of national air surveillance. The intent behind the ISSO is to provide independent technical analysis to support collaborative efforts of the partner agencies.

In FY 2013, with $1,817 thousand, the JPDO will continue its efforts to coordinate partner agency activities in the development of technical planning documents which will lead to a formal interagency coordination process for research and development, requirements development and validation, and acquisition of IS capabilities. Specifically, in 2013, the JPDO/ISSO will perform analysis leading to two joint DOT/DHS/DOD/DOC decisions: (1) national surveillance sensor capabilities for non-cooperative aircraft and (2) software that will enable all mission partners to share a common operating picture.

3. Why Is This Particular Program Necessary?

The JPDO provides the multi-agency governance that guides the development of the Nation's air transportation system. The JPDO convenes the Senior Policy Committee, comprised of Cabinet-level Secretaries, to develop goals, align resources, and ensure that stakeholders are involved in decision-making. This dialogue will help prevent duplication and will ensure NextGen systems will work with those of the other Federal partners. The JPDO ensures research coordination with the international community so that NextGen will work seamlessly with other global aviation systems.

The FAA's main focus needs to be NextGen implementation and its normal operational issues. The JPDO is "future" focused and provides coordination among all the Federal partners affected by NextGen decisions. In the future, use of airspace will be more integrated, considering civil aviation, defense and homeland security. This need for integration will make airspace more complex while all missions must operate together. Further, the pace of technology is unfolding rapidly requiring all departments to have full situational awareness of new developments. The JPDO provides the common view.

The JPDO is comprised of employees from both FAA and the other Federal partners (FAA employees represent about 50 percent of the JPDO Federal workforce). This ensures all the partners have the benefit from a multi-Departmental perspective when developing plans. It is more difficult for the FAA to properly consider the implications of its decisions on other Federal systems. The JPDO provides a broader perspective and insights that help Departmental decision-makers in reviewing FAA's NextGen related resource requests and in considering the impact of NextGen decisions on other Administration entities.

The JPDO, working together with partner agencies and industry, defines the capabilities and mechanisms that enable the national air transportation system to accommodate a wide range of customers. The JPDO has a strategic view, assessing needs for research, technologies and policies in a dynamically changing global environment. Because the JPDO is not a research performer, implementer or operator, its role is well-suited to analyze a range of possible solutions and guide the Federal partners to one successful solution that best meets the needs of all the partners.

In recent studies, the Government Accountability Office (GAO) and Office of the Inspector General (OIG) have reported the need for technology transfer, research into human factors and weather, development of integrated surveillance capabilities and integration of UAS. The JPDO's work plan is actively emphasizing these key areas with government and industry partners.

4. How Do You Know The Program Works?

The following items are recent examples to illustrate how JPDO efforts translate into technology transfer and agency action:

- The SPC, a cabinet-level decision-making body chaired by DOT, relies on JPDO support. In 2010, the SPC endorsed the JPDO's Integrated US Air Surveillance Governance Report and called for its expedited implementation as part of the Air Domain Awareness initiative led by DHS. During 2011, the JPDO demonstrated efficient surveillance information exchanges among agencies utilizing a combination of operational and prototype net-centric implementations that forged new partnerships between agencies and industry. Importantly, areas were identified where agencies can now realize potential cost-savings through consolidation of systems and capabilities.
- The SPC charged the JPDO with leading interagency coordination of research toward integration of UAS into the airspace. In 2011, every NextGen partner participated in the initial development of a UAS R&D Roadmap. As stated in the report, FAA's progress to define a clearer path toward certification and routine UAS operations can be accelerated by leveraging research at NASA and DOD while these partners also benefit from stronger FAA involvement in their research programs.
- Prior JPDO analyses identified human factors research, including the balance of human and automation roles for NextGen, as a gap. This gap, if not addressed, would constrain the roles of human operators to current tasks and prevent efficiency gains that automation can provide. During 2010, the JPDO worked with NASA and the FAA to produce a Human Factors Research Coordination Plan. The agencies are executing according to that plan during the current budget formulation cycle.

- In 2008, the JPDO, FAA and NASA established Research Transition Teams to facilitate transfer of research in four areas. In 2011, one of those teams, Flow Based Trajectory Management, successfully completed their effort. The team had defined a common outcome, agreed on roles, and developed means to evaluate, monitor, and report results. Specifically, proven NASA prototype capabilities were mapped to the particular automation systems on which FAA will evaluate implementation strategies.

- The JPDO works with DOC, FAA and DOD on developing a vision for aviation weather management that is focused on the aviation user. The JPDO regularly facilitates a senior executive panel, known as the NextGen Executive Weather Panel, who oversaw the development of a joint program plan. Aligned with the joint plan and its weather information governance structure, during FY 2011 the FAA and the National Weather Service demonstrated the ability to share and discover many types of weather data within an interagency, net-centric environment.

- In 2010, the JPDO conducted a study on flight prioritization and outlined a framework for best equipped best served options, a concept of critical importance to airline operations that was not well-defined in the early NextGen vision. The JPDO's policy analysis and strategic framework provided the basis for discussion by the FAA's NextGen Advisory Committee to identify the single preferred option for the airlines.

The Research, Engineering and Development Advisory Committee (REDAC) endorsed this level of funding for the JPDO. The REDAC reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

Without the requested funding, the JPDO may cease to exist. In FY 2012, the JPDO managed a severe budget reduction through re-prioritization, reduction and/or elimination of every task, activity and job position for ongoing or planned FY 2012 research. Every existing JPDO contract task order was modified in scope or performance period during FY 2012, and backfill of vacant FAA positions was deferred several months to save costs. The JPDO continued a few high priority activities in FY 2012 through judicious management of prior year funds and unexpired contracts. Partner agency contributions (personnel or funding) for the JPDO, which depend on matching FAA resources, were also reduced in FY 2012. These one-time strategies will enable the JPDO to produce a few quality products during FY 2012; however, the FAA cannot repeat this strategy. Plans call for no unexpended funds for the JPDO beyond October 2012.

The JPDO ensures efficient coordination and collaboration among NextGen partner agencies. It addresses key interagency priorities identified by the SPC for NextGen. Without the benefit of a dedicated, co-located interagency entity, the Nation can expect increased costs due to both the duplication of systems and the development of systems that will not work together for all missions (civil, defense and homeland security). The JPDO maintains a future focus and is able to provide the broader perspectives and insights that are necessary for Department decision-makers to review and assess NextGen investment and policy decisions. For example:

> Demand for UAS access to the National Airspace System (NAS) is increasing rapidly with the US Government expected to invest more than $19B for UAS during the next three years. JPDO will lead efforts with the NextGen partners to develop a program plan that identifies the National goals for UAS integration into the NAS including agency requirements, transition steps, coordinated activities and milestones.
>
> Every agency needs data and sensors to see all aircraft (cooperative and threats) to meet its own mission. JPDO will ensure there is an understanding of individual agency mission needs, capabilities, and requirements, resulting in coordinated solution decisions. Without cross-agency requirements and implementation plans, duplication, inefficiency and gaps will exist resulting in

individual and uncoordinated solutions. Consequently, there is an increased risk to national security.

Information is the backbone of NextGen. The capabilities detailed in the NextGen Concept of Operations will not be successful without ensuring that the right parties have the right information at the right time. The JPDO will coordinate with partner agencies to identify information exchange requirements which will reduce the cost of having multiple stove-piped systems that cannot quickly communicate.

National aviation-related policy issues that the partner agencies have identified as important in NextGen implementation will not be addressed without this program, leading to uncoordinated FAA NextGen decisions which will have a negative impact on other Federal systems.

Detailed Justification for
A12.b NextGen – Wake Turbulence

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – NextGen - Wake Turbulence

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A12.b NextGen - Wake Turbulence	$10,664,000	$10,674,000	$10,350,000	-$324,000

For FY 2013, $10,350,000 is requested for NextGen - Wake Turbulence research. Major activities and accomplishments planned include:

- Develop high level concept for practical application of dynamic wake separations in air traffic control.
- Provide analysis support to airports with closely spaced parallel runways (parallel runways with less than 2500 feet between their center lines) to identify needed changes to enable better arrival capacity when weather causes them to shift to instrument flight rules operation.
- Collaborate with the European participants of the Single European Sky ATM Research (SESAR) program in developing wake turbulence mitigation solutions for the NextGen/SESAR era operations.
- Conduct experiments, develop analysis tools and host aviation community forums to define, in terms of a wake turbulence hazard, unacceptable level of wake turbulence for an encountering aircraft.
- Conduct data collection and analysis to determine the characteristics of wake vortices generated by aircraft – statistical foundation for wake separation standards and wake modeling enhancements.
- Incorporate wake turbulence data analysis results into wake transport-and-decay models and utilize models to review proposed air route and terminal airspace change proposals.
- Develop modeling and other analysis tools required for evaluation of wake encounter risks of Trajectory-Based and other NextGen era operational concepts.
- Continue development of crosswind based concept feasibility prototype for use in determining reduced air traffic control wake mitigation separations to be applied between aircraft arriving to a single runway.
- Provide wake turbulence evaluation support in determining wake separation standards to be for new aircraft being introduced into the NAS.

The program provides the research to achieve near-term objectives of increasing airport runway capacity by reducing aircraft wake separation minima under certain conditions. The program also provides the research and analysis to answer the Next Generation Air Transportation System (NextGen)-era questions of:

- What wake turbulence mitigations will be required in implementing Trajectory-Based Operations?
- How can more aircraft be accommodated in high-demand airspace (terminal and en-route) and still be safe in terms of wake turbulence?

In FY 2013, NextGen - Wake Turbulence Program will continue its NextGen near- and mid-term research agenda, addressing wake turbulence restrictions in today's terminal and en route airspace and in the future NextGen airspace designs. Program outcomes include:

- Increasing runway capacity at airports and capacity for more flights in high-usage airspace
- Providing more capacity-efficient wake separations to aircraft with the same or reduced safety risk

2. What Is This Program?

The NextGen - Wake Turbulence Program conducts applied research to improve, in terms of flight efficiency and safety, aircraft-separation processes associated with today's generalized and static air navigation service provider (ANSP) wake-turbulence-mitigation-based separation standards. As an example, during periods of less than ideal weather and visibility conditions, implementation of an air navigation service provider (ANSP) decision support tool that adjusts required wake separations based on wind conditions would allow ANSP to operate at arrival rates closer to their visual flight rule arrival capacity. Additionally, the research program is developing wake-mitigation application solutions that safely enable reduced aircraft separations in congested air corridors and during arrival and departure operations at our nation's busiest airports.

This program supports the DOT Strategic Plan 2010-2015 Goal "Economic Competitiveness" in the following areas:

- Maximum Economic Returns on Transportation Polices and Investments in Aviation – NextGen-Wake Turbulence research will provide the information and develop the technology for safe, capacity efficient wake separation standards as a component of DOT's commitment to "Implement procedures with supporting infrastructure to increase the efficiency of individual flights, deliver capacity for high density operations, and maintain capacity in low-visibility conditions. (see page 37 of DOT's Plan)
- Advance U.S. Transportation-Related Economic Interests in Targeted Markets Around the World – NextGen – Wake Turbulence research accomplishes by its work in obtaining globally accepted air traffic control wake separation standards and procedures a component of DOT's commitment to: "….. advocate worldwide adoption of harmonized standards and global technical regulations (GTR) through participation in bilateral and regional forums or international organizations at the ministerial and working levels." (see page 41 of DOT's Plan)

Specific goals set for the NextGen – Wake Turbulence research in support of the strategic DOT/FAA goals are:

- By FY 2013, develop as requested, airport specific instrument flight rules (IFR) closely spaced parallel runways (CSPR) approach procedures that would insure wake safety and increase IFR capacity of the airport's CSPR.
- By 2016, develop the algorithms that would be used in the ANSP and flight deck automation systems (if required) for setting and monitoring dynamic wake separation minimum between aircraft and surrounding aircraft.

This research addresses the needs of the FAA Air Traffic Organization and works with the agency's Aviation Safety Organization to ensure new capacity-efficient procedures and technology solutions are safe and that the airports and air routes targeted for their implementation are those with critical needs to reduce airport capacity constraints and air route congestion. The research program works with controllers, airlines, pilots, and aircraft manufacturers to include their recommendations and ensure training and implementation issues are addressed in the program's research from the start. Customers include pilots, air traffic control personnel, air carrier operations, and airport operations. Stakeholders include the Joint Planning and Development Office, commercial pilot unions, FAA ANSP unions, other International Civil Aviation Organization (ICAO) air navigation service providers, and aircraft manufacturers.

In addition to maintaining its partnership with the agency's Aviation Safety organization, this research program accomplishes its work via working relationships with industry, academia, and other government agencies. The coordination and tasking are accomplished through joint planning/reviews, contracts, and interagency agreements with the program's contributors:

- John A. Volpe National Transportation Systems Center
- The Center for Advanced Aviation System Development
- The National Aeronautics and Space Administration (NASA) Langley Research Center (NASA-sponsored research)

- The European Organization for the Safety of Air Navigation (EUROCONTROL) and associated research organizations (coordination and shared research)
- Massachusetts Institute of Technology's Lincoln Laboratory
- National Center of Excellence for Aviation Operations Research
- National Institute of Aerospace

In FY 2012, major activities and accomplishments planned include:

- Maintained and added to the world's most extensive aircraft wake transport data and analysis database – statistical foundation for wake separation standards and wake modeling enhancements.
- Obtained RTCA agreement on weather observation parameters to be transmitted from aircraft – vital to the development of dynamic wake separation processes.
- Incorporated wake transport and decay as well as aircraft navigation performance analysis results into FAA wake-encounter risk models.
- Initiated development of wake turbulence mitigation processes/procedures to support the NextGen era operational environment.
- Continued development of crosswind based concept feasibility prototype for use in determining reduced air traffic control wake mitigation separations to be applied aircraft arriving to the same runway.
- Collaborated with European participants of the Single European Sky ATM Research (SESAR) program in developing wake turbulence solutions for the NextGen/SESAR.
- Evaluated reports of wake turbulence encounters as part of the FAA Safety Management System assurance process for changes to Air Traffic Control (ATC) procedures.
- Continued to conduct experiments, develop analysis tools, and host aviation community forums to define, in terms of a wake turbulence hazard, what is an unacceptable level of wake turbulence for an encountering aircraft.
- Provided analysis support to airports with closely spaced parallel runways to identify needed changes to enable better arrival capacity when weather causes them to shift to instrument flight rules operation.
- Continued development of wake turbulence transport and decay modeling tools for use in evaluating proposed Trajectory-Based and other NextGen era operational concepts.
- Provided wake turbulence evaluation support in determining wake separation standards for new aircraft being introduced into the NAS.

In FY 2012, the FAA continued its development of the capabilities needed to enable aircraft separation processes supportive of NextGen shared separation and dynamic spacing in super density operations. These capabilities are highly dependent on technologies that accurately predict aircraft tracks, the track/decay of their generated wake vortices and the provision of this information to pilots and controllers. Some aspects of the NextGen Concept of Operations are dependent upon the aircraft being a participant in efficient, safe air traffic control processes that would minimize the effects of required wake turbulence mitigation on the flow of air traffic in all weather and visibility conditions. The NextGen - Wake Turbulence research will result in enhanced technology assisted processes for safely mitigating aircraft wake encounter risks while optimizing capacity, for all flight regimes, including the effects of weather.

3. Why Is This Particular Program Necessary?

Wake turbulence research has provided and will continue to provide the data, analysis, models and aircraft wake turbulence information collection systems that are needed to "bring to market" wake mitigation standards, procedures, and processes that allow safe but more capacity efficient aircraft-to-aircraft wake separations. The research has produced airport specific procedures and safety analyses to bring a new air traffic control wake mitigation capacity enabling procedure into everyday operation at airports with closely spaced parallel runways (CSPR). More airports are requesting similar analysis support to allow their use of the dependent 1.5 nm diagonal approach procedure on their CSPR when instrument approach procedures are required. The requested FY 2013 funding will support this activity.

The NextGen – Wake Turbulence Program has produced validated concepts for applying aircraft performance characteristics and runway crosswind information to reduce the required wake mitigation separations applied to aircraft arriving to and departing from an airport's runways. These research products have been transitioned into the FAA F&E projects: Wake Re-Categorization, Wake Turbulence Mitigation for Departures, and Wake Turbulence Mitigation for Arrivals. These F&E projects, when implemented, will provide air traffic control with decision support tools that will allow them to safely reduce the wake separations between aircraft when crosswinds blow the wakes out of the way of trailing aircraft. The reduced wake separations equate to more airport operations per hour when the airport is busiest. Aircraft manufacturers, airports and air carriers agree that squeezing in more operations onto an airport's existing runway structures results in major savings in flight delays during bad weather and time period directly following a major weather event.

The requested FY 2013 NextGen - Wake Turbulence research funding will further explore using predicted and monitored approach corridor crosswinds to allow reduced wake separations between aircraft landing behind each other onto a single runway. This is the next development step after the research's prior work on capacity enabling wake separation solutions for airport CSPR. A wake solution for safely reducing wake separation during instrument flight rule operations to a single runway will allow more operations at an even greater number of the nation's busiest airports.

In 2013, research will continue on wake mitigation solutions that will be needed to effectively achieve the operational benefit of NextGen Trajectory Based and Flexible Terminal Operations. NextGen – Wake Turbulence research will provide safe capacity efficient wake mitigation procedures and processes that must be integrated into the design of future air traffic control tools that implement these concepts. Without NextGen era wake mitigation procedures and processes, the NextGen objective of putting more aircraft through a given airspace or onto a runway will not be fully realized.

4. How Do You Know The Program Works?

The FAA NextGen – Wake Turbulence research applies wake vortex scientific knowledge, technology and modeling to developing feasible safe capacity efficient improvements to the current air traffic control procedures and processes used to mitigate the risk that an aircraft will encounter a hazardous wake generated by another aircraft.

Recent evidence that the research is working is the publishing of FAA Order 7110.308, "1.5-Nautical Mile Dependent Approaches to parallel Runways Spaced Less than 2,500 Feet Apart" in CY2008 with subsequent changes (change 2, September 2010) that have added more airport runway pairs that are allowed use of this airport capacity enhancing wake separation procedure. The order is based on this program's wake data collection and analysis work at Lambert – St. Louis International Airport and other airports in the US and Europe.

Another evidence of the research's effectiveness is the expected operational use in FY11 of an air traffic decision support tool that will advise controllers at George Bush Houston intercontinental Airport when to safely reduce the wake mitigation delay time between departures on the airport's CSPR. NextGen – Wake Turbulence research constructed the operational concept for the decision support tool plus generated the crosswind prediction and monitoring logic for the decision support tool.

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms. This research is reviewed annually by the REDAC's NAS Operations Subcommittee, with its most recent review occurring March 1, 2011. Results of the Subcommittee's review were that the research was vital to the FAA and the aviation community and the NextGen – Wake Turbulence research planned for FY 2013 was appropriate for delivering the research products needed by FAA and other stakeholders (airports, air carriers, aircraft manufacturers, controller, and pilot unions).

5. Why Do We Want / Need To Fund The Program At The Requested Level?

The NextGen – Wake Turbulence research addresses both the FAA's near term needs (capacity enhancing wake mitigation procedures/processes) for current operations and developing wake mitigation solutions that will be needed as FAA transitions to Trajectory Based and Flexible Terminal Operations. The FY 2013 requested funding will provide the needed wake solution concepts and underlying technology, collected data and analyzes in a feasible time frame. Increasing the research funding will not result in the getting the solutions sooner, since there are limited number of researchers that are qualified to work in this problem area and many of them are working the solutions because of this research program. Priority for the research is developing wake separation capacity enhancing changes for today's air traffic control operational environment. A significant reduction in funding would impact the FAA's progress in developing NextGen era wake mitigation procedures/processes and supporting technology/models – specifically delaying the development of the concepts and supporting technology for potential reduction of wake separations during instrument flight rule operations to a single runway.

Detailed Justification for
A12.c NextGen – Air Ground Integration Human Factors

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen – Air Ground Integration Human Factors

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A12.c NextGen – Air Ground Integration Human Factors	$5,603,000	$7,000,000	$10,172,000	+$3,172,000

For FY 2013, $10,172,000 is requested for NextGen – Air Ground Integration Human Factors. Major activities and accomplishments planned include:

Data Communications - Guidance for certification and flight standards personnel

- Displays and User Interface: Recommend minimum requirements for alternative and supplemental data communication displays and controls in the flight crew forward field of view to reduce head-down time.
- Automation: Recommend minimum FMS integration requirements for NextGen 4D trajectory clearances.
- Procedures and Operations: Evaluate and recommend pilot-ATC procedures for negotiations and shared decision making NextGen activities.
- Shared Situation Awareness: Recommend procedures to mitigate loss of available party line information in air/ground radio communications as data communications increase.
- Message Set: Provide recommended human factors improvements to the RTCA SC-214 message set and recommended ICAO training requirements for non-native English speaker proficiency in reading and writing to ensure comprehension and compliance with ATC clearances and instructions transmitted via data communications.

Error Detection and Correction - Guidance for certification and flight standards personnel

- Provide assessment of current design and training methods to support human error detection and correction in NextGen operations.
- Recommend minimum flight deck design requirements and training methods to mitigate mode errors and unintended uses of flight deck equipment in NextGen operations.

Information Requirements - Guidance for certification and flight standards personnel

- Provide inventory of cognitive tasks, associated information needs and recommended display methods for flight deck tasks that require shared flight deck-ATC information.
- Identify human factors issues and mitigation strategies for the use of legacy avionics in NextGen procedures.
- Provide guidelines to address human-automation integration issues regarding the certification of pilots, procedures, training and equipment necessary to achieve NextGen capabilities.

The program continues to assess human system integration issues in use of airborne NextGen concepts, capabilities, and procedures, and Air Traffic Management (ATM) leading to a full mission demonstration by 2017. Each of these research areas, although general in nature, continued to be conducted in the context of specific near-to mid-term NextGen applications such as closely spaced parallel operations, oceanic in-trail procedures, etc. Research continued to enable safe and effective changes to pilot and ATC roles and responsibilities for NextGen procedures and also continued on human systems integration issues related to information needs, interface design and system integration required to support effective guidance for NextGen equipment design, procedure development and personnel training. Research continued to identify and manage the risks posed by new and altered human error modes in the use of NextGen procedures and equipment. Research priorities address the implementation of RTCA NextGen Task Force recommendations as described in the NextGen Implementation Plan.

2. What Is This Program?

The NextGen - Air Ground Integration Human Factors Program supports the DOT Safety Strategic Goal and addresses flight deck and air traffic service provider integration for each operational improvement or NextGen application considered, with a focus on those issues that primarily affect the pilot side of the air-ground integration challenge. Through use of modeling, simulation, and demonstration, the program assesses interoperability of tools, develops design guidance, determines training requirements, and verifies procedures to support certification and flight standards and ATO service units for ensuring safe, efficient and effective human system integration in transitions of NextGen capabilities.

Research goals include:

- Defining, understanding, and developing guidance to successfully implement the changes in roles and responsibilities between pilots and controllers, and between humans and automation required for NextGen capabilities and applications
- Defining human and system performance requirements and guidance for the design and operation of aircraft and ATM systems to include examination of information needs, human capabilities, interface design and systems integration issues
- Developing and applying risk and error management strategies, mitigating risk factors, and reducing human errors

The program provides integration of air and ground capabilities that address challenges for pilots and air traffic service providers. A core human factors issue is ensuring the right information is provided to the right human operators at the right time to make the right decisions. Transitions of increasingly sophisticated automation and procedures must be accompanied by supporting interoperability with baseline systems and refinement of procedures to ensure efficient operations and to mitigate potential automation surprises. Program benefits accrue to pilots and air traffic service providers, and those who perform certification and regulatory oversight of these NAS operators.

The program addresses changes in roles and responsibilities will occur not only between pilots and air traffic service providers, but also for both groups and the respective automation they use to achieve NextGen safety and efficiency gains. Issues such as mode confusion, transitions, and reversions must be understood and addressed to ensure appropriate levels of situation awareness and workload are maintained.

The program focus includes changes in the NextGen environment such as increased reliance on collaborative and distributed decision making. Information must be provided to participants, e.g., pilots, air traffic service providers and airline operation centers in a fashion that facilitates a shared understanding of phenomena, such as weather, wake, etc. The format, content, timeliness and presentation of that information must be well integrated with other information provided to decision makers and their decision support tools.

Program partnerships include researchers who work directly with colleagues in FAA, other government agencies, academia, and industry to support the following R&D programs and initiatives:

- NASA's Aviation Safety and Airspace Programs
- Close collaboration with FAA organizations, notably Flight Standards and Aircraft Certification in the Aviation Safety (AVS) line of business
- FAA Research, Engineering and Development Advisory Committee – representatives from industry, academia, and other government agencies annually review the activities of the program and provide advice on priorities and budget

The NextGen - Air Ground Integration Human Factors Program collaborates with industry and other government programs through:

- Collaborative research with NASA on its safety, airspace and air portal projects including the identification of human factors research issues in the NextGen as technology brings changes to aircraft capabilities
- Cooperative research agreements used with universities to address NextGen human factors issues
- Coordination on research issues and plans with aircraft and avionics manufacturers and operators as well as international civil aeronautics authorities

In FY 2012, major activities and accomplishments planned include:

Roles and Responsibilities

- Completed definition of a standard taxonomy for describing the relationship between flight deck and Air Traffic Control (ATC) automated systems and human operators in the context of NextGen equipment and applications.
- Developed recommendations for function allocation strategies and policy between pilots(s), controller(s), Airline Operations Centers and automated systems to communicate, execute, monitor and resolve conflicts during delegated separation operations.

Human System Integration – Information Needs

- Determined which pilot flight procedures are associated with NextGen applications, using task and information needs analysis techniques, and develop guidelines for each type of procedure in NextGen.
- Completed initial guidance for the design of NextGen flight deck displays and alerts that are compatible with those in ATC, including those required for oceanic in trail procedures.
- Completed initial research to identify human factors issues associated with instrument procedure design and to develop human factors guidelines for instrument procedures.

Human System Integration – Human Capabilities and Limitations

- Completed development of a methodology to address the human capabilities and limitations of pilots (including single-pilot aircraft) to conduct a range of NextGen airspace procedures in normal and non-normal situations.
- Based on pilot performance capabilities and limitations, developed recommendations for system performance requirements and operating limitations that should be applied when using data communications with integrated and non-integrated flight management systems (FMS).

Human System Integration – System Integration

- Completed research to develop flight crew training recommendations for flight deck automation supporting NextGen operations for single pilot and two pilot crews.
- Conducted research to support guidance for data communications procedures, training, displays and alerts.

Risk and Error Management

- Developed guidance to support certification personnel in evaluating risks and mitigation of human error and potential unintended uses of new technology in NextGen systems and procedures.
- Assessed human error impact and mitigation in Automatic Dependent Surveillance-Broadcast (ADS-B) applications including oceanic in-trail procedures, flight deck interval management, and closely spaced parallel operations.

Research will support development of policy, standards and guidance required to design, certify and operate NextGen equipment and procedures from the perspective of Air-Ground Integration. Additionally, this research will include integrated demonstrations of NextGen procedures and equipment in the context of ongoing Air-Ground Integration human factors research. The goals of the focused research endeavors are:

- By 2016 complete research to enable safe and effective changes to pilot and ATC roles and responsibilities for NextGen procedures.
  - By 2013 complete initial research to evaluate and recommend pilot-ATC procedures for negotiations and shared decision making NextGen activities.
  - By 2015 complete research to identify and recommend mitigation strategies to address potential coordination issues between humans and automated systems.
  - By 2016 complete research to identify methods for effectively allocating functions between pilots/ATC and automated systems as well as mitigating any losses of skill associated with these new roles and responsibilities.
- By 2016 complete research to identify and manage the risks posed by new and altered human error modes in the use of NextGen procedures and equipment.
  - By 2013 complete development of guidance to support certification and flight standards personnel in assessing suitability of design and training methods to support human error detection and correction.
  - By 2013 complete initial research investigating methods to mitigate mode errors and unintended uses of NextGen equipment.
  - By 2014 develop initial guidance on training methods to support detection and correction of human errors in near to mid-term NextGen procedures.
  - By 2016 complete research and modeling activities to identify, quantify and mitigate potential human errors in the use of NextGen equipment and procedures.
- By 2016 complete research on human systems integration issues related to information needs, human capabilities and limitations, interface design and system integration required to support effective guidance for NextGen equipment design, procedure development and personnel training.
  - By 2013 complete initial research to identify cognitive tasks, associated information needs and recommended display methods for tasks that require shared flight deck-ATC information.
  - By 2013 complete research to identify human factors issues and potential mitigation strategies for the use of legacy avionics in NextGen procedures.
  - By 2013 complete initial research to address human-automation integration issues regarding the certification of pilots, procedures, training and equipment necessary to achieve NextGen capabilities.
  - By 2014 complete initial research to provide recommendations for displays, alerts, procedures and training associated with data communications.
  - By 2014 complete research to provide initial recommendations for equipment design, procedures and training to support use of 2 ½ to 4 D trajectories.
  - By 2016 complete research to assess procedures, training, display and alerting requirements to support development and evaluation of planned and unplanned transitions between NextGen and legacy airspace procedures.

3. Why Is This Particular Program Necessary?

NextGen involves implementation of new complex systems and flight crew procedures. The NextGen Air Ground Integration Human Factors R&D program supports the FAA Aviation Safety (AVS) team's certification and operational approval processes and also provides tools to address flight crew procedures, maintenance procedures, training development, and continuous safety monitoring. Specific human factors research activities in this R&D program address advanced NextGen procedures such as trajectory operations, and the associated flight deck automation and air ground digital data communications technologies.

The NextGen vision includes a shift to management of traffic by trajectories (Trajectory-Based Operations). Every Instrument Flight Rule (IFR) aircraft that is operating in and managed by the system is represented by a four dimensional trajectory (4DT) either provided by the user or derived from a flight plan by the ground system. The 4DT includes a series of points from departure to arrival representing the aircraft's path in four dimensions: latitude, longitude, altitude, and at least one required time of arrival (RTA). The 4DT gets refined over time as it is used for flight planning through separation management. To be effective, the trajectory must be maintained and exchanged with ground automation at sufficient intervals to reflect the latest detailed data, including intent information. Both controller and pilot must monitor aircraft conformance with the negotiated 4DT, supported by their respective ground and flight deck automated systems. Human factors efforts ensure conformance alerts and recommended recovery maneuvers are consistent and effective.

Data communications permit exchanges concerning complex 4DT clearances. Data communications also reduces errors that can occur when flight crews transcribe and read back voice communications. Planned human factors R&D efforts are addressing flight deck displays, message content, and procedures for disseminating data communications to support transfer of routine ATC clearances, exchange of four dimensional flight plan trajectory information (to support trajectory operations), reroute requests, transfer of voice frequency channels, exchange of near term hazardous weather information, and allow flight crew reports for appropriately equipped aircraft. Current human factors research efforts are addressing data communication message set design factors to prevent recurrence of incidents involving human factors issues such as flight crew misunderstanding of clearances containing terms BY, AT, and EXPECT, and concatenated (compound) clearances with multiple elements.

The NextGen Air Ground Integration Human Factors R&D program includes critical work to ensure flight deck controls, displays, alerts, and procedures that are implemented to achieve the NextGen capabilities related to trajectory operations and associated flight deck automation and air ground digital data communications technologies are compatible with flight crew capabilities and limitations. Specific research plans are developed in coordination with FAA stakeholders including those in the Aviation Safety (AVS) line of business including Aircraft Certification Service and Flight Standards Service, and ATO program offices such as Data Communications, Surveillance and Broadcast Services, and other offices within the NextGen and Operations Planning (AJP) organization. This research provides the foundation for guidelines, handbooks, advisory circulars, rules, and regulations that help ensure the safety and efficiency of NextGen aircraft operations.

4. How Do You Know The Program Works?

Air Ground Integration research and development products inform and support critical NextGen technologies and applications. For example, a human factors analysis of the RTCA SC-214 message set produced recommendations that were incorporated at ICAO. The program is reviewed and evaluated by the Research, Engineering and Development Advisory Committee (REDAC), and in particular the Human Factors subcommittee. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A reduction in funding to the NextGen - Air Ground Integration Human Factors program would defer until FY 2014 the planned FY 2013 completion of development of guidance to support certification personnel in evaluating risks and mitigation of human error and potential unintended uses of new technology in NextGen systems and procedures. This work provides human factors recommendations using scientific and technical information to assist Aircraft Certification Service personnel in their evaluation of new technology supporting NextGen applications. The result is a delay in research products by one year.

Detailed Justification for
A12.d NextGen – Self-Separation Human Factors

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen – Self-Separation Human Factors

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A12.d NextGen – Self-Separation Human Factors	$5,260,000	$3,500,000	$7,796,000	+$4,296,000

For FY 2013, $7,796,000 is requested for NextGen – Self-Separation Human Factors. Major activities and accomplishments planned include:

ADS-B Applications

- Recommend air traffic and flight deck procedures and operating limitations based on human factors research to address cockpit display of traffic information (CDTI) applications such as Closely Spaced Parallel Operations, In Trail Procedures, Enhanced Visual Approach, Interval Management, and Surface Alerting.

Advanced Vision Technologies for Low Visibility Operations

- Conduct human factors simulation and flight trials to evaluate and recommend safe decision height and flight crew qualification and training requirements to allow operations beyond current 14 CFR 91.175 use of Enhanced Flight Vision Systems (EFVS) for approach below minimums to 100 ft., such as operational credit for EFVS for approach to touchdown and operational credit for use of Synthetic Vision Systems (SVS) to 100 ft in low visibility conditions.
- Apply human factors techniques to determine minimum characteristics for aircraft equipage and operational procedures for approval to use EFVS and SVS technologies for additional operations, including surface movement, rollout and takeoff, merging and spacing, or in lieu of certain infrastructure requirements.

Instrument Procedure Design and Use

- Through human factors analysis, identify and evaluate instrument procedure design factors leading to flight crew error in RNAV departures and arrivals.
- Conduct human factors analytical techniques to recommend instrument procedure design guidance, and flight crew procedural and training approaches to mitigate flight crew errors related to characteristics of instrument procedures.
- Develop human factors guidance for procedure designers, including general human factors considerations, procedure naming conventions, and linkage of RNAV/RNP procedures to conventional procedures such as SIDs and STARs.
- Provide human factors recommendations for improved charting to enable complex NextGen operations using paper and electronic depictions of instrument procedures and related NAS navigation infrastructure, such as NRS waypoints, Q routes, T routes, and Taxi routes.

The program continued to assess human system integration issues in use of airborne NextGen concepts, capabilities, and procedures, and Air Traffic Management (ATM) leading to a full mission simulation in 2019. Research priorities address the implementation of RTCA NextGen Task Force recommendations as described in the NextGen Implementation Plan. Research continued to enable enhanced aircraft spacing for surface movements in low visibility conditions guided by enhanced and synthetic vision systems, as well as cockpit displays of aircraft and ground vehicles and associated procedures.

2. What Is This Program?

The NextGen – Self-Separation Human Factors Research Program supports the DOT Safety Strategic Goal and develops human factors scientific and technical information to address human performance and coordination among pilots and air navigation service providers (air traffic controllers), human system integration, and error management strategies to implement NextGen capabilities. Human factors technical information will also support the development of standards, procedures, training, policy, and other guidance material required to implement the operational improvements leading to enhanced aircraft spacing and separation.

Research goals include:

- Evaluating and developing recommendations for operational credit for advanced vision technologies. Because today's scheduling is based on VFR conditions, capacity is significantly reduced with IFR conditions. EFVS and SVS can reduce the impact of weather on the national air transportation system by providing additional information to the pilot despite deteriorated weather/visibility conditions. Human factors research will enable recommendations for policy and rulemaking leading to greater operational credit with low minimums, in direct alignment with the goal of increasing capacity within the national air transportation system.
- Recommending air traffic and flight deck procedures which apply ADS-B technology with CDTI displays to increase safety and efficient operations in high density airspace. ADS-B is a new technology on which the FAA has had very little human factors guidance in the Advisory Circulars and Technical Standard Orders. Although a rule has been issued for ADS-B out, very large gaps exist in regulations, guidance, and standards regarding how ADS-B will be used. CDTI-based applications continue to be developed at a rapid pace, yet these applications have very little or no human factors research behind them. By addressing human factors issues, this research will generate guidance that will help prevent unsafe displays of traffic information and help prevent unsafe operational use of these displays, so that the intended safety benefits of ADS-B can be realized.
- Developing requirements for better depiction of instrument procedures. Research is needed to produce a set of human factors guidelines for design of instrument procedures and associated charts that are usable and flyable by appropriately qualified pilots without being susceptible to making errors. The guidelines should address known difficulties with use of instrument procedures, and also address future instrument procedure requirements. Research results inform regulatory guidance and orders such as FAA Order 8260.3 (TERPS) and associated guidance material for flight checking and operational approval documents (AC 90-100 and AC 90-101), and charting guidelines.

Program partnerships include researchers who work directly with colleagues in FAA, other government agencies, academia, and industry to support the following R&D programs and initiatives:

- NASA's Aviation Safety and Airspace Programs
- Close collaboration with FAA organizations, notably Flight Standards and Aircraft Certification in the Aviation Safety (AVS) line of business
- FAA Research, Engineering and Development Advisory Committee – representatives from industry, academia, and other government agencies annually review the activities of the program and provide advice on priorities and budget

The NextGen Self-Separation Human Factors Program collaborates with industry and other government programs through:

- Collaborative research with NASA on its aviation safety and airspace projects including the identification of human factors research issues in the NextGen as technology brings changes to aircraft capabilities
- Coordination on research issues and plans with aircraft and avionics manufacturers and operators.
- Coordination with appropriate RTCA Committees, e.g., Airborne Separation Assurance System

In FY 2012, major activities and accomplishments planned include:

Surface/Runway Operations Awareness

- Conducted research to evaluate the effects of Enhanced Flight Visibility System (EFVS) Head-Up Display (HUD) clutter and masking on detection of potential ground conflicts during taxi operations across a range of visibility and lighting conditions and develop recommended mitigations.
- Initiated research to evaluate and recommend display methods to ensure pilot awareness of selected operating modes of Cockpit Display of Traffic Information (CDTI), including research to assess manual and automatic methods of transitioning between CDTI display of ground and air traffic for both takeoff and landing operations.
- Conducted research to provide and evaluate alternatives and recommend minimum acceptable cockpit display method(s), alerts, and operational procedures to mitigate the effects of position uncertainty when degraded positioning information or other system failures introduce position uncertainty in closely-coupled all-weather ground operations.

Reduced Separation

- Conducted initial research to evaluate the impact and potential risks associated with use of Traffic Alert and Collision Avoidance System (TCAS) in NextGen procedures.
- For near to mid-term NextGen reduced separation operations, initiated research to develop and evaluate recommendations for pilot/controller phraseology for clearances, instructions and effective communication of degraded systems and residual capabilities as well as transitions to and from NextGen unique airspace and procedures. For closely spaced parallel approach operations, this included abandoning a closely-spaced parallel approach when a blunder or Mode C intruder is detected or in the event of abnormal situations (system malfunction, weather, etc.).

Delegated Separation

- Initiated research to evaluate Automatic Dependent Surveillance-Broadcast (ADS-B)/CDTI displays and procedures in a robust evaluation of merging and spacing operations for a range of controller-specified spacing and a variety of aircraft (not all same carrier or aircraft type).
- Continued research to evaluate and recommend procedures, equipage and training to safely conduct oceanic and en route pair-wise delegated separation.

Cross-cutting

- For proposed delegated separation procedures and equipment, continued research to support development of training guidance for NextGen applications and technologies.
- Continued research to develop risk and error management strategies to identify and mitigate human-system errors.
- Initiated research to develop recommendations for location and grouping of NextGen related displays relative to the primary field of view.

Research will support the development of standards, procedures, training, policy, and other guidance material required to implement the NextGen operational improvements leading to enhanced aircraft spacing and separation including improved awareness of surface/runway operations, reduced separation, and delegated separation. The goals of the focused research endeavors are:

- By 2016, complete research to enable enhanced aircraft spacing for surface movements in low visibility conditions guided by enhanced and synthetic vision systems, as well as cockpit displays of aircraft and ground vehicles and associated procedures.
  - By 2013, evaluate approach decision heights and recommend certification and regulatory changes to allow EFVS and SVS operational credit consistent with human performance factors.

  - By 2015, evaluate and recommend minimum display standards and operational procedures for use of CDTI to support pilot awareness of potential ground conflicts and to support transition between taxi, takeoff and departure phases of flight.
- By 2016, complete research and provide human factors guidance to reduce arrival and departure spacing including variable separation in a mixed equipage environment.
  - By 2014, complete initial research to provide recommended guidance for design of cockpit displays and alerts to support delegated separation.
  - By 2015, complete research to identify likely human error modes and recommend mitigation strategies in closely spaced arrival/departure routings, including closely spaced parallel operations.
  - By 2016, enable reduced and delegated separation in oceanic airspace and en route corridors.
- By 2015, develop a repository of NextGen human factors data containing research roadmaps, results, and data from relevant ongoing and historical research, demonstrations and operational experience to provide a foundation for flight deck human factors research to support policy decisions, standards development, certification and approval to enable NextGen operational improvements, and to ensure the future system adequately considers human systems integration issues.

3. Why Is This Particular Program Necessary?

NextGen involves implementation of new complex systems and flight crew procedures. FAA's Aviation Safety mission dictates that we ensure those systems are reliable and safe, even when they fail, and that we address the operational aspects of these systems. The NextGen Self-Separation Human Factors R&D program supports the FAA Aviation Safety Team's certification and operational approval processes and also provides tools to address flight crew procedures, maintenance procedures, training development, and continuous safety monitoring. Specific human factors research activities in this R&D program address NextGen procedures such as area navigation (RNAV) and required navigation performance (RNP), and NextGen capabilities such as those derived from the use of Automatic Dependent Surveillance-Broadcast (ADS-B) as a surveillance source and to broadcast aeronautical information.

RNAV/RNP procedures provide new arrival and departure routes, and become more effective with performance-based Air Traffic Management capabilities such as time-based metering and the adoption of ATC digital communication that can dynamically define those procedures. With new ADS-B technologies, users will be provided cockpit-based surveillance and near real-time access to aeronautical flight information. In the near term, user situational awareness in both visual meteorological conditions and instrument meteorological conditions (IMC) will be enhanced. Flight crews on the airport surface and aloft will have the capability to detect conflicts or hazards created by aircraft, obstacles, weather areas, airspace restrictions, and airport surface vehicles. In the long-term end-state environment, select spacing, sequencing, and separation tasks may be performed by qualified and certified aircrews/aircraft within defined criteria and/or in designated situations or areas. An example of a key ADS-B initiative is the development of standards supporting Closely Spaced Parallel Operations (CSPO). The NextGen Self-Separation Human Factors R&D program supports studies on simultaneous independent approaches to parallel runways to investigate potential reductions of runway separation standards. By completing the standards and obtaining agreement with the operators on a timeframe for their equipage, airports will likely be able to increase capacity and have greater design flexibility as they plan for new runways.

The NextGen Self-Separation Human Factors R&D program includes critical work to ensure flight deck controls, displays, alerts, and procedures that are implemented to achieve the NextGen capabilities related to RNAV/RNP procedures and ADS-B technologies are compatible with flight crew capabilities and limitations. Specific research plans are developed in coordination with FAA stakeholders including those in the Aviation Safety (AVS) line of business (Aircraft Certification Service and Flight Standards Service), and ATO program offices such as Data Communications, Surveillance and Broadcast Services, and other offices within the NextGen and Operations Planning (AJP) organization. This research provides the foundation for guidelines, handbooks, advisory circulars, rules, and regulations that help ensure the safety and efficiency of NextGen aircraft operations. Initiatives span assessments of new information requirements to allow pilots to safely maintain aircraft separation, especially during low visibility ground operations, and transition of integrated air and ground capabilities to ensure interoperability with baseline systems and refinement of procedures to ensure efficient separation and mitigate potential automation surprises.

4. How Do You Know The Program Works?

Self-Separation Human Factors R&D products inform and support critical NextGen technologies and applications. For example, NASA completed a human factors analysis of the Navigation Reference System (NRS) waypoint nomenclature identified a number of critical human factors issues that are being addressed to minimize error potential in NextGen 4D trajectory operations. The program is reviewed and evaluated by the Research, Engineering and Development Advisory Committee (REDAC), and in particular the Human Factors subcommittee. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program.

5. Why Do We Want / Need To Fund The Program At The Requested Level?

This work allows crews of ADS-B-In – equipped aircraft to efficiently use the ADS-B-In data in flight operations involving multiple applications and modes of CDTI, and enhanced vision operations in lower visibility conditions than were previously possible. Reduction in funding would defer until FY 2014 the planned FY 2013 completion of development of guidance to support Aircraft Certification Service personnel to develop minimum requirements for new and modified flight deck designs to incorporate NextGen displays such as ADS-B/CDTI, Data Communications, and Synthetic and Enhanced Vision Systems. Reduction in funding would also defer achievement of operational capabilities to apply these technologies in high density and low visibility environments by one year.

Detailed Justification for
A12.e NextGen – Weather Technology in the Cockpit

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen - Weather Technology in the Cockpit

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A12.e NextGen - Weather Technology in the Cockpit	$2,507,000	$8,000,000	$4,826,000	-$3,174,000

For FY 2013, $4,826,000 is requested for NextGen - Weather Technology in the Cockpit (WTIC). Major activities and accomplishments planned include:

- Development of Functional Requirements for integrating meteorological (MET) information into the cockpit based on the WTIC ConOps and User Needs studies.
- Perform feasibility study and initial benefits identification of exchanging weather radar between aircraft.
- Methodology for translating meteorological (MET) information into Weather Avoidance Fields and the integration of the translated information into the cockpit.
- Develop user needs and functional requirements for integrating and presenting observation data.
- Perform initial flight demonstrations with real time uplinked presentations of cloud tops and turbulence.
- Perform Human in the loop (HITL) verification of MET symbology set developed by SAE G-10.
- Support RTCA Special Committee 206 development of a MASPS.
- Complete research on Wind Diagnosis and Forecasting requirements to support TBO in the terminal area and FMS optimized profiles.

2. What Is This Program?

Weather-related goals of NextGen include reducing weather delays via increasing capacity and efficiency under adverse weather conditions, enhancing Air Traffic Management (ATM) and aircraft re-routing flexibility to avoid adverse weather, reducing the number of weather-related accidents and incidents, and reduction of emissions through lower fuel consumption resulting from optimized routing and rerouting during adverse weather. To support NextGen in realizing these goals, the overall objective of the NextGen - WTIC Program is to enable availability and enhance the quality and quantity of MET information available to the aircraft to enhance safety and efficiency in commercial, business, and general aviation operations.

The specific goals of the WTIC Program are:

- Reduce Pilot/Flight Crew/ATM workloads to support efforts to increase NAS capacity.
- Support NextGen and other near/mid/far term programs needs for the availability of enhanced MET information.
- Eliminate MET information gaps and meet user needs.
- Make more efficient use of existing data link bandwidth.
- Reduce ambiguity in transmitted MET information.
- Support increased efficiency via timelier decisions in adverse weather, and more optimum routes from enhanced wind and temperature information.

- Reduce the likelihood of recurrence of specific weather-related incidents including those reported in the Aviation Safety Reporting System (ASRS) as well as other safety reporting systems.

WTIC addresses the need to enable better weather decision making and use of MET information in the transformed NAS. This includes integrating MET information tailored for decision support tools and systems into NextGen operations. The project will research the best weather technology to bring MET information into the cockpit and MET information from the cockpit to the ground and cross linked to local aircraft. The project will define the necessary MET information and its presentation to safely and efficiently incorporate it into collaborative decision making relative to adverse weather decisions. It also establishes standards for a "common weather picture" to establish common situational awareness between pilots, controllers, air traffic managers, local aircraft, etc. The project will define Human Factors guidance for effective rendering of MET information to pilots, define required pilot training, and it will use RTCA SC206, SC214, SC223 and SAE G10 to further the project objectives. WTIC will also enhance the global harmonization of MET and Aeronautical Information (AIM) data links and provide recommended guidance for more efficient use of existing data link bandwidth. Through the efficient use of data links, the project will provide a reply/request and contract capability. These data link capabilities enable benefits of increased NAS efficiency and capacity via fewer flight diversions by reducing dependency on voice and paper MET information, timelier decisions in adverse weather, and more optimum routes from enhanced MET information in the cockpit.

Initial WTIC research evaluated the overarching NextGen ConOps and requirements for NextGen MET integration on the flight deck and it identified the current capabilities to meet NextGen requirements. WTIC is currently evaluating planned and funded development of new weather support capabilities and the gaps between NextGen requirements and these developing capabilities. Since WTIC requires data links to support the dissemination of MET information to users in various coverage environments, the program is researching required data link capability for bandwidth, security, quality of service, and reliability. Based on the results of WTIC research, the program will develop functional and performance requirements for cockpit integration of MET information, guidance on the rendering of MET information in the cockpit, and recommended data link architectures for uplinking, downlinking, and cross linking MET information.

In addition, the WTIC human factors (HF) research will enable the development of the human performance, technology design, and human-computer interaction requirements and standards to enable safe, efficient, and cost-effective operations and training. The HF research will attempt to identify shortcomings in current capabilities in order to focus weather technology advancements to optimize the safety and efficiency for Parts 91, 135, and 121 operators.

The information management and the HF research deliverables will enable the development of Air Circulars and Orders for NextGen training, symbology, and information standards; support the development of aircraft certification standards for Minimum Aviation Safety Performance Standards (MASPS), Minimum Operations Standards (MOPS), and Technical Standard Orders (TSO) to support development, operations, and procedures for weather technologies in the cockpit. In addition, the WTIC program research will support the development of the communications information management to include storage and retrieval requirements and standards to acquire MET information from commercial and government provided graphical and textual databases.

By 2015, WTIC will demonstrate that technology and automation, combined with policy, procedures, and regulatory oversight, enables NextGen to meet the weather-related goals listed at the beginning of this section. Demonstrations will show the technology and automation used in the cockpit provides pilots and aircrews with safe and efficient routes and re-routes for aircraft traversing areas impacted by adverse weather conditions.

The germane characteristics of the technology defined in the NextGen Concept of Operations (ConOps) are that it assists collaborative decision-making (pilot, controller, ATM, etc.), leverages both human and automation capabilities, and integrates weather data and information with other necessary operational information to provide decision support and increase situational awareness. In the near term, this technology will be implemented as machine-to-human interface requiring human analysis and processing of visual presentations. In the far term, it will migrate to automated processing via machine-to-machine interfaces between ground-based and aircraft systems. As a result, the NextGen ConOps differs dramatically from current operations regarding weather procedures.

The NextGen - WTIC Program works with FAA organizations, other government agencies, and industry groups to ensure its priorities and plans are consistent with user needs. This is accomplished through:

- Guidance from the Joint Planning and Development Office NextGen initiative through involvement in the Aircraft, Weather, and Integration Working Groups
- Inputs from the aviation community, including weather information providers, technology providers (e.g., avionics manufacturers, etc.), and simulator training centers (e.g., Flight Safety, etc.)
- The annual National Business Aviation Association conference, the Friends/Partners in Aviation Weather Forum, scheduled public user group meetings, and domestic and international aviation industry partners
- Subcommittees of the FAA Research, Engineering and Development Advisory Committee – representatives from industry, academia, and other government agencies annually review program activity, progress, and plans
- Various RTCA Special Committees, including SC-206, and SAE G-10 subcommittees

The WTIC program leverages research activities with members of other government agencies, academia, and the private sector through interagency agreements, university grants, and Memoranda of Agreement. Partnerships include:

- National Center for Atmospheric Research
- National Aeronautics and Space Administration Langley and Glenn Research Centers
- Public and private universities
- Center for General Aviation Research
- Initiatives with airlines, pilots, and manufacturers

In FY 2012, major activities and accomplishments planned include:

- Developed WTIC ConOps for Part 121 and 135, and GA aircraft.
- Developed capability to efficiently disseminate turbulence products to the flight deck.
- Evaluated the usefulness of an in-flight display of uplinked satellite-based product that outlines the 30kft and 40kft convective cloud top heights in a two-hour look-ahead display focused on the aircraft position and flight direction for Pacific Ocean transoceanic flights between California and Australia.
- Demonstrated and assessed the usefulness of the uplinking turbulence eddy dissipation rates (EDR) to the flight deck.
- Benefits analyses of in situ turbulence observations, downlinking turbulence data to enhance ground based models, and uplinking turbulence data to enhance cockpit situational awareness.
- Research and analysis of needs and use of portable devices and observation data.
- Assessed improvements in situational awareness of Multiple Radar Multiple Sensor (MRMS) application in cockpits and aircraft inputs to MRMS.
- Researched pilot decision making in the cockpit using probabilistic weather forecasts and demonstrations with convective weather products integrated into the laboratory simulator.
- Completed initial report of Part 121 User Needs Study to identify use of MET information in the cockpit today and planned use in the future.
- Supported RTCA SC206 to develop architecture and minimal aviation system performance standards for datalink weather products.
- Researched impact of weather on wake turbulence and wake dissipation.
- Simulated and validated data-linked bandwidth, quality of service, security, and latency standards requirements for disseminating graphical turbulence and icing products to the cockpit.

The NextGen - WTIC Program supports the DOT strategic goal of Economic Competitiveness by creating a competitive air transportation system which is responsive to customer needs through NAS on-time arrivals.

Research will enable the development of policy, standards, and guidance needed to safely implement weather technologies in the cockpit to provide shared situational awareness and shared responsibilities. The research goals are:

- By FY 2013, develop MET symbology set (SAE G-10).
- By FY 2013, identify human factors interfaces and automated prototype weather information integration modules for flight deck technologies (e.g., FMS, EFB, etc.).
- By FY2013, complete CALLBACKS and analysis of 100 weather-related incident reports in the Aviation Safety Reporting System (ASRS).
- By FY 2014, simulate and verify cockpit use of data-linked weather decision support tools, including probabilistic forecasts.
- By FY 2014, develop guidance standards for airmen training and evaluation criteria for the use of probabilistic forecast products and pilot decision making support tools.
- By FY 2014, demonstrate the ability to uplink wind information to the FMS.
- By FY 2015, developed recommended datalink architecture to support uplink, downlink, and cross link of MET information to provide common situational awareness and to support the MET information needs of related systems and NextGen activities.
- By FY 2015, flight demonstration to evaluate the integration of four dimension flight path information including data-linked meteorological information into cockpit decision-making and shared situational awareness among pilots and dispatchers supported by NextGen air and ground capabilities.
- By FY 2016, demonstrate capability to disseminate winds and other MET information from the 4D Weather Cube to the cockpit.
- BY FY 2017, identify guidelines, technology, and procedures for secure on-demand interactive NAS demand weather information services.
- By FY 2018, demonstrate dissemination of weather radar data over aircraft MET-network.

3. Why Is This Particular Program Necessary?

Weather has been identified as a causal factor for 70 percent of delays and 20 percent of accidents as cited in "The Mission Need Statement for Aviation Weather (#339)". Having access to more MET information in the cockpit does not necessarily translate into better pilot decision-making and performance. Although technologically advanced graphical weather information products have entered the GA market in the recent decade, the percentage of accidents that have an attributed cause due to weather or weather-related pilot error have remained fairly stable (NTSB, 2006, 2008, 2009). The WTIC program plans to research why the introduction of state-of-the-art weather information products has not dramatically improved the safety of GA operations concerning weather.

The WTIC Program research will enable the adoption of cockpit, ground, and communication technologies, practices, and procedures that will enhance situational awareness. WTIC is necessary to address the lack of MET information standardization since it results in potential safety concerns and a lack of common situational awareness. The lack of standardized MET information and standardized presentation of MET data results in susceptibility to misinterpretation of information and ambiguities.

WTIC is also necessary to research improvements to address a NTSB safety alert related to thunderstorm encounters. In this alert, the NTSB stated that investigations of recent GA aircraft weather-related accidents revealed that aircraft were in contact with ATM, pilots were either not advised or were misinformed about adverse weather conditions, and that the pilots had alternatives available that would have likely averted the accidents. The implication of this alert is that verbalizing a ground MET display to a pilot is difficult. A goal of WTIC is resolve this performance gap.

WTIC is necessary to reduce the use of paper by Part 121 aircraft since it printed text is not conducive to decision making in the cockpit. In addition, the printed text typically contains extraneous MET information and latencies that can make it difficult to interpret.

Other sources of MET information, such as FIS-B, are not suited for inflight pilot decision making due to latencies, a lack of resolution, and susceptibility to misinterpretation since the data presented is not temporally or spatially tailored to specific aircraft. In addition, FIS-B does not replace printed text or voice since it is not intended for primary use.

Finally, WTIC is necessary for global harmonization of AIS/MET datalinks. WTIC will perform research to resolve datalink limitations outside the NAS and incorporating the aircraft was a node in the MET network.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

A reduction in the WTIC FY 2013 total funding will impact at least 14 NextGen Enterprise Architecture (EA) Operational Improvements (OIs) that are linked to four different NextGen Solution Sets. WTIC research is a key element to successfully implementing these 14 OIs, and potentially other OIs. If WTIC is not funded to the requested level, the program will have to reduce the scope of its goals and objectives resulting in incomplete or insufficient research inputs to the OIs supported by the program.

In addition, a reduction in WTIC FY 2013 funding will put at risk the benefits of already completed research to support the dissemination of safety critical inflight icing and graphical turbulence products since the required follow-on evaluations to develop the standards is substantial and would not be effective if partially funded.

One of the main goals of the WTIC program is to provide for a common MET situational awareness between the air and ground. A reduction in funding and the resulting reduction in program scope and goals could result in a divergence of MET situational awareness that may prove to be more costly in the future.

In many cases, WTIC research can not adequately provide required research on schedule to supported Solution Sets if the research is delayed or not fully funded. Many of the WTIC efforts include flight and laboratory demonstrations and proof of concepts that are not conducive to incremental or partial funding. Since WTIC is a centralized program that researches capabilities to provide MET information to the cockpit, the inability of WTIC to successfully complete efforts on time could result in decentralized projects. A decentralization of the research could result in duplicative research efforts being conducted by the various supported Solution Sets to meet their schedule needs thus resulting in higher total costs to NextGen

Detailed Justification for
A13.b NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics

1. What Is The Request And What Will We Get For The Funds?

FY 2013 – NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics

Activity/Component	FY 2011 Enacted	FY 2012 President's Budget	FY 2013 Request	Difference from FY 2012 President's Budget
A13.b NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics	$20,060,000	$23,500,000	$19,861,000	-$3,639,000

For FY 2013, $19,861,000 is requested for NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics. Major activities and accomplishments planned include:

Technology Maturation

- Perform system level assessment of CLEEN aircraft technologies.
- Perform aircraft level noise and emissions reduction performance of CLEEN aircraft technologies.
- Identify technical issues impacting commercialization of CLEEN technologies.
- Perform detailed design review of system components and configurations.
- Perform validation testing and analysis to verify technology performance and environmental impacts predictions.

Alternative Turbine Fuels

- Conduct fuel characterization testing and environmental assessments of additional "drop-in" renewable alternative fuels.
- Conduct sustainability analysis of renewable fuels.
- Assess mechanisms for increasing commercial use of aviation alternative fuels.
- Initiate process for ASTM International approval of additional alternative fuel blends.

Metrics, Goals and Targets

- Refine and evaluate noise and emissions impacts metrics for use in NextGen environmental analysis.
- Reduce key uncertainties in climate impacts of aviation.
- Conduct evaluation of advanced analytical approaches for noise and emissions impacts assessment.
- Refine intermediate targets towards meeting NextGen environmental goals performance targets for Destination 2025 and perform gap analysis.

In FY 2013, the NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics Program will continue to advance system design, integration and testing of Continuous Lower Energy, Emissions and Noise (CLEEN) aircraft technologies for accelerated progress towards flight demonstration and system-wide assessments. For alternative fuels, activities focused on safety, performance, and environmental assessments for qualification of renewable alternative fuels. Activities were also initiated to assess production capacity and fleet infusion for alternative fuels. On the Metrics, Targets and Goals front, activities continued to refine and evaluate metrics for NextGen environmental impacts, advance capability for and assessment of environmental noise, air quality and climate impacts. This also included improved climate impacts assessment under second phase of ACCRI activities. The work also continued to refine estimates of environmental targets and assess gaps towards meeting NextGen environmental goals.

2. What Is This Program?

The program is protecting the environment by reducing significant aviation environmental impacts associated with noise, exhaust emissions, and increasing energy efficiency and availability to enable mobility and scalable capacity growth. Collaborating with industry, the program will advance and mature engine and airframe technologies to reduce aviation noise, air quality impacts, greenhouse gas emissions, and energy use. It will also provide data and methodologies to assess environmental sustainability including life-cycle environmental impact and support certification of alternative aviation fuels that could serve as drop-in replacements for today's petroleum-derived turbine engine fuels. This will lead to faster deployment of these fuels, and accompanying reductions in greenhouse gas and aviation emissions that impact air quality. Ultimately, the program will demonstrate advanced technologies and alternative fuels in integrated ground and flight demonstrations. The program is also helping to achieve NextGen goals by improving metrics to define and measure significant aviation environmental impacts. The program will improve the fundamental understanding of aviation environmental health and welfare and climate impacts, and translate impact into improved metrics that can be used to better assess and mitigate aviation's contribution. This program will identify the gaps in scientific knowledge to support NextGen; focus research in areas that will reduce key uncertainties to levels that allow action; and develop enhanced metrics to enable sound analyses. Ultimately, the program will enable the refinement of goals and targets to support the NextGen EMS to better manage and reduce aviation's environmental impacts to enable mobility and scalable capacity growth.

The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics Program helps achieve NextGen goals to increase mobility by reducing environmental impacts of aviation in absolute terms, including significant community noise, air quality and global climate change. The program is focused on reducing current levels of aircraft noise, air quality and greenhouse gas emissions, and energy use and advancing sustainable alternative aviation jet fuels.

The Program specifically supports the following outcomes:

Demonstrate aircraft and engine technologies that reduce noise and air quality and greenhouse gas emission at the source level, to a developmental level that will allow quicker industry uptake of these new environmental friendly technologies to produce a fleet that will operate more efficiently with less energy usage and permit expansion of airports and airspace capacity in a scalable manner consistent with the environmental goals of the NextGen plan.

Specific activities include developing and demonstrating:

- Certifiable aircraft technology that reduces aircraft fuel burn by 33 percent compared to current technology, reducing energy consumption and greenhouse gas (CO2) emissions
- Certifiable engine technology that reduces landing-and-takeoff-cycle nitrogen-oxide emissions by 60 percent, without increasing other gaseous or particle emissions, over the International Civil Aviation Organization (ICAO) standard adopted at the sixth meeting of the ICAO Committee on Aviation Environmental Protection
- Certifiable aircraft technology that reduces noise levels by 32 decibels at each of the three certification points, relative to Stage 4 standards
- Determination of the extent to which new engine and aircraft technologies may be used to retrofit or re-engine aircraft so as to increase the level of penetration into the commercial fleet

Demonstrate alternative fuels for aviation to reduce emissions affecting air quality and greenhouse gas emissions and increase energy supply security for NextGen.

Specific activities include developing and demonstrating:

- The feasibility of the use of alternative fuels in aircraft systems, including favorable environmental qualification, successful demonstration and quantification of benefits and internationally agreed criteria to quantify relative carbon content
- Processing capability and technical data to support certification and assured safety of a drop-in replacement for petroleum-derived turbine engine fuels

Determine the appropriate enhancements of goals and metrics to manage NextGen aviation environmental impacts that are needed to support Environmental Management Systems (EMSs) and achieve environmental protection that enables sustained aviation growth.

Specific activities include:

- Evaluate, establish, and implement advanced metrics to better assess and control noise, air quality impacts, and greenhouse gas emissions that may influence climate impacts from anticipated NextGen commercial aircraft operations.
- Evaluate and refine required technology and operational goals and targets to mitigate the environmental impact of NextGen and support NextGen EMS implementation.

FAA works closely with other federal agencies (including NextGen Joint Planning and Development Office Environmental Working Group or JPDO/EWG and U.S. Global Change Research Program), industry, academia, and international governments, organizations (e.g. ICAO/CAEP, International Civil Aviation Organization/Committee on Aviation Environmental Protection) and coalitions (e.g. CAAFI, Commercial Aviation Alternative Fuels Initiative) to design research and development (R&D) efforts that can mitigate the environmental impact of aviation and explore alternative gas turbine fuels.

As does the Environment and Energy Research Program and other NextGen activities, the NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics Program relies on a series of Memoranda of Agreement to work closely with NASA and DoD. FAA is also pursuing collaborative agreements with the Department of Energy, and EPA to leverage resources to address aviation's environmental impact.
Through the JPDO, the program supports the EWG comprising FAA, NASA, EPA, DoD, DOC, Council on Environmental Quality, and OST, as well as industry, academia, local government, and community groups. The EWG is pursuing an intensive, balanced approach, emphasizing alignment across stakeholders in developing needed business and technology architectures, as well as other relevant tools, metrics, and products to address aviation's environmental impact.

In FY 2012, major activities and accomplishments planned include:

Noise reduction, emissions and fuel burn reduction technology maturation

- Fabricated advanced aircraft component level flight test hardware.
- Integrated advanced low NOx combustor on engine demonstrator.
- Began integration of flight management system with air traffic management system for flight simulations of operational and environmental benefits.
- Conducted component level engine rig tests.
- Completed preliminary design review of advanced engine configuration for demonstration.
- Conducted engine tests of advanced turbine blades and ceramic matrix composite turbine blade tracks.

Alternative Turbine Fuels

- Conducted fuel characterization testing of renewable alternative fuels.
- Conducted sustainability assessment of renewable alternative fuels.

- Conducted performance and environmental assessment of additional candidates for "drop-in" renewable alternative fuels.
- Assessed production capacity and impacts of commercial fleet infusion of aviation alternative fuels.
- Identified additional candidates for "drop-in" aviation alternative fuels.

Metrics, Goals and Targets

- Evaluated noise and emissions impacts metrics for use in Next Generation Air Transportation System (NextGen) environmental analysis.
- Performed integrated NextGen noise and emissions impacts analysis.
- Assessed climate impacts of aviation climate impacts and underlying uncertainties.
- Refined and assessed intermediate targets towards meeting NextGen environmental goals.

The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program supports DOT strategic goal of environmental sustainability by increasing the use of environmentally sustainable practices in the transportation sector. Those practices will improve capital projects that include environmental management systems, context sensitive solutions, or use a sustainable transportation project evaluation to manage the environmental impacts of construction and operations.

By FY 2017, complete design, fabrication and integration as well as system level analyses and testing of near-and mid-term CLEEN airframe and engine technologies to reduce noise, emissions, and fuel burn for civil subsonic jet aircraft; and initiate the second phase of CLEEN program.

Airframe and engine technologies supporting milestones:

- By FY 2013, perform system level tests and demonstrations of CLEEN aircraft technologies.
- By FY 2013, perform aircraft level noise and emissions assessments of CLEEN aircraft technologies.
- By FY 2013, identify technical issues impacting commercialization of CLEEN technologies.
- By FY 2013, perform detailed design review of system components and configurations.
- By FY 2013, perform validation testing and analysis to verify technology performance and environmental impacts predictions.
- By FY 2014, characterize and test aircraft technologies for noise reduction.
- BY FY 2014, perform ground tests for advanced engine configurations.
- By FY 2014, perform tests of advanced aircraft Flight Management System.
- By FY 2014, develop plans for demonstration and environmental assessment of additional aircraft technologies in a potential second phase of CLEEN.
- By FY 2015, perform tests and assessment for advanced engine and airframe configurations.
- By FY 2015, conduct a market survey of additional aircraft technologies for a second phase of CLEEN
- By FY 2016, develop and issue a solicitation for a second phase of CLEEN to demonstrate and assess additional aircraft technologies that reduce fuel burn, emissions and noise.
- By FY 2017, award cost share agreements with industry to demonstrate and assess additional aircraft technologies in a potential second phase to CLEEN
- By FY 2016, complete comprehensive assessment and research to support certification of drop-in and renewable alternative turbine engine fuels and develop implementation plan to foster implementation in the commercial fleet.

Alternative fuels supporting milestones:

- By FY 2013, conduct fuel characterization testing and environmental assessments of additional "drop-in" alternative fuels.
- By FY 2013, conduct sustainability analysis of renewable fuels.
- By FY 2013, assess mechanisms for increasing commercial use of aviation alternative fuels.
- By FY 2013, initiate process for ASTM International approval of additional alternative fuel blends.
- By FY 2014, conduct engine demonstrations for additional "drop-in" alternative fuels.
- By FY 2014, complete environmental assessment of additional "drop-in" renewable alternative fuels.
- By FY 2015, conduct flight test demonstrations for additional "drop-in" renewable alternative fuels.
- By FY 2015, secure ASTM International approval of additional "drop-in" renewable alternative fuels.
- By FY 2016, identify potential of non-drop-in fuels and develop plans for development and demonstration.
- By FY 2016, conduct initial feasibility study, including economic feasibility, environmental impacts, and assessment of potential for non-drop-in alternative aviation fuels.
- By FY 2017, initiate fuel characterization tests and assessments of a non-drop-in alternative aviation fuel.
- By FY 2017, investigate metrics, uncertainties on aviation emissions health and welfare and climate impact to facilitate NextGen EMS implementation.

Metrics supporting milestones:

- By F Y2013, refine and evaluate noise and emissions impacts metrics for use in NextGen environmental analysis.
- By FY 2013, reduce key uncertainties in climate impacts of aviation.
- By FY 2013, conduct evaluation of advanced analytical approaches for noise and emissions impacts assessment.
- By FY 2013, refine intermediate targets towards meeting NextGen environmental goals performance targets for Destination 2025 and perform gap analysis.
- By FY 2014, refine metrics that more accurately capture aviation emissions health and welfare and climate impact and goals to facilitate EMS implementation.
- By FY 2014, refine estimates of interim NextGen environmental targets and perform gap analyses.
- By FY 2014, complete second phase of ACCRI program with improved estimates of aviation climate impacts.
- By FY 2015, continue refined assessment of aviation environmental, health, and climate impacts.
- By FY 2015, complete an updated assessment of aviation environmental, health, and climate impacts.
- By FY 2015, refine estimates of interim NextGen environmental targets and perform gap analyses.
- By FY 2016, advance capabilities for integrated analysis for aviation noise and emissions impacts.
- By FY 2016, develop improved estimates for targets and assess scenarios towards meeting the NextGen environmental goals.
- By FY 2017, refine estimates of interim NextGen environmental targets and perform gap analyses.

3. Why Is This Particular Program Necessary?

Protecting the environment is at the heart of the NextGen plan. Ensuring energy availability and protecting the environment will be critical elements to enable the mobility (capacity and efficiency) our nation needs. The NextGen environmental strategy includes efforts to better understand the extent of the problem associated with aviation emissions and the development and fielding of new operational enhancements, aircraft and ATM technologies, alternative fuels, and policies to achieve near-term and long-term solutions. The NextGen Environment and Energy R&D program supports research to develop new aircraft technologies and sustainable fuels and to develop metrics to quantify NextGen's environmental impacts and inform performance targets.

The vast majority of improvements in environmental performance over the last three decades have come from enhancements in engine and airframe design. Although major contributors, improved technologies and air traffic management will not be enough to reduce aviation's carbon dioxide (CO_2) footprint. Sustainable alternative fuels with lower overall carbon foot prints are critical to reducing aviation's climate impact in order to enable mobility. The main focus of this R&D effort is the CLEEN program. The CLEEN program is focused on reducing current levels of aircraft noise, emissions that degrade air quality, GHG emissions, and energy use, and it advances sustainable alternative fuels for aviation use.

Embedded in energy and environmental issues are several scientific uncertainties concerning aviation energy issues and aviation environmental impacts, particularly on climate. There are large uncertainties in our present understanding of the magnitude of climate impacts due to aviation non-CO2 emissions. Understanding the relative impacts of different emission (including altitude emissions impacts on air quality) is vital for informing NextGen EMSs implementation. The ACCRI is an element of the R&D program focused on addressing these uncertainties. In addition, noise is the most immediately objectionable impact of aviation, and the impact demanding the most Federal resources (i.e., minimum AIP grant set aside of $300M annually). Research is outdated that underpins determinations of aircraft noise impacts, land use compatibility guidelines, and federally funded noise mitigation. New noise metrics research effort is needed to reflect public sensitivity and current air traffic conditions, guide mitigation funding and local land use planning near airports, and assure the U.S. response to aircraft noise keeps pace with NextGen needs and international efforts.

4. How Do You Know The Program Works?

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Any reduction in the requested budget will further slow our ability to mature aircraft technologies for reduction in noise, emissions and fuel burn, qualification of alternative fuels for commercial aviation as well as limit our efforts for analysis of environmental impacts and metrics including reduction in climate impacts uncertainties under ACCRI. Delay in advancing progress in these areas will further severely limit our ability to meet NextGen environmental goals, prepare for international negotiations and efforts for sustainable and secure supply of alternative sources of jet fuels. Finally, reduction in Environment and Energy specific NextGen R&D activities will cause delay in development of proven technology based environmental mitigation solutions which will result in billions of dollars of operational, human health, welfare and opportunity cost to government, industry and public. It will allow environmental concerns to become limiting factor and prevent us from full realization of expected NextGen benefits – which will eventually limit aviation growth. In other words, we will not be able to use full potential of ATM and NextGen capabilities without clean operating fleet that will allow environmental sustainability.

Operations
($000)

NextGen – Environmental Performance (APL) - $728

The funding continues to support the efforts of five FTEs in the Office of Policy, International Affairs, and Environment (APL) organization as well as contract support and computational resources that are necessary to conduct in-depth studies on the impact of any proposed flight routing, airport development, or NAS improvements. With these resources, FAA will be able to streamline the environmental review process. This will help avoid delays in constructing new airports and implementing NextGen procedures.

NextGen – Environmental/Noise Studies (APL) - $1,678

The funding continues to support five FTEs and associated contracts in the Office of Policy, International Affairs, and Environment (APL) organization to manage and implement a strategic environmental management system (EMS) approach that will integrate environmental protection objectives into the core business and operational strategies of NextGen by reducing aviation's environmental footprint while meeting near-term NAS capacity and efficiency needs.

NextGen Staffing (ANG) - $3,212

The funding continues to support 24 FTEs in NextGen organization (ANG) that are necessary to manage, integrate, and implement complex activities. The ANG organization will be involved in concept review and validation, prototyping analysis, review and validation; human factors review and validation; requirements analysis and validation; training assessment and development; and procedural analysis, review, and development/modifications.

NextGen Staffing (ATO) - $6,826

The funding continues to support 51 FTEs in the Air Traffic Organization (ATO) that are necessary to manage, integrate, and implement complex activities. Like the ANG organization, the ATO operational organizations will be involved in concept review and validation, prototyping analysis, review and validation; human factors review and validation; requirements analysis and validation; training assessment and development; and procedural analysis, review, and development/modifications.

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JOINT PLANNING AND DEVELOPMENT OFFICE (JPDO)

Executive Summary –

The JPDO ensures efficient coordination and collaboration among NextGen partner agencies. It addresses key interagency priorities identified by the Cabinet-level Senior Policy Committee (SPC) for NextGen. Without the benefit of a dedicated, co-located interagency entity, the Nation can expect increased costs due to both the duplication of systems and the development of systems that will not work together for all missions (civil, defense and homeland security). This office maintains a future focus and is designed to provide the broader perspectives and insights that are necessary for Department decision-makers to review and assess NextGen investment and policy decisions. The JPDO provides a National big picture perspective that encompasses a broader Federal view than just FAA.

The JPDO has already achieved a number of critical milestones in setting the NextGen vision, beginning in 2004 by establishing the top-level goals for capacity, safety, environment, security and international leadership. In the early years, the JPDO engaged hundreds of technical experts from government, industry and academia to plan NextGen research, describe it in a Concept of Operations and add details within a database framework known as Enterprise Architecture. Later, the JPDO encouraged and monitored adoption of elements of the integrated plan by agencies. With NextGen implementation underway, the JPDO reinforces agency accountability for NextGen through agency plans and reports that complement the long-term strategic plan.

Since 2011, JPDO has been coordinating interagency efforts to integrate Unmanned Aircraft Systems (UAS) into the National Airspace System (NAS) beginning with a UAS research and development roadmap. In FY 2012 and FY 2013, JPDO will lead the effort to identify National goals for the integration of Unmanned Aircraft Systems (UAS) into the National Airspace System (NAS). The establishing legislation for the JPDO calls for an integrated plan for NextGen that accommodates a wide range of aircraft operations including UAS. The JPDO effort emphasizes strategic planning including agency requirements, transition steps, coordinated activities and milestones.

The current NAS environment was developed to accommodate the capabilities of manned aircraft. While many procedures and principles used for manned aircraft apply to UAS, there are significant differences in technological maturity, perception and acceptance, and operational experience that remain. NextGen must deal with these differences now because the demand for UAS operations, particularly by military and public agencies, has increased dramatically over the past few years, and is expected to continue to increase due to the unique capabilities, mission effectiveness, reduced risk and lower operating costs of UAS.

Reporting Relationship

FAA requests that the JPDO be realigned to report directly to the Deputy Administrator because of these management and oversight responsibilities, the level of interaction and collaboration required with other Federal agencies and stakeholders, and the need to smoothly and effectively move forward with the new UAS initiative,. The JPDO Director would also continue to serve as a Senior Advisor to the Secretary of Transportation on NextGen. This new relationship would enhance the visibility of NextGen inter-agency issues within FAA and among partner agencies, and expand opportunities for collaboration among departments. This new structure will also allow the FAA to better leverage work being conducted outside the FAA to help us meet our NextGen goals.

Introduction

The JPDO's $12 million total request for activities in Fiscal Year 2013 will continue to coordinate goals, priorities and research activities within the Federal Government for NextGen. JPDO will continue to facilitate transfer of technology and review research activities such as those related to safety, weather, noise and emissions, and secure data exchange. In carrying out its plans, JPDO will ensure participation by the public and consult with stakeholders from the private sector.

JPDO's collaborative methodology begins by engaging stakeholders to articulate a common outcome. To support this outcome, the JPDO seeks agreement on roles and responsibilities to execute the joint strategy, including how resources will be leveraged. In many cases, compatible standards, policies, procedures and data systems must be established to operate across boundaries. Finally, the JPDO, with guidance by the Senior Policy Committee (SPC), develops means to monitor and report on the multi-agency effort.

For example, following a series of interagency summits, the JPDO brought together technical experts from five agencies to prepare a concept that describes how all agencies can have a common picture to see all aircraft at all times using a series of sensors and data. This is often called "Integrated Surveillance." With SPC endorsement, technical experts with executive oversight continued to refine the concept, creating a multi-level architecture, and to outline development responsibilities for each agency that will be finalized in a formal agreement in 2012. The JPDO, with agency participation, also used a combination of operational and prototype systems to show how data for a lost cargo jet scenario could be automatically exchanged between FAA and DOD. This is just one of many examples where JPDO-led engagements are producing results.

The JPDO Today

Today, the JPDO has completed its visionary planning role and is prepared for a new role in NextGen leadership coordinating interagency initiatives or resolving interagency issues. The FAA's main focus needs to be NextGen implementation and it's normal operational issues for the near term. The JPDO is future focused and provides coordination among all the Federal partners affected by NextGen decisions. The JPDO's FY 2012 work plan is focused on supporting a broad Federal view of NextGen and several priority areas such as information sharing and dissemination of weather and flight data, ensuring harmonization exists among the global aviation systems and continuing to promote and develop integrated surveillance capabilities. The JPDO's efforts have resulted in a National approach to complex NextGen related issues and reduced duplicative efforts which ultimately leads to cost savings.

During FY 2011, the JPDO led the development of a UAS Research, Development and Demonstration Roadmap by bringing together senior executives and technical experts from all five NextGen partner agencies to describe the current government-wide plan to integrate UAS into NextGen. The JPDO's independent role creates trust and enabled us to work with researchers, operators and regulators to identify the most critical technology issues involved in establishing a plan for UAS operations. The JPDO's Avionics Roadmap, defined with industry stakeholders in FY 2011, and our investigations of trajectory-based operations (conducted during FY 2010) which are reflected within the national integrated plan, supported the UAS work. By creating the UAS plan, in lock step with the national NextGen plan, there are opportunities to cost-share demonstrations, eliminate potentially duplicate investments and accelerate the FAA's utilization of data and development of performance requirements.

Going forward, use of airspace will be more integrated, considering civil aviation, defense and homeland security. This need for integration will make airspace more complex while all missions must operate together. Further, the pace of technology is unfolding rapidly requiring all departments to have full situational awareness of new developments. The JPDO provides the common view.

FY 2013 Funding Profile

This budget supports continued execution of the JPDO's collaborative processes to ensure the efficient coordination between all Federal partners whose decisions impact NextGen, including UAS integration into the NAS. A total funding request of $12 million enables the JPDO to conduct policy analyses, cost, benefit and risk assessments, and joint studies with stakeholders that will help prioritize multi-agency concerns and drive consensus in the development of investment choices. The JPDO also performs program management and integration, ensuring studies are executed in a cohesive framework with the resulting content updated in the strategic plan. The funding enables the JPDO to convene the Senior Policy Committee; develop National goals for UAS integration; establish interagency data exchange policies; identify research priorities; and examine Federal requirements for surveillance data and sensors.

During FY 2012, the JPDO continued to execute its Congressionally-mandated mission with full support from the Secretary of Transportation and the FAA Administrator. While all Federal budgets are constrained for FY 2012 and beyond, the JPDO managed a severe budget reduction through re-prioritization, and reduction or elimination of every task, activity and job position for ongoing or planned FY 2012 research. As a result of careful management of multi-year research funds, the JPDO was able to retain all Federal employees and execute a set of priority activities through the year. These were one-time strategies that can neither be sustained nor repeated. We believe the level of program funding for FY 2013 enables the JPDO to continue to resolve NextGen interagency issues while being mindful of the constrained budget environment.

Organization and Staffing

With the FY 2013 budget, the FAA is requesting that the JPDO report directly to the Deputy FAA Administrator. The Director of the JPDO remains unchanged and will continue as the Senior Staff Advisor to the Secretary of Transportation. No change in or redirection of funds is required for this request.

NextGen requires the active engagement of many different agencies (the Departments of Transportation, Commerce, Defense and Homeland Security; NASA; Office of the Director for National Intelligence; and the White House Office of Science and Technology Policy). Additionally, NextGen requires the work of all of the FAA's internal offices to be successful. Elevation of the JPDO will increase its ability to quickly raise and resolve concerns of all the partners who are affected by FAA's NextGen decisions.

The Senior Policy Committee relies on the JPDO to maintain a strategic "future" focus and national view for NextGen whereas the FAA's internal focus needs to be on NextGen implementation and its normal operational issues. The JPDO's broad perspective and insights have been helpful for Departmental decision-makers in reviewing FAA's NextGen-related resource requests and in considering the impact of NextGen decisions on other Administration entities. Elevation of the organization will enable better strategic direction across all partners.

The FY 2013 budget requests funding to support a total of 11 FAA positions at the JPDO, all fully dedicated to NextGen. These people are skilled in disciplines such as engineering, computer science, program and business management, and policy. Mostly due to attrition and partly due to skill mix, the JPDO will be required to hire new employees over the next several years. No new positions are being requested at this time.

The 11 FAA employees represent about 50 percent of the Federal workforce located at the JPDO. Employees from the Departments of Commerce, Defense and Homeland Security and from NASA bring additional skills in research, information technologies, systems engineering and weather information. The JPDO's Federal workforce is blended, meaning that all employees focus on interagency goals while providing the insights, cultural perspectives and linkages to their own agency. The end result of this blended workforce model is that all points of view are considered from the inception of concept definition in order to mitigate risk and streamline knowledge transfer.

JPDO Challenges

The JPDO faces many of the same challenges as the NextGen initiative itself: often competing goals, a dynamically-changing environment, multiple and interdependent capabilities, and alignment of capabilities on the ground and in the aircraft. NextGen is not a single piece of equipment or a program or a system that will instantaneously transform aviation. NextGen must build on legacy air traffic control systems and avionics, taking advantage of technologies that have already been transforming our personal lives and the way we do business, such as GPS, analog-to-digital and network-to-network data sharing. The JPDO seeks to forge collaborations that consider all stakeholder views to minimize these broad NextGen challenges.

NextGen issues cut across many agencies and must be delivered in a way that is consistent with multiple missions and limited resources. There are also long lead times from research to implementation. As budgets tighten, it is sometimes easier for agencies to revert to stove-piped or tactical solutions rather than considering cost-effective National approaches. As the first line of defense, the JPDO must diligently promote and maintain the forward-thinking stakeholder focus.

The JPDO's plans and initiatives must be flexible, ready to pose options to meet the ever-changing National needs. Our world has changed considerably since NextGen was first envisioned. We have had airline bailouts, an economic downturn, a new emphasis on climate change and volcanic ash. Similarly, the growth of the UAS industry now requires thoughtful and proactive consideration of how these aircraft will operate in the NextGen environment.

Now that the JPDO has transitioned from its earlier visionary planner role, we must carefully balance our skill mix and investments between major projects, such as Federal requirements for surveillance data and sensors, and keeping an eye on new technologies. Research priorities for trajectory-based operations, including human systems integration, air/ground automation, software verification and validation and cyber-security will drive US leadership in aviation beyond the mid-term implementation.

Detailed Justification for – A12.a Joint Planning and Development Office

1. What Is The Request and What Will We Get For The Funds?

FY 2013 – Joint Planning and Development Office (JPDO)

Activity/Component	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	Difference from FY 2012 President's Budget
A12.a Joint Planning and Development Office	$13,792,000	$5,000,000	$12,000,000	+$7,000,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

PC&B	$2,439
Activity Tasks	$9,561
Total	$12,000

Activity Tasks	Estimated Cost ($000)
National Goals for UAS Integration	$3,149
Interagency Data Exchange Definition and Policies	$1,687
NextGen Research Priorities	$1,316
Public/Private Partnerships	$1,592
Federal Requirements for Integrated Surveillance Data and Sensors	$1,817
Total	$9,561

For FY 2013, $12,000,000 of funding is requested for the JPDO to provide the following activities:

National Goals for UAS Integration

- Formulate the strategic National program plan for UAS integration
- Refine NextGen partner agencies' requirements for UAS operation
- Conduct cost, benefit and risk assessments using modeling and simulations of relevant scenarios to establish possible transition steps and milestones
- Analyze policy options and implications for UAS integration

Interagency Data Exchange Definition and Policies

- Continue to identify information data sharing requirements, processes, and applications that can be applied within specific functional areas (such as surveillance) which can then be shared for use by all NextGen partner agencies.
- Utilize the virtual interagency test environment to address the UAS information sharing and infrastructure requirements, policies, and standards of all agencies (Federal, Local, and State) without impacting the operational environment upfront.

NextGen Research Priorities

- Continually identify, define and coordinate research gaps related to UAS and Trajectory Based Operations (TBO)
- Review technology developments and innovation to recommend opportunities for technology transfer among Federal entities and/or industry
- Apply program management and integration to ensure research content (needs and priorities) is updated within the Joint Planning Environment, a database framework that supports interagency decision-making and plans

Public/Private Partnerships

- Engage industry stakeholders via the NextGen Institute
- With the Institute, continue to develop, test, review and document stakeholder perspectives on NextGen concepts and analyses including the Trajectory Based Operations (TBO) safety case, weather and harmonization of global implementation of air transportation
- Define and conduct a series of stakeholder engagement forums to formulate the UAS program plan across Federal entities
- Convene the Senior Policy Committee (SPC) for the Secretary of Transportation

Federal Requirements for Surveillance Data and Sensors (Integrated Surveillance)

- Define and conduct a series of forums to identify independent activities of the surveillance mission partners that should be synchronized.
- Conduct technical and policy analyses to support governance of joint surveillance capabilities
- All of the above activities will ultimately result in Federal surveillance systems that communicate with each other thereby ensuring common situational awareness that avoids conflicting efforts and costs

2. What Is This Program?

The JPDO executes collaborative processes to ensure efficient coordination between all Federal partners whose decisions impact NextGen, namely the Federal Aviation Administration (FAA), NASA, and the Departments of Defense, Homeland Security and Commerce. The JPDO provides a National "big-picture" perspective that encompasses a broad Federal view of NextGen. JPDO is developing a framework for NextGen planning and development, identifying and prioritizing key multi-agency concerns, and driving consensus in the development of investment choices and decisions thereby improving efficiencies, ensuring cross-Federal compatibility, and reducing costs.

In the completion of its work, the JPDO conducts and disseminates a wide variety of studies including cost, benefit and risk assessments; policy analysis; modeling and simulation; and program management and integration. The JPDO was established in 2003, when Congress enacted NextGen under Vision 100 – Century of Aviation Reauthorization Act (P.L. 108-176). Maintaining the NextGen vision and facilitating a public/private partnership to manage critical collaborations needed to make NextGen a reality are among the JPDO's responsibilities.

The JPDO convenes the SPC to provide strategic policy guidance for NextGen. For example in FY 2011, SPC direction enabled the JPDO to engage more than 60 experts from five agencies to initially describe the current, Government-wide research plan for UAS. The SPC is chaired by the Secretary of Transportation and its members include the heads of the participating departments and agencies, as well as the Director of the Office of Science and Technology Policy and the Office of the Director of National Intelligence (ex officio). In support of the SPC, the JPDO governance structure has a Board, chaired by the JPDO Director, whose members are executives from each department/agency who meet quarterly and work continuously to resolve issues directed by the SPC.

The JPDO is comprised of employees from FAA and the other Federal partners. This ensures that all the partners may benefit from a multi-departmental perspective when developing future plans, contract requirements, technical specifications, etc. The JPDO workforce actively facilitates and engages researchers, program managers and executives from among the partner agencies to formulate the interagency view.

The private sector is also an integral part of JPDO's work. In 2006, the NextGen Institute was established as an alliance of major aviation stakeholder communities to ensure industry engagement. The Institute, together with nine government/industry Working Groups, helped formulate the vision for NextGen. Today, the Institute continues to host public/private forums and to bring the right experience and range of viewpoints to inform NextGen analyses. With the Institute, the JPDO has taken steps to ensure NextGen will work seamlessly with other global aviation systems focusing on stakeholder priorities.

The JPDO work directly links to the DOT Strategic Goal of Economic Competitiveness and the FAA's "Destination 2025" goals.

Activities and planned accomplishments for FY 2012, representing a significantly de-scoped research plan for the JPDO compared to prior years, include:

- Formulate the national program planning approach for UAS integration into NextGen emphasizing interagency requirements and gap assessment.
- Leverage NASA resources to conduct cost, benefit and risk assessments directed toward UAS, weather and information data sharing.
- Refine interagency concepts for surveillance sensors and data (called Integrated Surveillance) that will ultimately lead to cost-effective acquisitions addressing civil aviation, defense and homeland security missions.
- Archive all net-centric test bed prototypes that demonstrate how aviation data can be securely accessed by all agencies in the conduct of their missions and promote best practices across Government. Some mature activities will be transitioned for single-agency leadership.
- Streamline stakeholder engagement under the NextGen Institute by replacing standing working groups with an efficient "study team" model. Complete and document existing working group activities in areas such as security, net-centric operations, environment, aircraft certification and operations while continuing TBO safety case planning and weather customer forums under the new structure of study teams and workshops. Our study team model ensures that all points of view are considered and stakeholder priorities are known at the inception of strategic concept definition.

For FY 2013, activities will build on the FY 2012 transition.

1. National Goals for UAS Integration

UAS play an increasing role in both federal and civil missions including homeland security, national defense, law enforcement, weather monitoring and surveying. To date, analysis has focused on identifying and defining research programs to address the technical barriers to their interoperation with manned vehicles in the NAS. In FY 2011, the JPDO partner agencies collaborated on the development of a UAS Research and Development Roadmap. With all partner agencies contributing expertise, the JPDO produced and delivered to OMB a comprehensive roadmap which identified the research gaps and opportunities for UAS integration in the NAS.

In FY 2013 with $3,149 thousand, the JPDO will undertake a new effort and lead the NextGen partner agencies in the formulation, development and tracking of a program plan that identifies National goals for UAS integration into the NAS. This program plan will include agency requirements, transition steps, coordinated activities and milestones in order to accelerate strategic decision making on UAS implementation issues.

2. Interagency Data Exchange Definition and Policies

Information data sharing among federal networks and systems is critical for the transition to NextGen. Full NextGen capabilities cannot be realized without ensuring that the right parties have the right information at the right time. The JPDO has facilitated the development of an information sharing approach that focused on shared understanding, incorporating technical components and leveraging existing interagency infrastructures. The JPDO has developed the NextGen Information Sharing Environment (NISE) which is a holistic and cyclical framework to identify the common set of requirements the community will use to facilitate information sharing across the enterprise.

In FY 2013, with $1,687 thousand, the JPDO will use its interagency collaboration best practices to maintain the management role and governance of the NISE. This role will facilitate the continued development of communities of interest, define enterprise information sharing support agreements, direct configuration control of the environment and sustain shared understanding development. This effort will result in cost savings to the Nation by reducing duplicative efforts in information sharing activities.

3. NextGen Research Priorities

Trajectory based operations (TBO) is a king pin to achieving the ultimate NextGen vision. TBO will provide additional capacity and increase flexibility through precision performance against agreed to and predictable flight paths that are managed by automation to ensure safety. Automation will monitor aircraft performance against a known flight path and detect and resolve potential conflicts, freeing the human from detecting and correcting these situations as they arise. The automated nature of this approach will enable more predictable flights thereby increasing capacity.

The JPDO and its partner agencies recognize the potential benefits of TBO and are simultaneously executing various efforts. In FY 2012, the JPDO deferred refinement of long-term research priorities for trajectory based operations, including human systems integration, air/ground automation, software verification and validation and cyber-security unless they are directly related to UAS integration in the NAS.

In FY 2013 with $1,316 thousand, the JPDO will lead the effort with the partner agencies to identify the necessary research priorities needed to recognize a full TBO environment. The JPDO will provide an overall map with associated interagency budget requirements identifying where activities are required and develop an interagency TBO program plan for execution. This interagency TBO program plan will indicate required research items, policy issues, requirements for implementation and cross organizational agreements. By documenting this interagency TBO program plan, the partner agencies can address issues before they become impediments to progress. The interagency TBO program plan will be incorporated into the Joint Planning Environment.

4. Public/Private Partnership

In FY 2013 with $1,592 thousand, will continue to forge private/public partnerships, most notably, convening the Senior Policy Committee (SPC) for the Secretary of Transportation. JPDO staff will organize the Committee's agenda, apply technical knowledge to prepare briefings for Committee Members, document actions and carry out those actions that are fully interagency in nature.

Also notable, the NextGen Institute will continue to provide a mechanism for private sector engagement in the definition of NextGen though study teams, workshops, information sharing forums and potentially, funded tasks. To support the JPDO's FY 2013 activities, the private sector will likely be asked to participate in UAS workshops on refining capability maturity, TBO Safety study teams or workshops to define gaps in TBO safety related issues, a TBO Concept of Operations definition effort, and forums related to weather and harmonization of global implementation of air transportation. Other activities may be added as they are determined.

5. Federal Requirements for Surveillance Data and Sensors (Integrated Surveillance)

Individual departments and agencies need data and sensors to see all aircraft (cooperative and threats) to meet its own mission. The JPDO led the development of the Integrated Surveillance Support Office (ISSO) at the direction of the SPC. The ISSO acts as the dedicated technical support capability for the governance of national air surveillance. The intent behind the ISSO is to provide independent technical analysis to support collaborative efforts of the partner agencies.

In FY 2013, with $1,817 thousand, the JPDO will continue its efforts to coordinate partner agency activities in the development of technical planning documents which will lead to a formal interagency coordination process for research and development, requirements development and validation, and acquisition of IS capabilities. Specifically, in 2013, the JPDO/ISSO will perform analysis leading to two joint DOT/DHS/DOD/DOC decisions: (1) national surveillance sensor capabilities for non-cooperative aircraft and (2) software that will enable all mission partners to share a common operating picture.

3. Why Is This Particular Program Necessary?

The JPDO provides the multi-agency governance that guides the development of the Nation's air transportation system. The JPDO convenes the Senior Policy Committee, comprised of Cabinet-level Secretaries, to develop goals, align resources, and ensure that stakeholders are involved in decision-making.

This dialogue will help prevent duplication and will ensure NextGen systems will work with those of the other Federal partners. The JPDO ensures research coordination with the international community so that NextGen will work seamlessly with other global aviation systems.

The FAA's main focus needs to be NextGen implementation and its normal operational issues. The JPDO is "future" focused and provides coordination among all the Federal partners affected by NextGen decisions. In the future, use of airspace will be more integrated, considering civil aviation, defense and homeland security. This need for integration will make airspace more complex while all missions must operate together. Further, the pace of technology is unfolding rapidly requiring all departments to have full situational awareness of new developments. The JPDO provides the common view.

The JPDO is comprised of employees from both FAA and the other Federal partners (FAA employees represent about 50 percent of the JPDO Federal workforce). This ensures all the partners have the benefit from a multi-Departmental perspective when developing plans. It is more difficult for the FAA to properly consider the implications of its decisions on other Federal systems. The JPDO provides a broader perspective and insights that help Departmental decision-makers in reviewing FAA's NextGen related resource requests and in considering the impact of NextGen decisions on other Administration entities.

The JPDO, working together with partner agencies and industry, defines the capabilities and mechanisms that enable the national air transportation system to accommodate a wide range of customers. The JPDO has a strategic view, assessing needs for research, technologies and policies in a dynamically changing global environment. Because the JPDO is not a research performer, implementer or operator, its role is well-suited to analyze a range of possible solutions and guide the Federal partners to one successful solution that best meets the needs of all the partners.

In recent studies, the Government Accountability Office (GAO) and Office of the Inspector General (OIG) have reported the need for technology transfer, research into human factors and weather, development of integrated surveillance capabilities and integration of UAS. The JPDO's work plan is actively emphasizing these key areas with government and industry partners.

4. How Do You Know The Program Works?

The following items are recent examples to illustrate how JPDO efforts translate into technology transfer and agency action:

- The SPC, a cabinet-level decision-making body chaired by DOT, relies on JPDO support. In 2010, the SPC endorsed the JPDO's Integrated US Air Surveillance Governance Report and called for its expedited implementation as part of the Air Domain Awareness initiative led by DHS. During 2011, the JPDO demonstrated efficient surveillance information exchanges among agencies utilizing a combination of operational and prototype net-centric implementations that forged new partnerships between agencies and industry. Importantly, areas were identified where agencies can now realize potential cost-savings through consolidation of systems and capabilities.
- The SPC charged the JPDO with leading interagency coordination of research toward integration of UAS into the airspace. In 2011, every NextGen partner participated in the initial development of a UAS R&D Roadmap. As stated in the report, FAA's progress to define a clearer path toward certification and routine UAS operations can be accelerated by leveraging research at NASA and DOD while these partners also benefit from stronger FAA involvement in their research programs.
- Prior JPDO analyses identified human factors research, including the balance of human and automation roles for NextGen, as a gap. This gap, if not addressed, would constrain the roles of human operators to current tasks and prevent efficiency gains that automation can provide. During 2010, the JPDO worked with NASA and the FAA to produce a Human Factors Research Coordination Plan. The agencies are executing according to that plan during the current budget formulation cycle.
- In 2008, the JPDO, FAA and NASA established Research Transition Teams to facilitate transfer of research in four areas. In 2011, one of those teams, Flow Based Trajectory Management, successfully completed their effort. The team had defined a common outcome, agreed on roles, and developed means to evaluate, monitor, and report results. Specifically, proven NASA prototype

capabilities were mapped to the particular automation systems on which FAA will evaluate implementation strategies.

- The JPDO works with DOC, FAA and DOD on developing a vision for aviation weather management that is focused on the aviation user. The JPDO regularly facilitates a senior executive panel, known as the NextGen Executive Weather Panel, who oversaw the development of a joint program plan. Aligned with the joint plan and its weather information governance structure, during FY 2011 the FAA and the National Weather Service demonstrated the ability to share and discover many types of weather data within an interagency, net-centric environment.

- In 2010, the JPDO conducted a study on flight prioritization and outlined a framework for best equipped best served options, a concept of critical importance to airline operations that was not well-defined in the early NextGen vision. The JPDO's policy analysis and strategic framework provided the basis for discussion by the FAA's NextGen Advisory Committee to identify the single preferred option for the airlines.

The Research, Engineering and Development Advisory Committee (REDAC) endorsed this level of funding for the JPDO. The REDAC reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee structure) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Without the requested funding, the JPDO may cease to exist. In FY 2012, the JPDO managed a severe budget reduction through re-prioritization, reduction and/or elimination of every task, activity and job position for ongoing or planned FY 2012 research. Every existing JPDO contract task order was modified in scope or performance period during FY 2012, and backfill of vacant FAA positions was deferred several months to save costs. The JPDO continued a few high priority activities in FY 2012 through judicious management of prior year funds and unexpired contracts. Partner agency contributions (personnel or funding) for the JPDO, which depend on matching FAA resources, were also reduced in FY 2012. These one-time strategies will enable the JPDO to produce a few quality products during FY 2012; however, the FAA cannot repeat this strategy. Plans call for no unexpended funds for the JPDO beyond October 2012.

The JPDO ensures efficient coordination and collaboration among NextGen partner agencies. It addresses key interagency priorities identified by the SPC for NextGen. Without the benefit of a dedicated, co-located interagency entity, the Nation can expect increased costs due to both the duplication of systems and the development of systems that will not work together for all missions (civil, defense and homeland security). The JPDO maintains a future focus and is able to provide the broader perspectives and insights that are necessary for Department decision-makers to review and assess NextGen investment and policy decisions. For example:

- Demand for UAS access to the National Airspace System (NAS) is increasing rapidly with the US Government expected to invest more than $19B for UAS during the next three years. JPDO will lead efforts with the NextGen partners to develop a program plan that identifies the National goals for UAS integration into the NAS including agency requirements, transition steps, coordinated activities and milestones.

- Every agency needs data and sensors to see all aircraft (cooperative and threats) to meet its own mission. JPDO will ensure there is an understanding of individual agency mission needs, capabilities, and requirements, resulting in coordinated solution decisions. Without cross-agency requirements and implementation plans, duplication, inefficiency and gaps will exist resulting in individual and uncoordinated solutions. Consequently, there is an increased risk to national security.

- Information is the backbone of NextGen. The capabilities detailed in the NextGen Concept of Operations will not be successful without ensuring that the right parties have the right information at the right time. The JPDO will coordinate with partner agencies to identify information exchange requirements which will reduce the cost of having multiple stove-piped systems that cannot quickly communicate.

National aviation-related policy issues that the partner agencies have identified as important in NextGen implementation will not be addressed without this program, leading to uncoordinated FAA NextGen decisions which will have a negative impact on other Federal systems.

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Executive Summary – Immediate Transportation Initiative: Next Generation Air Transportation System (NextGen)

1. What Is The Request And What Will We Get For The Funds?

The President's Immediate Transportation Investment initiative puts America back to work while rebuilding and modernizing America's roads, rails, and airports. For Fiscal Year 2012, $1 billion of the Immediate Transportation Investment will support NextGen air traffic modernization efforts. This funding will be used to accelerate delivery of NextGen services and capabilities which will ensure aircraft operators accrue the economic, environmental, and efficiency gains of nextGen as soon as possible.

While many aircraft flying today are equipped to fly in fast lanes, the current airspace design and infrastructure essentially keeps all the traffic in the local lanes. In order to provide better "highways in the sky," FAA needs to design the interconnecting system, develop efficient on and off ramps, establish the supporting infrastructure, and publish the maps that will allow aircraft to take advantage of 21^{st} century technologies already available in their cockpits.

2. What Is This Program?

This project consists of multiple supporting projects, some of which are already underway. Accelerated delivery of this infrastructure is supported with investments in the following areas:

- Future air traffic control facilities
- Improved air traffic surveillance capabilities to ensure safety and continuity of operations
- Implementation of expedited processes to support instrument procedures development
- Improved management of operations on the surface integrated with traffic flow
- Enhanced traffic flow management and data handling capabilities
- Navigation and surveillance infrastructure to support new airspace designs and allow access in low visibility conditions

3. Why Is This Particular Program Necessary?

Aviation is a major driver of our nation's economy, impacting all sectors of business and directly contributing $1.3 trillion and 11 million jobs to the U.S. economy. A vibrant aviation system, supported by a high-performance aviation infrastructure, increases capacity at our large metropolitan airports, improves access to small and remote communities, meets passenger demand for travel, supports a thriving tourist industry, and enables strong American business development.

4. How Do You Know The Program Works?

The FAA continues to expand its work on demonstrations, trials and initial deployment of NextGen systems and procedures. National Airspace System (NAS) operators and users – particularly participants in the demonstrations and trials – are benefiting from them.

Our latest estimates show that by 2018, NextGen air traffic management improvements will reduce total delays, in flight and on the ground, about 35 percent, depending on fuel prices and traffic, compared with what would happen if we did nothing. The delay reduction will provide $23 billion in cumulative benefits from 2010 through 2018 to aircraft operators, the traveling public and the FAA. We will save about 1.4 billion gallons of aviation fuel during this period, cutting carbon dioxide emissions by 14 million tons.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Improvements to the air transportation infrastructure stimulate the economy in a myriad of ways not directly related to aviation. Airlines alone have forfeited 300,000 jobs over the last 10 years. Improvements to the air transportation infrastructure will lower operating costs and provide a better passenger experience, which support airline growth with the accompanying increase in airline jobs. Just a 10 percent growth would represent 3,000 jobs.

We estimate the projects included in this $1 billion NextGen portfolio will generate an additional 7,991 jobs in FY 2013 and FY 2014. This does not include what would be a significant downstream jobs impact with manufacturing firms producing radios, management and administrative staff necessary to oversee construction crews and software engineers, as well as additional jobs elsewhere in the economy due to increased economic activity.

Detailed Justification for – Immediate Transportation Initiative: Next Generation Air Transportation System (NextGen)

1. What Is The Request And What Will We Get For The Funds?

For Fiscal Year 2012, FAA assumes $1 billion to support NextGen air traffic modernization efforts, as part of the Immediate Transportation Investment initiative to put Americans back to work while rebuilding and modernizing America's roads, rails and airports.

While many aircraft flying today are equipped to fly in fast lanes, the current airspace design and infrastructure essentially keeps all the traffic in the local lanes. In order to provide better "highways in the sky," FAA needs to design the interconnecting system, develop efficient on and off ramps, establish the supporting infrastructure, and publish the maps that will allow aircraft to take advantage of 21st century technologies already available in their cockpits.

2. What Is This Program?

This project consists of multiple supporting projects, some of which are already underway. Accelerated delivery of this infrastructure is supported with investments in the following areas:

- Future air traffic control facilities
- Improved air traffic surveillance capabilities to ensure safety and continuity of operations
- Implementation of expedited processes to support instrument procedures development
- Improved management of operations on the surface integrated with traffic flow
- Enhanced traffic flow management and data handling capabilities
- Navigation and surveillance infrastructure to support new airspace designs and allow access in low visibility conditions

The specific projects include:

NextGen Future Facilities Program - $225 Million

The FAA's current inventory of Air Traffic Control (ATC) Facilities is no longer capable of meeting traffic demand in the future, and is no longer affordable in the long term. All of the FAA's large enroute centers are over 40 years old and have reached the end of their useable life. They were designed and located to accommodate technology available in the 1960's and are not as well suited for the new technologies and procedures coming on line in the National Airspace System (NAS).

The NextGen Future Facilities concept will create a new FAA ATC Facility for the future which will fully leverage new NextGen capabilities to improve traffic flow, ensure cost savings to the user community, reduce the environmental impact of aviation, and reduce operating costs. This facility will replace buildings currently being used. These legacy facilities will be closed

The FAA is requesting $95 million in the FY 2013 Facilities and Equipment President's budget submission to support the continued planning for the overall Segment 1 of the program, which includes the airspace within the current ARTCCs at New York, Boston, Cleveland and Chicago. The funding will be used to focus on completing the business case for Project One Final Investment Decision (FID), and setting up the planning, engineering, and procurement for the facility equipment and systems. In addition, site selection, site preparation, environmental assessments, and utility work to prepare for construction of the Segment 1, Project 1 (the first facility) could be completed in FY 2013.

This additional $225 million will support construction of the new NextGen facility. The NextGen Future Facilities Segment 1, Project 1 Final Investment Decision will be November 2012. Construction award of the "Liberty" Integrated Control Facility should be made by September 2013,

With construction award assumed to occur in late 2013, construction, equipment, and transition during 2014-2016, Initial Operating Capability would be in 2017. Employees and airspace transition will be achieved in 2017-2023.

Expansion of ADS-B Services - $350 Million

The FAA has identified key areas where supplementing Automatic Dependent Surveillance – Broadcast (ADS-B) coverage with additional ground infrastructure can provide economic and safety benefits to air transport and general aviation users through increased airport access, route development, and expanded surface coverage. Potential areas for expansion include:

ADS-B Radio Station Expansion ($258 million):

- Adding up to 200 new radio stations can provide complete coverage down to 1,500 feet above terrain; augment non-radar airport surveillance at roughly 40 – 50 locations in states and territories such as Arizona, Utah, Nevada, Washington, California, Louisiana, Arkansas, Kansas, Mississippi, Idaho, Montana, New Hampshire, Wisconsin, Minnesota, Oregon, Iowa, Idaho, Massachusetts, South Dakota, and Guam; support international deployment in areas such as Mexico, Caribbean, and Bermuda; and support Routes along the East Coast, North Atlantic Tracks (NATS), Southern Pacific (SOPAC), the West Atlantic Route System (WATRS), and Pacific Route System (PACOT).

- Five remaining Service Volumes in Alaska.

Airport Surface Surveillance Capability (ASSC) ($92 million):

Airport Surface Surveillance Capability (ASSC) is a runway safety system that provides coverage on runways and taxiways by collecting data from: multilateration sensors, ADS-B sensors, the terminal automation system, and terminal secondary surveillance radar (optional). When ASSC fuses data from these sources, it determines the position and identification of aircraft and transponder-equipped vehicles on the airport movement area in addition to aircraft located inside the airport approach corridors out to five miles. ASSC, coupled with ADS-B, will provide enhanced situational awareness for both pilots and air traffic controllers. Potential areas for expansion include:

- Surface coverage at non-ASDE locations at up to 19 airports selected based on the potential benefits using ASSC

The FAA estimates that this infrastructure can be established within three to four years.

Improving Access to Non-Towered Airports - $3 Million

As an adjunct to the expansion of ADS-B service, the FAA will develop the necessary changes to the controller equipment to support the benefits of improving access to smaller airports. Improving access in nearly all weather conditions by adding a surveillance capability to these small airports will not only eliminate delays due to one-in and one-out at those airports but also provide economic opportunity for these communities. This effort expands the exiting Colorado demonstration for improved low altitude surveillance by adding surveillance down to airport surface and adds capability to the controller workstation to support these non-towered airports.

NAV Lean - $28 Million

As new skyways are developed for use with NextGen, the FAA needs to be able to approve and certify new procedures in a timely manner. By ensuring that both design and approval are integrated and optimized, the new roads in the sky will be fully utilized. The NAV Lean project will expedite completion of the 21 recommendations proposed by the NAV Lean working groups is expected to significantly reduce the average time required to implement Instrument Flight Procedures (IFPs). Improved efficiency will reduce time required for implementation of IFP's by up to 54 percent. This positions the FAA to meet the increased demand for approval of instrument flight procedures, which are the cornerstone of the NextGen. This task will require $28 million to expedite the implementation of efficient procedure development processes.

Surface Surveillance Management and Collaborative Departure Que Management (CDQM) - $20 Million

To provide immediate/near-term operational benefits to FAA facilities and surface stakeholders on the airport surface, FAA proposes a public/private partnership to accelerate delivery of near-term surface traffic management capability at up to 15 busy airports. The capability could provide surface surveillance of both movement and non-movement areas to provide a common operational picture to surface stakeholders to include the FAA, airport authorities, airlines, and homeland security. Additionally, it could provide a runway queuing management capability that would absorb departure delays at the gate, significantly reducing airport movement area congestion, fuel usage, and greenhouse emissions. These capabilities provide a greatly enhanced common operational picture to what is currently available and answer RTCA Task Force 5 surface recommendations. This task will require a public/private partnership with technology companies and airports. A total of $20 million will provide these capabilities at three selected airports of the Core 30. Of this amount, $10 million will provide for client equipment, communications, and site adaption for collaborative departure management at several busy airports, and $10 million will provide for the expanded non-movement area surveillance at selected airports.

Integration of Flight Deck with Traffic Flow - $160 Million

The integration of Flight Deck with Traffic Flow will enhance the potential of an uninterrupted fuel efficient optimized profile descents: (For RNAV/RNP Procedures and Tailored Arrivals).

- Benefits to the airlines in fuel savings.
- First Arrival 4D Trajectory Operation.
- Benefits to the environment in reduction of emissions and noise.
- Benefits to air traffic controllers and pilots in reducing workload.

The proposal is to implement a comprehensive approach to providing efficient, 4D trajectory-based operations at medium to high density airports for NextGen. The concept was developed as a collaborative effort between FAA, NASA, Sensis, Inc., The Boeing Company, United, Continental, and SkyWest Airlines, and other industry participants.

The concept is focused on commercial air carrier operations in the arrival-transition airspace. This proposal uses a combination of currently present airborne automation and a new ground automation tool under development by NASA, to compute and execute advisories for conflict-free optimized profile descents from cruise altitude to the Center/TRACON metering fix. The arrival is maximized in that fuel is saved, emissions are reduced and the aircraft spends less time in the air.

Secondary benefits include potentially enhancing throughput at airports. The concept including the ground automation tool has proven to help controllers perform time-based metering which are practiced today at most busy airports. The concept and tool can be used for other applications (i.e. high altitude airspace) where metering is being performed. The tool provides a single trajectory clearance for the controllers to issue, significantly reducing the workload for both controllers and pilots. A total of $160 million is required to develop source code, computer human interface, and extend capabilities to Datalink.

En Route Data Distribution Acceleration - $120 Million

The funding will complete the operational and engineering analysis to develop a Flight Information Service (FIS) that extends the en route flight data processing into terminal and towers. The FIS would be the core services and flight data processing to converge functions currently in the Flight Data Input Output system, Electronic Flight Strip Transfer System, and would provide a full flight data capability for TRACON and Airport Traffic Control Tower (ATCT) personnel. The benefit of convergence is to reduce the life cycle cost of maintaining the existing NAS capabilities and minimize the cost to implement the planned NextGen capabilities for TRACON, ATCT, and surface operations. This effort will require $120 million to complete operational requirements, system requirements, computer human interface design, design trade studies, and risk reduction studies to reach a final investment decision.

Distance Measuring Equipment (DME) Acceleration - $48 Million

To ensure that the airspace highways are always open, the FAA needs to expand the navigation infrastructure to support the new designs. This includes adding Distance Measuring Equipment (DME's) to keep the capability available even when GPS is not available. With this enhancement to the navigation system, no design will be limited by the lack of navigation coverage. To achieve this at the major airports there is a requirement for improved DME/DME Service. The Terminal Navigation performance level targeted is RNP 1 and the En Route Navigation Performance level is targeted for RNP 2, 99.9 percent availability from FL 180 down to the Final Approach Fix (FAF) or 1,000 feet. The coverage volume to be targeted will primarily be SID/STAR areas out to 130 nautical mile range in all of the terminal airspace at the Core 30 airports, to include coverage in metroplex areas. This task will require a minimum of $48 million.

With additional funding for FY 2013 – FY 2014, the acquisition process to support NextGen Area Navigation (RNAV) in the en route and terminal domains can be accomplished. A contract for Distance Measuring

Equipment (DME) was awarded in 2011, making DMEs available once testing and acceptance is accomplished. With the current planned schedule, production will start in 2013.[1] This should factor in well with the Optimized Airspace Procedures Metroplex (OAPM) effort that is scheduled to begin reporting out in 2012. There is a great deal of preparation work for site locations, including site surveys, research, testing, analysis, and official FAA document update, such as Advisory Circulars and Orders. In addition, research, testing, and analysis can be accelerated to help implement such concepts as the hybrid service volume model that will lead to more efficient use of airspace and frequency spectrum.

Since a significant number of aircraft are already equipped and can use DME-RNAV, once work is achieved, operational benefits could accrue in the near-term. Currently, 150 sites are identified for NextGen RNAV terminal operations as requiring either a new DME facility or upgrades to that site. These are sites supporting the Core 30 airports and the 120 next busiest airports for terminal operations. Much of the research and analysis work supported would accelerate both terminal and en route efforts for NextGen DME-based RNAV. These funds could support the implementation of the 30 Core Terminals and 38 critical Enroute DME's.

Improve Take Off and Landing Access in Low Visibility Conditions - $46 Million

The Enhanced Low Visibility Operations (ELVO) program has the following major benefits for the NAS during periods of low visibility and IFR:

- Decreased delays and diversions, safety
- Reduced minima for CAT I and CAT II operations
- Lower takeoff minima
- Lower fuel consumption

The ELVO program is seeking funding for the following:

- Single Thread Airports: Major airports with single CAT II capability. If that capability is lost, the airport operations are downgraded and adversely impacted. There are currently eight identified Single Thread Airports: BWI, SFO (being worked), OAK, ONT, JAX, RDU, PDX, and DCA. ($8 million estimate)
- Airport runways that present significant benefits over cost for Special Authorization CAT II. ($20 million estimate)
- Airports with no current CAT II capability that impact current operations ($8 million estimate)
- Remaining qualifying runway ends for RVR 1800 and SA CAT I approaches that require infrastructure, showing significant benefit over cost, including for LPVs. ($10 million estimate)

With this additional funding, multiple runway projects could be accomplished to improve low visibility operations within the National Airspace System (NAS) and quickly create jobs throughout the geographic United States. Low visibility conditions limit the number of aircraft that are capable of performing landing and take-off operations. This program increases that number over the current NAS capacity during low visibility Instrument Meteorological Conditions (IMC). Greater NAS capacity is achieved through reduced delays and diverts, allowing passengers and commerce to reach the desired destination in a timely, more efficient manner while reducing the carbon footprint.

A NAS-wide study was conducted on all towered airports to identify the number of qualifying runway ends and analyze those potential sites for need, cost, and benefit. Of those qualifying runway ends, a first focus is on "Single Thread Airports" or major airports with only single Category II/III (CAT II/III) capability.

When that single runway capability is out due to repair, maintenance, or Continuity of Service issues, it can cost up to $5 million per year in lost NAS operations, adversely impacting the movement of passengers and commerce. Adding an additional CAT II level capability through Special Authorization (SA) CAT II can address this need and keeps commerce and passengers moving successfully throughout the NAS.

Based on this initial analysis and including the Single Thread Airports, there are:

- 42 runway ends that show benefit of $10 million or higher per year (18 ESA, 5 CSA, 19 WSA); and

[1] These DMEs can be purchased from the contract awarded. First Article Testing is scheduled for 2013. If successful, units will be produced in 2014.

- 18 runway ends showing $1million to $10 million in benefits.[1]

Final analysis may show additional runway ends with varying levels of benefits. This work is NextGen funded through the Enhanced Low Visibility Operations (ELVO) program. There are RVR 1800, SA CAT I, and SA CAT II published procedures being flown in the NAS today. Currently, this program is officially approved through Concept and Requirements Definition (CRD) and is pressing for Investment Analysis Readiness Decision (IARD) in second quarter of FY2012.

Summary:

The following table summarizes the costs associated with the FAA's proposal for Air Transportation Infrastructure project:

Air Transportation Infrastructure	($ in millions)
NextGen Future Facility	$225
ADS-B Radio Station Expansion	258
ADS-B ASSC Sites	92
Improving Access to Non-Towered Airports	3
NAV Lean Project	28
Surface Surveillance Management and CDQM	20
Integration of Flight Deck with Traffic Flow	160
Enroute Data Distribution Acceleration	120
Distance Measuring Equipment Acceleration	48
Improve Take-Off and Landing Access in Low Visibility Conditions	46
Total	$1,000

3. Why Is This Particular Program Necessary?

Aviation is a major driver of our nation's economy, impacting all sectors of business and directly contributing $1.3 trillion and 11 million jobs to the U.S. economy. A vibrant aviation system, supported by a high-performance aviation infrastructure, increases capacity at our large metropolitan airports, improves access to small and remote communities, meets passenger demand for travel, supports a thriving tourist industry, and enables strong American business development.

By investing in the infrastructure of aviation – the air routes and procedures that aircraft follow - we open the skies to new opportunities. Rather than flying indirect routes based on the historical locations of ground-based navigational beacons, satellite-based navigation will allow aircraft to fly shorter, more direct routes. We can create more efficient, environmentally friendly, safe routes in the air – from departures to arrivals at a destination airport. Precision, satellite provided location information can be the standard, allowing aircraft increased safety while saving fuel and reducing delays with lower emissions and noise. Smoothing out the aircraft's descent profile can also increase efficiency and reduce environmental impacts. Current operations often require aircraft to burn large amounts of fuel in level flight during its descent to an airport. "Optimized Profile Descents" allow an aircraft to fly most of its descent with the engines at their lowest power setting, saving significant amounts of fuel.

The benefits accrue each flight these techniques are used. Airlines report that saving only one mile of flight distance saves $25. New more efficient routes can save many miles per flight. Smoothing the descent profile is shown to save hundreds of gallons of fuel per flight. The compounding effects of flight after flight, new location after location will lead to tremendous benefits. For example, a 25 percent reduction in amount of time in level flight during descents into Los Angeles is now saving the operators and the environment two to three million gallons of fuel per year, without even reducing the distance flown. FAA studies and early

[1] Net Present Value over 20 years.

deployments have shown that introduction of these more efficient processes into the airspace around and connecting major metropolitan areas can save operators up to $40 million per year in fuel savings in that metro-area alone. Improved passenger experience resulting from fewer delays and overall improvements to communities from reduced noise and emissions would add to these direct operator benefits.

Accelerating improved Next Generation air routes and operating procedures is good for communities, the environment, the economy and jobs. Industry has already invested in the equipment and training to make their adoption a reality and the efforts fall within FAA's existing authority.

4. How Do You Know The Program Works?

The FAA continues to expand its work on demonstrations, trials and initial deployment of NextGen systems and procedures. National Airspace System (NAS) operators and users – particularly participants in the demonstrations and trials – are benefiting from them.

Our latest estimates show that by 2018, NextGen air traffic management improvements will reduce total delays, in flight and on the ground, about 35 percent, depending on fuel prices and traffic, compared with what would happen if we did nothing. The delay reduction will provide $23 billion in cumulative benefits from 2010 through 2018 to aircraft operators, the traveling public and the FAA. We will save about 1.4 billion gallons of aviation fuel during this period, cutting carbon dioxide emissions by 14 million tons.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Improvements to the air transportation infrastructure stimulate the economy in a myriad of ways not directly related to aviation. Airlines alone have forfeited 300,000 jobs over the last 10 years. Improvements to the air transportation infrastructure will lower operating costs and provide a better passenger experience, which support airline growth with the accompanying increase in airline jobs. The $1 billion would be attributable to other F&E programs.

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Executive Summary - Immediate Transportation Investment: Grants-in-Aid for Airports

1. What Is The Request And What Will We Get For The Funds?

The President's Immediate Transportation Investment initiative puts Americans back to work while rebuilding and modernizing America's roads, rails and airports.

For Fiscal Year (FY) 2012, $2.0 billion of the Immediate Transportation Investment will fund additional projects in the Grants-in-Aid for Airports program, also known as the Airport Improvement Program (AIP). Most of this funding will be used for runway construction and other airport improvement projects aimed at increasing overall system efficiency in the future. Eligible airports in all size categories are able to compete for the $2.0 billion in one-time funding, which is in addition to the $3.35 billion of FY 2012 funding provided in the regular AIP program.

2. What Is The Program?

The AIP provides grants to local and state airport authorities to help ensure the safety, capacity, and efficiency of U.S. airports. Through the AIP, the agency funds a range of activities to assist in airport development, preservation of critical facilities, economic competitiveness, and environmental sustainability.

3. Why Is This Particular Program Necessary?

Through the AIP, the agency funds a range of activities to ensure the safety, security, capacity, and environmental mitigation of U.S. airports. The FAA identifies public-use airports for the national transportation system and the National Plan of Integrated Airport Systems (NPIAS). These public use airports support scheduled air carrier service at more than 500 commercial service airports. In addition to the scheduled passenger and cargo service, the airport system serves a diverse range of functions at approximately 2,829 non-primary airports that provide emergency medical, flight training, agricultural, and business/corporate activities. The proposed AIP funding level will provide sufficient funding for all high priority safety, security, preservation, capacity, and environmental projects.

4. How Do You Know The Program Works?

The FAA has a very high level of confidence in the effectiveness of the program. The investment of AIP funds in the National Airport System (NAS) improves the safety and enhances the capacity of the system. We work closely with airports and the state aeronautical agencies to monitor the condition of critical airfield infrastructure, and can draw direct connections between our efforts and improvements in safety and capacity.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

The principal tool FAA uses to establish the Airports Capital Improvement Program is the 5-year development needs identified in the NPIAS. The latest NPIAS, which was published in September 2010, identified over $52 billion in capital needs over the 5-year period from 2011-2015. The FAA funds capital projects that support system safety, capacity, and environmental projects and the highest priority needs in the NPIAS.

Detailed Justification for Immediate Transportation Investment: Grants-in-Aid for Airports

1. What Is The Request And What Will We Get For The Funds?

The President's Immediate Transportation Investment initiative puts Americans back to work while rebuilding and modernizing America's roads, rails and airports.

For Fiscal Year (FY) 2012, $2.0 billion of the Immediate Transportation Investment will fund additional projects in the Grants-in-Aid for Airports program, also known as the Airport Improvement Program (AIP). Most of this funding will be used for runway construction and other airport improvement projects aimed at increasing overall system efficiency in the future. Eligible airports in all size categories are able to compete for the $2.0 billion in one-time funding, which is in addition to the $3.35 billion of FY 2012 funding provided in the regular AIP program.

The one-time mandatory funding will be used, in part, to fund commitments made under Letters of Intent (LOI) issued prior to FY 2012, Runway Safety Area (RSA) improvements, noise mitigation for impacted communities, and other high priority projects designated by the Secretary.

The request allows the agency to continue supporting the following key initiatives:

- Improve RSAs that do not conform to FAA standards;
- Reduce the risk of runway incursions by reconfiguring taxiways, perimeter service roads and other facilities;
- Preserve or enhance the safety of critical airfield and other airport infrastructure at airports nationwide;
- Preserve or enhance airfield capacity and efficiency at airports nationwide;
- Mitigate the environmental impacts of aviation including noise mitigation, land use compatibility planning and air quality improvements; and
- Continue to support airport security improvements where applicable.

Funding will support the following key outputs and outcomes:

- Improved RSAs increase safety on runways;
- Reconfigured taxiways, perimeter service roads and other facilities reduce the risk of runway incursions;
- Reconstructed and rehabilitated runways, taxiways and aprons will preserve the nation's critical aviation infrastructure; and
- Air quality improvement and noise mitigation projects reduce air and noise pollution.

2. What Is This Program?

The Grants-in-Aid for Airports program primarily supports Department of Transportation's (DOT) State-of-Good Repair goal, contributing toward the outcome of increased proportion of infrastructure assets in good condition. We also support DOT's Safety goal through our efforts to "reduce transportation-related injuries and fatalities." We additionally support DOT's Economic Competitiveness goal, with resources dedicated to two outcomes: "Maximum economic returns on transportation policies" and "A competitive air transportation system responsive to consumer needs." This program also significantly contributes toward DOT's Environmental Sustainability goal, contributing toward the reduction of transportation-related pollution and impacts on ecosystems.

<u>State of Good Repair</u>
The Airport Improvement Program provides grants to local and state airport authorities to maintain critical facilities, including runways, taxiways, aircraft parking areas (aprons) as well as many other airport facilities, systems and equipment. For example, AIP provides funds to ensure that no less than 93 percent of runways at more than 3,300 airports included in the NPIAS are maintained in excellent, good or fair condition.

Safety
The AIP provides grants to local and state airport authorities to help ensure the safety, capacity and efficiency of U.S. airports. Through the AIP, the agency funds a range of activities to assist in airport development, preservation of critical facilities, economic competitiveness, and environmental sustainability.

We also support the DOT Safety goal by providing funding for safety-related development at airports that benefit both commercial service and general aviation operations. For example, AIP provides funds to airports to reduce runway incursions caused by vehicle/pedestrian deviations, to accelerate improvements to runway safety areas that do not meet current standards, supports research in airport technology to develop improvements in airport marking and lighting, airport rescue and fire fighting, and mitigation of wildlife hazards near airports.

Economic Competitiveness
The AIP supports the DOT Economic Competitiveness through the following outcomes:

- Maximum economic returns on transportation policies and investments;
- A competitive air transportation system responsive to consumer needs.

By funding airport infrastructure projects that provide access to the National Aviation System in order to maintain a competitive air transportation system responsive to consumer needs, AIP contributes to economic competitiveness. For example, the AIP directs funding investments toward capacity development projects at airports ranging from the largest and most congested airline hubs serving some of the largest metropolitan areas to smaller urban areas and down to airports that enable critical access for emergency medical services to isolated communities.

Environmental Sustainability
The AIP supports the DOT Environmental Sustainability goal, "Reduced transportation-related pollution and impacts on ecosystems" outcome by funding projects and programs that help reduce transportation-related impacts on air quality, water quality, noise, and other impacts on ecosystems. For example, the AIP supports projects to reduce ozone emissions in EPA-designated nonattainment areas; supports airport greening initiatives and developing sustainability best practices; implements Environmental Management Systems to ensure that FAA operations protect the environment and meet statutory and regulatory environmental requirements; and reduces the number of people exposed to significant noise.

Anticipated accomplishments for the Immediate Transportation Investment in AIP grants include:

- Improve nonstandard RSAs;
- Fund infrastructure development projects to meet airport safety and design standards;
- Ensure that 93 percent of runways at more than 3,200 airports in the NPIAS (excluding Large and Medium hubs) are maintained in excellent, good or fair condition (the Large and Medium hub airports would be expected to use PFCs and other resources to maintain their state of good repair);
- Continue progress on reducing runway incursions by 10 percent from the FY 2008 baseline within 5 years;
- Fund all approved Runway Safety Action Team (RSAT) recommendations identified in the Airports Capital Improvement Program (ACIP);
- Fund capacity projects identified in the ACIP;
- Fund noise mitigation to benefit 12,500 residents and students within Day-Night average sound level (DNL) 65dB (decibels) or higher-impacted contours

3. Why Is This Particular Program Necessary?

The aviation system plays a critical role in the success, strength, and growth of the U.S. economy. Approximately 590,000 active pilots, 232,000 general aviation aircraft, and 4,520 air carrier jets rely upon the U.S. airport system. The economic impacts of the air traffic control system are well-documented in FAA's report on "The Economic Impact of Civil Aviation on the US Economy," published in December, 2009. It states that, in 2007, aviation accounted for 12 million jobs, $1.3 trillion toward the gross domestic product output, and 5.6 percent of gross domestic product. Continued growth in this industry will be predicated in part on a modernized air traffic control system.

Airport infrastructures, particularly airfield facilities, are exposed to constant heavy use and harsh environmental conditions. Runways, taxiways, and aprons are designed to withstand the heavy equipment that operates on them, but even so these facilities require frequent maintenance and rehabilitation in order to remain in good working condition. Runways and taxiways have to be kept clear of snow, ice, and ponding water that can jeopardize aircraft directional control or braking action. Chemicals and plowing, as well as freeze-thaw cycles, all take a toll on runways, taxiways, and other paved areas. The smallest bit of broken asphalt or concrete can represent a major safety hazard to aircraft accelerating on takeoff or maintaining directional control after landing.

The vast majority of public-use airports in the United States are owned and operated by municipal, county or state government agencies, or by independent public authorities. They are required to follow strict rules in establishing rates and charges for the airlines and other users in order to recover their operating and maintenance costs.

Through AIP, the agency funds a range of activities to ensure the safety and capacity of U.S. airports. The FAA identifies public-use airports that are important to the national transportation system, including those airports in the federal plan known as the NPIAS. These public use airports support scheduled air carrier service at approximately 500 airports (known as commercial service airports). In addition to the scheduled passenger and cargo service, the airport system serves a diverse range of functions at approximately 2,829 general aviation airports. These uses include emergency medical, flight training, agricultural, and business/corporate activity. The proposed AIP funding level will provide sufficient funding for all high priority safety and capacity projects.

The 65 Large and Medium hub airports account for about 89 percent of all passenger enplanements. Much of the delay to air traffic can be traced to inadequate capacity or efficiency at some of these airports. With the critical support of AIP, constructing new or extended runways, taxiways, and airfield reconfiguration continues to be an important part of FAA's NextGen Implementation Plan. Arrival and departure rates at the nation's busiest airports are constrained by the limited number of runways that can be in active use simultaneously. Since FY 2000, 16 new runways, 2 runway extension, and 1 airfield reconfiguration have opened with another airfield reconfiguration two-thirds completed, allowing about 2 million more annual operations.

AIP supports vital technical and financial assistance for planning, environmental analysis, and construction/rehabilitation of runways, taxiways, and aprons as well as other measures to expand and make more efficient use of airports. The AIP funding plan will reflect a special emphasis to increase capacity and improve the airport arrival efficiency rate. AIP funding of the following airport projects contributes to these projects:

- Construct, rehabilitate or overlay existing runways, taxiways, and aprons;
- Extend runways, taxiways, and aprons;
- Construct/improve terminal buildings;
- Acquire and install visual approach aids;
- Acquire and install Instrument Landing Systems (ILS);
- Acquire and install weather-reporting equipment;
- Bring pavement and other facilities up to design standards; and
- Construct new airports/heliport.

4. How Do You Know The Program Works?

The FAA works closely with commercial service airports and with state aeronautical agencies to monitor the physical condition of airport infrastructure, particularly the critical airfield facilities. This gives FAA real-time information about capital funding needs and priorities, the effectiveness of funded projects, and the utilization of the airports. One of the core performance objectives of AIP is to maintain at least 93 percent of the runways at NPIAS airports in good, fair or excellent condition. The FAA's funding decisions consider a number of factors including the physical condition of airport facilities as well as historical, current and projected activity levels. The FAA also reports annually to Congress on how the funds have been used and the benefits of those investments in terms of increased safety, capacity, efficiency, and environmental compatibility.

The investment of AIP funds in the National Airport System has direct benefits, improving the safety and capacity of the system, and providing American jobs. The AIP program also assists airports to become more environmentally friendly and reduces the impact of airport activities on its communities.

<u>Safety</u>
We have several metrics that show the AIP investment is improving or maintaining safety. In FY 2011, the number of total runway incursions decreased slightly from 966 in FY 2010 to 954 in FY 2011. Serious runway incursions (category A and B) remained low. There were 6 Category A or B incursions in FY 2010, and 7 in FY 2011.

The reduction in serious runway incursions is partially attributed to improvement of airport markings, such as the enhanced taxiway centerline marking, end-around taxiways, and improvements in surface geometry. The investment in improving RSAs and installing Engineered Materials Arresting Systems (EMAS) arresting systems has also shown to be effective. EMAS has already recorded seven successful overrun arrestments with minimal or no damage to the aircraft. The latest arrestment came at Key West International, Florida in November 2011 when an overrunning Cessna Citation was safely arrested.

Since FY 2000, FAA has improved 512 RSAs, and by 2012, 88 percent of practicable improvements will be completed. The installation of EMAS is an example of the effectiveness of this investment. Since installing EMAS on 63 runway ends where it was not practical to achieve standard physical runway safety areas, seven aircraft have departed the runway surface and were stopped by the EMAS, avoiding significant damage and loss of life.

<u>Economic Competitiveness</u>
Since FY 2000, 23 airfield projects have opened at 20 Large and Medium hub airports. These include 16 new runways, 3 taxiways, 2 runway extensions, 1 airfield reconfiguration, and 1 airfield reconfiguration two-thirds completed. The projects have provided these airports with the potential to accommodate about 2 million more annual operations and decrease average delay per operation at these airports by about 5 minutes.

<u>Environmental Sustainability</u>
Funds have assisted airports to become more environmentally friendly. AIP funds assist airports owners to improve land use compatibility near airports through the acquisition of non-compatible residences and sound insulation of residences, schools, and hospitals. Since 2005, over 105,000 people have benefited by their relocation from a noise impacted area or through sound attenuation programs designed to reduce the noise exposure on residences, schools, or hospitals.

The VALE Program addresses air quality by helping airports reduce emissions from all mobile and stationary ground sources. The FAA has funded 52 VALE projects through the AIP program since 2005. A total of $108 million has been invested in VALE clean airport technology. Over the long-run, VALE initiatives will reduce ozone forming pollutants (Nitrous Oxides and Volatile Organic Compounds) at airports by 8,010 tons. The smog-reducing benefits of VALE projects are equivalent to removing over 17,640 cars and trucks from the road each year for the next decade.

5. Why Do We Want/Need To Fund The Program At The Requested Level?

Every other year, FAA is required to develop a five-year prospective analysis of capital needs and submit it to Congress as part of the NPIAS. The capital projects included in the NPIAS consistently exceed the annual available funding for the AIP. Projects are routinely broken into smaller phases or deferred to a future year until funding can be identified. The latest NPIAS, published in September 2010, identified over $52 billion in capital needs over the 5-year period from 2011-2015. The additional Immediate Transportation Investment in FY 2012 for $2.0 billion would fulfill less than 5 percent of these identified capital needs.