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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 93 million successful flights on U.S. commercial aircraft, transporting over 6.5 billion passengers safely to their destinations. Commercial aviation fatality rates are at historic lows, and other safety indicators, such as runway incursions, are also headed in the right direction. 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 account for and save taxpayers' money. Despite our many successes, there is still more to be done.

The FAA is heading into a period of unprecedented challenge as we pilot the future of aviation into our skies and into space. We must work to adapt to the changing technological, economic, social, environmental and energy needs of both our nation and our global partners. Like the rest of the government, we face significant budget pressures that will shape our ability to maintain today's system and critical infrastructure as we build to meet tomorrow's demands. The FAA must find a way to enable aviation to be a transportation choice that provides the traveling public, U.S. business, and our international partners with safe, secure, convenient, and environmentally sustainable air travel.

Our vehicle for this transformation is the Next Generation Air Transportation System (NextGen), which will offer increased safety, capacity and efficiency while providing for a cleaner environment and bolstering America's continued economic growth. The next ten 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 are already on the ground at airports, in cockpits, and are providing aviation improvements for passengers and aviation professionals today. From flight decks to control towers, our system is already changing. As we change, FAA remains deeply committed to ensuring America has the safest, most advanced and efficient aviation system in the world, and that air transportation is safe and efficient wherever U.S. citizens travel.

Overview by Appropriation Account

Operations

The FY 2012 request of $9.8 billion is an increase of $473 million (5 percent) above the FY 2010 enacted level. This will fund inflationary adjustments and maintenance and operating costs of new National Airspace System (NAS) systems and equipment. Major initiatives funded by the request include the collective bargaining agreement with air traffic controllers, increased safety staffing, advancements in commercial space transportation, and NextGen Technology and Advancement.

The FY 2012 request maintains our critical Aviation Safety inspector staff increases from recent years, while further increasing overall Aviation Safety staffing by 178 positions. The increase enables FAA to perform additional safety inspections and the rulemaking, certification, and outreach activities necessary to move NextGen forward.

The demand for FAA services has never been so complex or comprehensive. As NASA retires the space shuttles, it will begin to utilize commercial space transportation systems to access the International Space Station (ISS) and to develop commercial human spaceflight systems. This change increases the workload of FAA's Office of Commercial Space Transportation. The FAA's FY 2012 budget request therefore supports a commercial spaceflight technical center at Kennedy Space Center. Requested increases for FY 2012 include $1.3 million to begin development and implementation of safety requirements for commercial human space flight and $5 million to establish a Low-Cost Access to Space Incentive program.

Funding is also requested for the enhancement of FAA's Cyber Security Management Center to increase information system security protection and increased staffing to improve Emergency Operations, Communications, Intelligence Watch and Investigations. The Operations request reflects $7.9 million in cost savings realized by FAA's Flight Services Contract. This contract is expected to save FAA $1.9 billion over its thirteen year lifespan. In addition, the budget incorporates base transfers to better align our resources with organizational functions.

Facilities & Equipment (F&E)

The budget allows FAA to meet the challenge of both maintaining the capacity and safety of the current NAS while keeping our comprehensive modernization and transformation efforts on track. The request of $3.1 billion is an increase of $184 million (6 percent) above the FY 2010 enacted level.

To spur job growth and initiate sound multi-year investments, the President's Budget includes a $50 billion boost above current law spending for roads, railways and runways. As part of this initiative, our F&E request includes $250 million in mandatory General Fund appropriations that will be used to advance NextGen and make near-term improvements in FAA's air traffic control infrastructure. $200 million will be used to accelerate applied research, advance development, and implement engineering solutions for NextGen technologies, applications, and procedures while $50 million will be used to upgrade existing capital infrastructure such as power systems and air traffic control centers and towers.

The F&E NextGen portfolio is $1.14 billion in FY 2012, a 44 percent increase above the FY 2010 enacted level. This funding will continue our ongoing NextGen modernization activities, including nation-wide Automatic Dependent Surveillance – Broadcast (ADS-B) deployment, and would allow the awarding of a data link communications services contract. In addition, funding is requested for NextGen future facilities investment planning and follow-on En Route Automation Modernization (ERAM) software development for future NextGen capabilities. A more detailed discussion of the NextGen effort is included in Section 5 of this submission.

The remainder of our investment – representing $2 billion – will be in legacy areas, including aging infrastructure, power systems, information technology, navigational aids, and weather systems. In FY 2012, FAA plans to award four 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 2012 request of $190 million is essentially unchanged from the FY 2010 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 aging aircraft.

The RE&D NextGen portfolio is $77 million, a $5 million increase from the FY 2010 enacted budget and supports NextGen research to enable the use of alternative and renewable fuels for general aviation aircraft to lessen aviation environmental impacts while reinforcing American leadership in clean technologies.

FAA must meet our nation's growing need for Unmanned Aircraft Systems (UAS). Our RE&D request continues to support this critical area, providing $3.5 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 $35.8 million. This program supports a range of research activities, from improved science and modeling capabilities to characterize and quantify aviation's environmental impacts to maturing certifiable clean and quiet aircraft technologies and developing 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 2012 request provides the funding needed to ensure safety, capacity, and efficiency at our nation's airports through a combination of continued grant funding at reduced levels and an increase in Passenger Facility Charges (PFCs). Our FY

2012 request totals $5.5 billion for the Airport Improvement Program, which includes $2.4 billion from the Airport and Airway Trust Fund and $3.1 billion in mandatory General Fund resources. With the $5.5 billion FY 2012 request we will continue our focus on safety-related development projects, including runway safety area improvements, runway incursion reduction, aviation safety management, and improving infrastructure conditions.

The Budget proposes to lower funding for the ongoing airport grants to $2.4 billion, a reduction of $1.1 billion, by eliminating guaranteed funding for large and medium hub airports. The proposal 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. Our 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) and provides them with greater flexibility to generate their own revenue.

In addition, FAA requests a one-time appropriation of $3.1 billion in mandatory General Fund resources for the Grants-in-Aid program. While regular AIP eligibility will be suspended for large and medium-hub airports, eligible airports in all size categories will be able to compete for the $3.1 billion. Most of this funding will be used for runway construction and other airport improvement projects aimed at increasing overall system efficiency in the future.

The Budget provides $101 million for Personnel & Related Expenses – an increase of $7.6 million over FY 2010 – to support increases in AIP implementation, guidance and oversight; legislative and regulatory analysis; Safety Management Systems (SMS) training in the Office of Airports; increased joint agreements with airports; data trend analysis; engineering support; field operations program / portfolio management/inspectors; and Information Systems Security (ISS) and privacy.

The budget also provides $29.5 million for Airport Technology Research – an increase of $6.8 million over FY 2010 – 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 our evolutionary blueprint for modernizing air transportation with revolutionary technologies. NextGen 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. The application of critical twenty-first century solutions is already transforming aviation from a ground-based system of air traffic control to a satellite-based system of air traffic management. We are working in partnership with industry, other agencies and departments, and our labor groups to achieve a shared vision, leveraging powerful technologies and setting new standards for the future of global aviation.

NextGen is changing the way the air transportation system operates – reducing congestion, noise, and emissions, expanding capacity and improving the passenger experience. By increasing FAA's NextGen investments by $369 million above the FY 2010 enacted level, the FY 2012 budget positions our aviation system to meet the future demand that will occur as the nation's economy improves.

The entire FY 2012 NextGen portfolio totals $1,237 million, distributed among Facilities & Equipment programs, Research, Engineering & Development, and Operations activities. The NextGen section of this budget request provides more detail about planned FY 2012 NextGen activities and accomplishments.

Implementing DOT's Strategic Goals

Safety

Safety is FAA's primary mission and our 2012 budget request reflects this most important of strategic objectives. 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 2012 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 wherewithal 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 increases 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.

The FAA will continue to work on focus areas for reducing aviation related injuries and fatalities, such as the air tour industry and in Helicopter Emergency Medical Services (HEMS). Flying in weather or in instrument conditions, even in a properly equipped aircraft with a properly rated pilot, increases the 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 places a high priority on initiatives that sustain and build on our progress in reducing runway 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, Engineered Materials Arresting Systems and others. The Runway Incursion Reduction Program remains a catalyst for acquisition of promising safety technologies that have reached a level of maturity appropriate for transition and implementation into the NAS.

The FAA's mandate for aviation safety includes leading the world safely into an exciting new era where international spaceports, commercial space transportation and orbital tourism are already becoming a reality. Our FY 2012 budget request allows us to maintain a spotless industry record for safety 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 bourgeoning industry.

The FAA's 2012 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.

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.

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 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. 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 (RNP/ RNAV) 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 96 pounds of fuel per ADS-B-IFR flight. Based on 12 equipped aircraft, that is about 20,000 pounds of fuel saved every 30 days. We have also seen an approximate operational time savings of 10 percent in instrument flight rules (IFR) operations.

Environmental Sustainability

Environmental protection and addressing the energy challenge are vital elements to ensure continued United States 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

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 2012 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. 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 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 2012 budget request supports continued efforts to manage our acquisitions responsibly so we deliver programs on time and on budget. In addition, we are implementing a Real Property Asset

Management Plan to ensure timely disposition of assets are measured by the number of days to process inactive assets.

Conclusion

We must continue to fulfill our mission for the flying public, delivering a safe and efficient system that continues to set the global standard. We will promote an increased sense of professionalism and accountability, fostering a culture of vigilance and safety. We also aim to support aviation's crucial role in our Nation's economic recovery, building on today's successes to meet tomorrow's demands. That means delivering on the promise and benefits of NextGen, offering economic and environmental efficiencies and technologies that support America's continued place as a global aviation leader.

EXHIBIT I
ORGANIZATION CHART

Office of the Administrator and Deputy Administrator

Total
FY 2011 24 FTE/ 21 FTP
FY 2012 24 FTE/ 21 FTP

Total FAA
FY 2011 46,266 FTE / 48,027 FTP
FY 2012 46,539 FTE / 48,256 FTP

Air Traffic Organization

Total
FY 2011 35445 FTE/ 36430 FTP
FY 2012 35384 FTE/ 36184 FTP

Assistant Administrator for Human Resource Management

Total
FY 2011 624 FTE/ 629 FTP
FY 2012 628 FTE/ 633 FTP

Assistant Administrator for Civil Rights

Total
FY 2011 85 FTE/ 86FTP
FY 2012 83 FTE/ 83 FTP

Assistant Administrator for Communications

Total
FY 2011 34 FTE/ 36 FTP
FY 2012 34 FTE/ 36 FTP

Associate Administrator for Aviation Safety

Total
FY 2011 7364 FTE/ 7995 FTP
FY 2012 7578 FTE/ 8202 FTP

Assistant Administrator for Government & Industry Affairs

Total
FY 2011 12 FTE/ 13 FTP
FY 2012 12 FTE/ 13 FTP

Assistant Administrator for Security & Hazardous Materials

Total
FY 2011 484 FTE/ 525 FTP
FY 2012 552 FTE/ 670 FTP

Associate Administrator for Commercial Space Transportation

Total
FY 2011 71 FTE/ 76 FTP
FY 2012 103 FTE/ 144 FTP

Associate Administrator for Airports

Total
FY 2011 557 FTE/ 607 FTP
FY 2012 572FTE/ 638 FTP

Assistant Administrator for Policy, International Affairs & Environment

Total
FY 2011 176 FTE/ 189FTP
FY 2012 179 FTE/ 195 FTP

Assistant Administrator for Financial Services

Total
FY 2011 168 FTE/ 177 FTP
FY 2012 171 FTE/ 181 FTP

Assistant Administrator for Regions and Center Operations

Total
FY 2011 828 FTE/ 830 FTP
FY 2012 815 FTE/ 832 FTP

Assistant Administrator for Information Services

Total
FY 2011 115 FTE/ 121 FTP
FY 2012 119 FTE/ 128 FTP

Office of the Chief Counsel

Total
FY 2011 279 FTE/ 291 FTP
FY 2012 285 FTE/ 297 FTP

EXHIBIT II-1

FY 2012 NEW BUDGET AUTHORITY
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	FY 2010 ACTUAL		FY 2011 CR ANNUALIZED	FY 2012 REQUEST
Operations	$9,351,400	*	$9,350,028	$9,823,000
Facilities and Equipment (AATF)	$2,936,203		$2,936,203	$2,870,000
Unobligated Balance Rescission**	($7,888)			
Mandatory General Fund				$250,000
Research, Engineering and Development (AATF)	$190,500		$190,500	$190,000
Grants-in-Aid for Airports				
Mandatory General Fund				$3,100,000
AATF				
Contract Authority	$3,515,000		$3,700,000	$2,424,000
Rescission of contract authority***	($394,000)			
Subtotal Grants-in Aid	$3,121,000		$3,700,000	$5,524,000
Obligation Limitation [Non-Add]	$3,515,000		$3,515,000	$2,424,000
Overflight Fees	$50,000		$50,000	$50,000
Overflight Fees (Transfer to EAS)	($50,000)		($50,000)	($50,000)
	---------------		---------------	---------------
TOTAL:	**$15,591,215**		**$16,176,731**	**$18,657,000**
[Mandatory]	$3,121,000		$3,700,000	$5,774,000
[Discretionary]	$12,470,215		$12,476,731	$12,883,000

* Includes $1.3 million transfer from the U.S. Department of State.
** Rescission of prior year authority per P.L. 111-226.
*** Rescission of prior year contract authority per P.L. 111-117.

EXHIBIT II-2

FY 2012 TOTAL BUDGETARY RESOURCES BY APPROPRIATION ACCOUNT
FEDERAL AVIATION ADMINISTRATION
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

ACCOUNT NAME	FY 2010 ACTUAL	FY 2011 CR ANNUALIZED	FY 2012 DISCRETIONARY	FY 2012 MANDATORY*	FY 2012 REQUEST
Operations	**$9,350,028**	**$9,350,028**	**$9,823,000**		**$9,823,000**
Air Traffic Organization (ATO)	7,299,299	7,299,299	7,646,145		7,646,145
Aviation Safety (AVS)	1,234,065	1,234,065	1,283,568		1,283,568
Commercial Space Transportation (AST)	15,237	15,237	26,625		26,625
Staff Offices	801,427	801,427	866,663		866,663
Facilities & Equipment	**$2,936,203**	**$2,936,203**	**$2,870,000**	**$250,000**	**$3,120,000**
Engineering, Development, Test and Evaluation	520,742	643,221	497,850	137,300	635,150
Air Traffic Control Facilities and Equipment	1,581,244	1,433,026	1,459,850	108,100	1,567,950
Non-Air Traffic Control Facilities and Equipment	131,917	149,156	180,400	2,000	182,400
Facilities and Equipment Mission Support	232,300	240,800	251,900	2,600	254,500
Personnel and Related Expenses	470,000	470,000	480,000		480,000
Research, Engineering & Development	**$190,500**	**$190,500**	**$190,000**		**$190,000**
Improve Aviation Safety	93,572	93,572	94,249		94,249
Improve Efficiency	48,543	48,543	54,406		54,406
Reduce Environmental Impacts	42,031	42,031	35,850		35,850
Mission Support	6,354	6,354	5,495		5,495
Grants-in-Aid for Airports	**$3,515,000**	**$3,515,000**	**$2,424,000**	**$3,100,000**	**$5,524,000**
Grants-in-Aid for Airports	3,378,106	3,378,106	2,278,750	3,100,000	5,378,750
Personnel & Related Expenses	93,422	93,422	101,000		101,000
Airport Technology Research	22,472	22,472	29,250		29,250
Small Community Air Service	6,000	6,000			
Airport Cooperative Research Program (ACRP)	15,000	15,000	15,000		15,000
TOTAL:	**$15,991,731**	**$15,991,731**	**$15,307,000**	**$3,350,000**	**$18,657,000**

* Mandatory General Fund resources are from the Administration's $50 billion Infrastructure initiative.

EXHIBIT II-3
FY 2012 BUDGET REQUEST BY DOT STRATEGIC AND ORGANIZATIONAL GOALS
Federal Aviation Administration
($000)

	SAFETY	STATE OF GOOD REPAIR	ECONOMIC COMPETITIVENESS	LIVABLE COMMUNITIES	ENVIRONMENTAL SUSTAINABILITY	ORGANIZATIONAL EXCELLENCE	CORPORATE SERVICES	TOTAL*
ACCOUNT/Program								
OPERATIONS								
Air Traffic Organization (ATO)	4,741,458		2,203,491			701,195		7,646,145
Aviation Safety (AVS)	1,283,568							1,283,568
Commercial Space Transportation (AST)	13,460		13,165					26,625
Staff Offices								
Financial Services (ABA)						68,454	43,914	112,369
Human Resource Management (AHR)							102,125	102,125
Regions and Center Operations (ARC)						76,305	298,650	374,955
Information Services (AIO)						47,299	15,711	63,010
Office of the Administrator (AOA)							4,220	4,220
Civil Rights (ACR)						5,260	5,609	10,868
Government & Industry Affairs (AGI)							1,603	1,603
Communications (AOC)							5,914	5,914
General Counsel (AGC)							50,772	50,772
Aviation Policy, Planning, Environment and International (APL)			23,576		7,690		7,765	39,032
Security and Hazardous Materials (ASH)	42,803					52,101	6,891	101,795
Subtotal - Staff Offices	42,803		23,576		7,690	249,419	543,175	866,663
Total - Operations	6,081,288		2,240,232		7,690	950,614	543,175	9,823,000
FACILITIES AND EQUIPMENT								
Activity 1. Engineering, Development, Test and Evaluation	122,200		479,050			33,900		635,150
Activity 2. Air Traffic Control Facilities and Equipment	254,900		1,203,200		6,400	103,450		1,567,950
Activity 3. Procurement and Modernization of Non-Air Traffic Control Facilities and Equipment	70,900				20,000	91,500		182,400
Activity 4. Mission Support	28,900		125,000			100,600		254,500
Activity 5. Personnel, Compensation, Benefits, and Travel	86,709		328,591		4,800	59,900		480,000
Total - Facilities and Equiptment	563,609		2,135,841		31,200	389,350		3,120,000
RESEARCH, ENGINEERING AND DEVELOPMENT								
A11. Improve Aviation Safety	94,249							94,249
A12. Improve Efficiency			54,406					54,406
A13. Reduce Environmental Impacts					35,850			35,850
A14. Mission Support	3,231		1,931		334			5,495
Total - Research, Engineering and Development	97,480		56,337		36,184			190,000
GRANTS-IN-AID FOR AIRPORTS								
Grants-in-Aid for Airports	2,285,969	1,828,775	715,374		548,633			5,378,750
Personnel & Related Expenses	57,926	3,319	22,847		13,285	3,622		101,000
Airport Technology Research	16,567	11,194			1,488			29,250
Airport Cooperative Research	5,000		5,000		5,000			15,000
Total - Grants-in-Aid for Airports	2,365,462	1,843,288	743,221		568,406	3,622		5,524,000
TOTAL REQUEST	9,107,839	1,843,288	5,175,631		643,480	1,343,586	543,175	18,657,000

* Includes $3.35 billion of mandatory General Fund resources from the Administration's $50 billion Infrastructure initiative. Of this amount, $3.1 billion is being applied to Grants-in-Aid for Airports and $250 million to Facilities and Equipment.

EXHIBIT II-3a
FY 2012 BUDGET REQUEST BY DOT OUTCOMES
Federal Aviation Administration
($000)

DOT GOAL / Outcome	Program	FY 2012 Request*
1. SAFETY		
i. Reduction in Injuries and Fatalities	Ops - Air Traffic Organization (ATO)	4,741,458
	Ops - Aviation Safety (AVS)	1,283,568
	Ops - Commerical Space Transportation (AST)	13,460
	Ops - Security and Hazardous Materials (ASH)	42,803
	F&E - Activity 1: Engineering, Development, Test and Evaluation	122,200
	F&E - Activity 2: Procurement and Modernization of Air Traffic Control	254,900
	F&E - Activity 3: Procurement and Modernization of Non-Air Traffic Control	70,900
	F&E - Activity 4: Facilities and Equipment Mission Support	28,900
	F&E - Activity 5: Personnel Compensation, Benefits and Travel	86,709
	RE&D - A11: Improve Aviation Safety	94,249
	RE&D - A14: Mission Support	3,231
	AIP - Grants-in-Aid for Airports	2,285,969
	AIP - Personnel & Related Expenses	57,926
	AIP - Airport Technology Research	16,567
	AIP - Airport Cooperative Research	5,000
Subtotal - Injuries and Fatalities		**9,107,839**
ii. Improved Safety Experience	---	**0**
Total – Safety		**9,107,839**

EXHIBIT II-3a
FY 2012 BUDGET REQUEST BY DOT OUTCOMES
Federal Aviation Administration
($000)

DOT GOAL/Outcome	Program	FY 2012 Request*
2. STATE OF GOOD REPAIR		
i. Increased Proportion of Infrastructure in Good Condition	AIP - Grants-in-Aid for Airports	1,828,775
	AIP - Personnel & Related Expenses	3,319
	AIP - Airport Technology Research	11,194
Total – State of Good Repair		**1,843,288**
3. ECONOMIC COMPETITIVENESS		
i. Maximize Economic Returns	Ops - Air Traffic Organization (ATO)	2,005,717
	Ops - Commerical Space Transportation (AST)	13,165
	Ops - Aviation Policy, Planning, Environment and International (APL)	3,706
	F&E - Activity 1: Engineering, Development, Test and Evaluation	479,050
	F&E - Activity 2: Procurement and Modernization of Air Traffic Control	1,146,200
	Support	2,500
	F&E - Activity 5: Personnel Compensation, Benefits and Travel	295,955
	AIP - Grants-in-Aid for Airports	265,393
	AIP - Personnel & Related Expenses	8,439
	AIP - Airport Cooperative Research	5,000
Subtotal - Maximize Returns		**4,225,125**
ii. Competitive Transportation System	Ops - Air Traffic Organization (ATO)	197,774
	Ops - Aviation Policy, Planning, Environment and International (APL)	2,256
	F&E - Activity 2: Procurement and Modernization of Air Traffic Control	57,000
	F&E - Activity 4: Facilities and Equipment Mission Support	122,500
	F&E - Activity 5: Personnel Compensation, Benefits and Travel	32,636

EXHIBIT II-3a
FY 2012 BUDGET REQUEST BY DOT OUTCOMES
Federal Aviation Administration
($000)

DOT GOAL / Outcome	Program	FY 2012 Request*
	RE&D - A12: Economic Competitiveness	54,406
	RE&D - A14: Mission Support	1,931
	AIP - Grants-in-Aid for Airports	449,981
	AIP - Personnel & Related Expenses	14,141
Subtotal - Competitive Transportation System		**932,626**
iii. Advance U.S. Transportation Interests Abroad	Ops - Aviation Policy, Planning, Environment and International (APL)	17,613
	AIP - Personnel & Related Expenses	267
Subtotal - Advance U.S. Interests		**17,880**
Total – Economic Competitiveness		**5,175,631**
4. LIVABLE COMMUNITIES		
i. Convenient and Affordable Choices	---	0
ii. Improved Public Transit Experience	---	0
iii. Improved Networks that Accommodate Pedestrians and Bicycles	---	0
iv. Improved Access for Special Needs Populations	---	0
Total – Livable Communities		**0**
5. ENVIRONMENTAL SUSTAINABILITY		
i. Reduced Carbon Emissions, Improved Energy Efficiency, and Reduced Dependence on Oil	Ops - Aviation Policy, Planning, Environment and International (APL)	3,894
Subtotal – Emissions, Energy Efficiency and Oil		**3,894**

EXHIBIT II-3a
FY 2012 BUDGET REQUEST BY DOT OUTCOMES
Federal Aviation Administration
($000)

DOT GOAL / Outcome	Program	FY 2012 Request*
ii. Reduced Transportation-Related Pollution and Impacts on Ecosystems	Ops - Aviation Policy, Planning, Environment and International (APL)	3,796
	F&E - Activity 2: Procurement and Modernization of Air Traffic Control	6,400
	F&E - Activity 3: Procurement and Modernization of Non-Air Traffic Control	20,000
	F&E - Activity 5: Personnel Compensation, Benefits and Travel	4,800
	RE&D - A13: Environmental Sustainability	35,850
	RE&D - A14: Mission Support	334
	AIP - Grants-in-Aid for Airports	548,633
	AIP - Personnel & Related Expenses	13,285
	AIP - Airport Technology Research	1,488
	AIP - Airport Cooperative Research	5,000
Subtotal – Reduced Pollution		**639,586**
iii. Environmentally Sustainable Practices in Transportation	---	**0**
iv. Environmentally Sustainable Practices in Transportation	---	**0**
Total – Environmental Sustainability		**643,480**

EXHIBIT II-3a
FY 2012 BUDGET REQUEST BY DOT OUTCOMES
Federal Aviation Administration
($000)

DOT GOAL/Outcome	Program	FY 2012 Request*
6. ORGANIZATIONAL EXCELLENCE		
i. Other FAA Organizational Outcome - Diverse and Collaborative DOT Workforce	Ops - Air Traffic Organization (ATO)	155,525
	Ops - Regions and Center Operations (ARC)	46,561
	Ops - Civil Rights (ACR)	5,260
	F&E - Activity 1: Engineering, Development, Test and Evaluation	33,900
	F&E - Activity 2: Procurement and Modernization of Air Traffic Control	72,450
	F&E - Activity 3: Procurement and Modernization of Non-Air Traffic Control	40,000
	F&E - Activity 4: Facilities and Equipment Mission Support	100,600
	F&E - Activity 5: Personnel Compensation, Benefits and Travel	44,900
	AIP - Personnel & Related Expenses	682
Subtotal – DOT Workforce		**499,878**
ii. Other FAA Organizational Outcome - Emergency Preparedness	Ops - Security and Hazardous Materials (ASH)	52,101
Subtotal – Emergency Preparedness		**52,101**
iii. Other FAA Organizational Outcome - Open Government	Ops - Air Traffic Organization (ATO)	163,956
	Ops - Information Services (AIO)	41,491
	F&E - Activity 3: Procurement and Modernization of Non-Air Traffic Control	50,000
	F&E - Activity 5: Personnel Compensation, Benefits and Travel	9,091
	AIP - Personnel & Related Expenses	714
Subtotal – Open Government		**265,251**

EXHIBIT II-3a
FY 2012 BUDGET REQUEST BY DOT OUTCOMES
Federal Aviation Administration
($000)

DOT GOAL/Outcome	Program	FY 2012 Request*
iv. Other FAA Organizational Outcome - Improved Financial Performance	Ops - Air Traffic Organization (ATO)	381,714
	Ops - Financial Services (ABA)	68,454
	Ops - Regions and Center Operations (ARC)	29,744
	Ops - Information Services (AIO)	5,808
	F&E - Activity 2: Procurement and Modernization of Air Traffic Control	31,000
	F&E - Activity 3: Procurement and Modernization of Non-Air Traffic Control	1,500
	F&E - Activity 5: Personnel Compensation, Benefits and Travel	5,909
	AIP - Personnel & Related Expenses	2,227
Subtotal - Improved Financial Performance		**526,357**
Total – Organizational Excellence		**1,343,586**
7.CORPORATE SERVICE FUNCTIONS DISTRIBUTED INDIRECTLY TO PROGRAMS		
	Financial Services (ABA)	43,914
	Human Resource Management (AHR)	102,125
	Regions and Center Operations (ARC)	298,650
	Information Services (AIO)	15,711
	Office of the Administrator (AOA)	4,220
	Civil Rights (ACR)	5,609
	Government & Industry Affairs (AGI)	1,603
	Communications (AOC)	5,914
	General Counsel (AGC)	50,772
	(APL)	7,765
	Security and Hazardous Materials (ASH)	6,891
Total – Corporate Services Functions		**543,175**
TOTAL FAA		**18,657,000**

* Includes $3.35 billion of mandatory General Fund resources from the Administration's $50 billion Infrastructure initiative. Of this amount, $3.1 billion is being applied to Grants-in-Aid for Airports and $250 million to Facilities and Equipment.

EXHIBIT II-4

FY 2012 BUDGET AUTHORITY
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	Mandatory/ Discretionary	FY 2010 ACTUAL		FY 2011 CR ANNUALIZED	FY 2012 REQUEST
Operations	D	**$9,351,400**		**$9,350,028**	**$9,823,000**
General		$5,351,400	*	$5,350,028	$4,865,000
AATF		$4,000,000		$4,000,000	$4,958,000
Facilities & Equipment (AATF)		**$2,928,315**		**$2,936,203**	**$3,120,000**
General	M				$250,000
AATF	D	$2,936,203		$2,936,203	$2,870,000
Unobligated Balance Rescission**	D	($7,888)			
Research, Engineering & Development (AATF)	D	**$190,500**		**$190,500**	**$190,000**
AATF		$190,500		$190,500	$190,000
Grants in Aid for Airports (AATF)		**$3,121,000**		**$3,700,000**	**$5,524,000**
General	M				$3,100,000
AATF					
Contract Authority	M	$3,515,000		$3,700,000	$2,424,000
Rescission***	M	($394,000)			
Overflight Fees	M	**$50,000**		**$50,000**	**$50,000**
Overflight Fees (transfer to EAS)	M	**($50,000)**		**($50,000)**	**($50,000)**
		---------------		---------------	---------------
TOTAL:		**$15,591,215**		**$16,176,731**	**$18,657,000**
[Mandatory]		$3,121,000		$3,700,000	$5,774,000
[Discretionary]		$12,470,215		$12,476,731	$12,883,000
		---------------		---------------	---------------
[General]		$5,351,400		$5,350,028	$8,215,000
[AATF]		$10,239,815		$10,826,703	$10,442,000

* Includes $1 million transfer from the U.S. Department of State.
** Rescission of prior year authority per P.L. 111-226.
*** Rescission of prior year contract authority per P.L. 111-117.

EXHIBIT II-5

FY 2012 OUTLAYS
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	FY 2010 ACTUAL	FY 2011 CR ANNUALIZED	FY 2012 REQUEST
Operations	**$9,294,232**	**$9,710,084**	**$9,766,240**
General	$5,294,232	$5,710,084	$4,808,240
AATF	$4,000,000	$4,000,000	$4,958,000
Facilities & Equipment	**$2,682,319**	**$2,928,986**	**$3,144,044**
General	**$72,493**	**$52,000**	**$152,000**
-Discretionary	$72,493	$52,000	$52,000
-Mandatory			$100,000
AATF	**$2,609,826**	**$2,876,986**	**$2,992,044**
-Discretionary	$2,593,126	$2,864,986	$2,980,044
-Mandatory	$16,700	$12,000	$12,000
Aviation Insurance Revolving Account (M)	**($137,000)**	**($137,000)**	**($139,000)**
Research, Engineering (TF) & Development	**$147,327**	**$211,651**	**$221,350**
Grants-in-Aid for Airports	**$4,007,026**	**$3,611,233**	**$4,110,611**
General			
-Discretionary	$725,523	$193,243	$1,421
-Mandatory			$496,000
AATF			
-Discretionary	$3,281,503	$3,417,991	$3,613,191
Franchise Fund	**$28,000**	**($29,000)**	**$99,000**
TOTAL:	**$16,021,904**	**$16,295,955**	**$17,202,245**
[Mandatory]	($120,300)	($125,000)	$469,000
[Discretionary]	$16,142,204	$16,420,955	$16,733,245

EXHIBIT II-6

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

OPERATIONS

	2011 CR Annualized	Baseline Changes: Adjustments to Base	Baseline Changes: Annualization of 2011 Pay Raises (*)	Baseline Changes: 2012 Pay Raises (*)	Baseline Changes: One Less Compensible Day	Baseline Changes: GSA Rent	Baseline Changes: WCF Increase/ Decrease	Baseline Changes: Inflation/ Deflation	2012 Baseline Estimate	Program Increases/ Decreases	FY 2012 Request
PERSONNEL RESOURCES (FTE)											
Direct FTE	42,371									235	**42,606**
FINANCIAL RESOURCES											
ADMINISTRATIVE EXPENSES											
Salaries and Benefits	$6,553,390	245,484	$9,713	$30,014	($26,146)				6,812,455	$124,039	$6,936,494
Travel	$146,742							$734	147,476	$0	$147,476
Transportation	$18,803							$94	18,897	$0	$18,897
GSA Rent	$116,112					9,900		$581	126,592	$0	$126,592
Rental Payments to Others	$52,424							$262	52,686	$0	$52,686
Communications, Rent & Utilities	$262,206	26,880						$1,311	290,397	($9,690)	$280,707
Printing	$4,780							$24	4,804	$0	$4,804
Other Services:									0		
-WCF	$30,394						$18,493		48,887	$3,833	$52,720
-Advisory and Assistance Services	$482,668							$2,413	485,081	$0	$485,081
-Other	$1,505,660	20,439						$7,680	1,533,779	$5,261	$1,539,040
Supplies	$108,920	767						$545	110,231	$0	$110,231
Equipment	$62,509							$313	62,821	$0	$62,821
Lands and Structures	$4,131							$21	4,152	$0	$4,152
Grants, Claims and Subsidies	$2,237							$11	2,248	$0	$2,248
Insurance Claims and Indemnities	$2,006							$10	2,016	$0	$2,016
Interest and Dividends	$530							$3	532	$0	$532
Refunds	($3,483)							($15)	(3,498)		($3,498)
Admin Subtotal	**$9,350,028**	**$293,570**	**$9,713**	**$30,014**	**($26,146)**	**$9,900**	**$18,493**	**$13,985**	**$9,699,557**	**$123,443**	**$9,823,000**
PROGRAMS											
Air Traffic Organization (ATO)	$7,299,299	$244,663	$9,713	$30,014	($20,706)	$0	$327	$10,557	$7,573,867	$72,278	$7,646,145
Aviation Safety (AVS)	$1,234,065	$34,118	$0	$0	($3,947)	$0	($52)	$1,229	$1,265,413	$18,155	$1,283,568
Commercial Space Transportation (AST)	$15,237	$164	$0	$0	($41)	$0	$0	$25	$15,385	$11,240	$26,625
Staff Offices	$801,427	$14,626	$0	$0	($1,452)	$9,900	$18,218	$2,174	$844,892	$21,770	$866,663
Programs Subtotal	**$9,350,028**	**$293,570**	**$9,713**	**$30,014**	**($26,146)**	**$9,900**	**$18,493**	**$13,985**	**$9,699,557**	**$123,443**	**$9,823,000**
GRAND TOTAL	**$9,350,028**	**$293,570**	**$9,713**	**$30,014**	**($26,146)**	**$9,900**	**$18,493**	**$13,985**	**$9,699,557**	**$123,443**	**$9,823,000**

EXHIBIT II-6

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

FACILITIES & EQUIPMENT

	2011 CR Annualized	Baseline Changes: Adjustments to Base	Baseline Changes: Annualization of 2011 FTE	Baseline Changes: 2012 Pay Raises	Baseline Changes: One Less Compensable Day	Baseline Changes: GSA Rent	Baseline Changes: WCF Increase/ Decrease	Baseline Changes: Inflation/ Deflation	FY 2012 Baseline Estimate	Program Increases/ Decreases	FY 2012 Request [1]
PERSONNEL RESOURCES (FTE)	3,117										
Direct FTE	3,062								3,062	20	3,082
Reimbursable FTE	55								55	0	55
FINANCIAL RESOURCES											
ADMINISTRATIVE EXPENSES											
Salaries and Benefits	$425,013	$5,068			($1,800)				$428,281	$4,500	$432,781
Travel	$35,126	$2,219	---					$176	$37,521	$4,550	$42,071
Transportation	$3,073	$15	---					$15	$3,103	$0	$3,103
GSA Rent	$0	---	---			---			$0		$0
Rental Payments to Others	$34,099	$170						$170	$34,439		$34,439
Communications, Rent & Utilities	$40,779	$204	---					$204	$41,187	$0	$41,187
Printing	$747	$4	---					$4	$755	$0	$755
Other Services:	$1,859,081	$8,839						$9,230	$1,877,150	$144,846	$2,021,996
-WCF	$0	---	---				---		$0		$0
-Advisory and Assistance Services	$0								$0		$0
-Other	$0	---	---						$0	$0	$0
Supplies	$42,873	$214	---					$214	$43,301	$0	$43,301
Equipment	$311,375	$1,557	---					$1,557	$314,489	$0	$314,489
Lands and Structures	$178,463	$892						$892	$180,247		$180,247
Grants, Claims and Subsidies	$5,574	$28						$28	$5,630		$5,630
Insurance Claims and Indemnities	$0								$0		$0
Interest and Dividends	$0								$0		$0
Admin Subtotal	**$2,936,203**	**$19,210**	**0**	**$0**	**($1,800)**	**$0**	**$0**	**$12,491**	**$2,966,104**	**$153,896**	**$3,120,000**
PROGRAMS											
Engineering, Development, Test and Evaluation	$643,221	$3,204	---	---				$3,204	$649,629	($14,479)	$635,150
Air Traffic Control Facilities and Equipment	$1,433,026	$6,769	---	---				$7,112	$1,446,907	$121,043	$1,567,950
Non-Air Traffic Control Facilities and Equipment	$149,156	$746	---	---				$746	$150,648	$31,752	$182,400
Facilities and Equipment Mission Support	$240,800	$1,204	---	---				$1,204	$243,208	$11,292	$254,500
Personnel & Related Expenses	$470,000	$7,287	---	---	($1,800)			$225	$475,712	$4,288	$480,000
Programs Subtotal	**$2,936,203**	**$19,210**		**$0**	**($1,800)**	**$0**	**$0**	**$12,491**	**$2,966,104**	**$153,896**	**$3,120,000**
GRAND TOTAL	**$2,936,203**	**$19,210**	**$0**	**$0**	**($1,800)**	**$0**	**$0**	**$12,491**	**$2,966,104**	**$153,896**	**$3,120,000**

[1] Includes $250 million from the Administration's $50 billion Infrastructure initiative.

EXHIBIT II-6

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

RESEARCH, ENGINEERING, & DEVELOPMENT

		Baseline Changes									
	2011 CR Annualized	Adjustments to Base	Annualization of 2011 FTE	2012 Pay Raises	One Less Compensable Day	GSA Rent	WCF Increase/ Decrease	Inflation/ Deflation	FY 2012 Baseline Estimate	Program Increases/ Decreases	FY 2012 Request
PERSONNEL RESOURCES (FTE)	276									3	279
Direct FTE	276									3	279
FINANCIAL RESOURCES											
Salaries and Benefits	38,236	260	0	0	-142	0	0		38,354	208	38,562
Benefits for Former Personnel	0	.							0		0
Travel	2,564	13						13	2,590	-261	2,329
Transportation	51	0						0	51		51
GSA Rent	0	0						0	0		0
Rental Payments to Others	0	0						0	0		0
Communications, Rent & Utilities	149	1						1	151	-1	150
Printing	129	1						1	131	-1	130
Other Services:	0	0						0	0		0
-WCF	0	0						0	0		0
-Advisory and Assistance Services	0	0						0	0		0
-Other	121,365	212						212	121,789	-253	121,536
Supplies	1,560	8						8	1,576	-8	1,568
Equipment	1,618	8						8	1,634	-8	1,626
Lands and Structures	0	0						0	0		0
Grants, Claims & Subsidies	24,828	124						124	25,076	-1,028	24,048
Insurance Claims and Indemnities	0	0						0	0		0
Interest & Dividends	0	0							0		0
Admin Subtotal	**190,500**	**627**	**0**	**0**	**-142**	**0**	**0**	**367**	**191,352**	**-1,352**	**190,000**
PROGRAMS											
Safety	93,572	428	0	0	-106			155	94,049	200	94,249
Economic Competitiveness	48,543	64	0	0	-16			107	48,698	5,708	54,406
Environmental Sustainability	42,031	86	0	0	-11			95	42,201	-6,351	35,850
Mission Support	6,354	49	0	0	-9			10	6,404	-909	5,495
Programs Subtotal	**190,500**	**627**	**0**	**0**	**-142**	**0**	**0**	**367**	**191,352**	**-1,352**	**190,000**
GRAND TOTAL	**190,500**	**627**	**0**	**0**	**-142**	**0**	**0**	**367**	**191,352**	**-1,352**	**190,000**

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

		Baseline Changes									
	2011 CR Annualized	Adjustments to Base	Annualization of 2011 FTE	2012 Pay Raises	One Less Compensable Day	GSA Rent	WCF Increase/ Decrease	FY 2012 Inflation/ Deflation	FY 2012 Baseline Estimate	Program Increases/ Decreases	FY 2012 Request
PERSONNEL RESOURCES (FTE)	558								558	15	573
Direct FTE	557								557	15	572
Reimbursable FTE	1								1	0	1
FINANCIAL RESOURCES											
Salaries and Benefits	$76,024	$4,243			($299)				$79,968	$825	$80,793
Benefits for Former Personnel	$0								$0		$0
Travel	$4,225							$21	$4,246		$4,246
Transportation	$122	$1						$1	$124		$124
GSA Rent	$0								$0		$0
Rental Payments to Others	$522	$3						$3	$528		$528
Communications, Rent & Utilities	$296	$2						$2	$300		$300
Printing	$34								$34		$34
Other Services:	$0								$0		$0
-WCF	$0								$0		$0
-Advisory and Assistance Services	$0								$0		$0
-Other	$47,569	$6,261						$227	$54,057	$3,044	$57,101
Supplies	$625	$3						$3	$631		$631
Equipment	$1,220	$6						$6	$1,232		$1,232
Lands and Structures	$257	$2						$2	$261		$261
Grants, Claims & Subsidies	$3,384,106								$3,384,106	$1,994,644	$5,378,750
Insurance Claims and Indemnities	$0								$0		$0
Interest & Dividends	$0								$0		$0
Admin Subtotal	**$3,515,000**	**$10,521**	**$0**	**$0**	**($299)**	**$0**	**$0**	**$265**	**$3,525,487**	**$1,998,513**	**$5,524,000**
PROGRAMS											
Grants-in-aid for Airports [1]	$3,378,106								$3,378,106	$2,000,644	$5,378,750
Personnel and Related Expenses	$93,422	$5,768			($285)			$96	$99,000	$2,000	$101,000
Airport Technology Research	$22,472	$4,753			($13)			$95	$27,307	$1,943	$29,250
Airport Cooperative Research	$15,000	$0			($1)			$74	$15,073	($73)	$15,000
SCASDP (transfer to OST)	$6,000	$0							$6,000	($6,000)	$0
Programs Subtotal	**$3,515,000**	**$10,521**	**$0**	**$0**	**($299)**	**$0**	**$0**	**$265**	**$3,525,487**	**$1,998,513**	**$5,524,000**
GRAND TOTAL	**$3,515,000**	**$10,521**	**$0**	**$0**	**($299)**	**$0**	**$0**	**$265**	**$3,525,487**	**$1,998,513**	**$5,524,000**

FY 2012 Includes $3.1 billion from the President's infrastructure initiative.

EXHIBIT II-7

WORKING CAPITAL FUND
FEDERAL AVIATION ADMINISTRATION
Appropriations, Obligation Limitations, Exempt Obligations and Reimbursable Obligations

	FY 2011 (ANNUALIZED)	FY 2012 REQUEST	CHANGE
DIRECT:			
Operations	**30,394,082**	**52,720,725**	**52,720,725**
Air Traffic Organization (ATO)	8,179,255	8,506,025	8,506,025
Aviation Safety (AVS)	2,480,916	2,429,200	2,429,200
Staff Offices	19,733,911	41,785,500	41,785,500
TOTAL	**30,394,082**	**52,720,725**	**22,326,643**

EXHIBIT II-8

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

	FY 2010 ACTUAL*	FY 2011 CR Annualized	FY 2012 REQUEST
DIRECT FUNDED BY APPROPRIATION			
Operations	42,291	42,371	42,606
Facilities & Equipment	2,899	3,062	3,082
Research, Engineering & Development	268	276	279
Grants-in-Aid for Airports	547	557	572
Recovery Act	4		
SUBTOTAL, DIRECT FUNDED	**46,009**	**46,266**	**46,539**
REIMBURSEMENTS/ALLOCATIONS			
Operations	263	263	263
Aviation Insurance Revolving Fund	5	5	5
Facilities & Equipment	46	55	55
Grants-in-Aid for Airports	1	1	1
Administrative Services Franchise Fund	1,649	1,666	1,676
SUBTOTAL, REIMBURSE./ALLOC.	**1,964**	**1,990**	**2,000**
TOTAL FTEs	**47,973**	**48,256**	**48,539**

* Actuals for each account reflect FAA's allocation of total FTEs as reported on the SF-113G Report.

EXHIBIT II-9

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

	FY 2010 ENACTED	FY 2011 ANNUALIZED CR	FY 2012 REQUEST
DIRECT FUNDED BY APPROPRIATION			
Operations	43,963	43,963	44,117
Facilities & Equipment	3,181	3,181	3,221
Research, Engineering & Development	308	308	314
Grants-in-Aid for Airports	575	575	604
SUBTOTAL, DIRECT FUNDED	**48,027**	**48,027**	**48,256**
REIMBURSEMENTS/ALLOCATIONS			
Operations	300	300	300
Aviation Insurance Revolving Fund	5	5	5
Facilities & Equipment	55	55	55
Grants-in-Aid for Airports	6	6	6
Administrative Services Franchise Fund	1,566	1,566	1,566
SUBTOTAL, REIMBURSE./ALLOC.	**1,932**	**1,932**	**1,932**
TOTAL FTPs	**49,959**	**49,959**	**50,188**

Note: Figures reflect authorized positions (FTP) approved by Congress. FAA does not intend to staff to these levels in FY 2012.

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 goals. FAA tracks agency performance measures in support of the DOT goals and outcomes as designated below.

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

PRIORITY GOAL
Total Runway Incursions: The total number of runway incursions for each year [1]

	2007	2008	2009	2010	2011	2012
Target	N/A	N/A	999	979	959	939
Actual	N/A	1,009	951	966[2]	N/A	N/A

[1] This was a new measure in FY 2009.
[2] Final result revised from preliminary estimate of 967.

Commercial Air Carrier Fatality Rate: Fatalities per 100 million persons on board.

	2007	2008	2009	2010	2011	2012
Target	N/A	8.7	8.4	8.1	7.9	7.6
Actual	N/A	0.4	6.7[1]	0.3[2]	N/A	N/A

[1] Preliminary estimate revised from original estimate of 6.8. Final data will be available in March 2011.
[2] Preliminary estimate. Final data will be available in March 2012.

General Aviation Fatal Accident Rate: Fatal general aviation accidents per 100,000 flight hours [1]

	2007	2008	2009	2010	2011	2012
Target	N/A	N/A	1.11	1.10	1.08	1.07
Actual	N/A	N/A	1.16[2]	1.14[3]	N/A	N/A
Previous Measure: Number of fatal general aviation accidents						
	2007	**2008**	**2009**	**2010**	**2011**	**2012**
Target	331	325	319	N/A	N/A	N/A
Actual	313	302[4]	279[5]	268[3]	N/A	N/A

[1] In FY 2009, this metric changed from General Aviation Fatal Accidents to the General Aviation Fatal Accident Rate. Through the FY 2012 submission, results for both measures will be reported.
[2] Preliminary estimate revised from original estimate of 1.17. Final data will be available in March 2011.
[3] Preliminary estimate. Final data will be available in March 2012.
[4] Final result revised from preliminary estimate of 299.
[5] Preliminary estimate revised from original estimate of 278. Final data will be available in March 2011.

Commercial Space Launch Accidents: Number of accidents resulting in fatalities, injuries, or significant property damage to uninvolved public [1]						
	2007	**2008**	**2009**	**2010**	**2011**	**2012**
Target	0	0	0	0	0	0
Actual	0	0	0	0	N/A	N/A

[1] FAA *Flight Plan* 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: Increased proportion of U.S. transportation infrastructure assets in good condition.

Runway Pavement Condition: Percentage of active airfield pavement in fair or better condition						
	2007	**2008**	**2009**	**2010**	**2011**	**2012**
Target	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Actual	96.7%	96.9%	97.0%	97.2%	N/A	N/A

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

Average Daily Airport Capacity: Average daily arrival and departure rates at the 35 Operational Evolution Partnership airports						
	2007	**2008**	**2009**	**2010**	**2011**	**2012**
Target	101,562	101,868	100,707	101,290[1]	103,068	103,068
Actual	102,545	103,222	101,691	101,668	N/A	N/A

[1] In FY 2009, this target was revised from 102,648

Adjusted Operational Availability: Ratio of total available hours, minus outage time, to total available hours for the reportable facilities that support the 35 Operational Evolution Partnership airports						
	2007	**2008**	**2009**	**2010**	**2011**	**2012**
Target	99.70%	99.70%	99.70%	99.70%	99.70%	99.70%
Actual	99.83%	99.82%	99.78%	99.79%	N/A	N/A

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

NAS On-Time Arrivals: Percentage of all flights arriving within 15 minutes of schedule at the 35 Operational Evolution Partnership airports due to National Airspace System related delays

	2007	2008	2009	2010	2011	2012
Target	87.40%	87.67%	88.00%	88.00%	88.00%	88.00%
Actual	86.96%	87.29%	88.98%	90.55%[1]	N/A	N/A

1 Final result revised from preliminary estimate of 90.33%.

DOT Goal: Economic Competitiveness
Outcome: US transportation interests advanced in targeted markets around the world.

NextGen Technologies: Total number of countries taking a significant step, as a result of FAA assistance and collaboration, to implement the operational use of NextGen technologies, procedures, or concepts

	2007	2008	2009	2010	2011	2012
Target	1	1	1	1	1	1
Actual	1	2	1	2	N/A	N/A

DOT Goal: Environmental Sustainability
Outcome: Reduced transportation-related pollution and impacts on the ecosystem.

Noise Exposure: Percent reduction in the number of people in the U.S. who are exposed to significant aircraft noise levels. [1]

	2007	2008	2009[1]	2010	2011	2012
Target	-4.96%	-8.76%	-12.41%	-15.91%	-19.28%	-22.51%
Actual	-6.00%	-22.00%	-42.53%[2]	-43.79%[3]	N/A	N/A

1 In FY 2010, this measure was revised from a 3-year average of the number exposed to noise to a single year's result, and the baseline was reset at FY 2005. Prior year targets and results have been recalculated.
2 Revised from recalculated projection of -31%.
3 Projection from trends, to be revised in May 2011.

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

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. [1]

	2007	2008	2009	2010	2011	2012
Target	-7.00%	-8.00%	-9.00%	-10.00%	-12.00%	-14.00%
Actual	-13.87%	-13.52%	-14.03%	-15.25%	N/A	N/A

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.

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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, $9,823,000,000, of which $4,958,000,000 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.

Note.--A full-year 2011 appropriation for this account was not enacted at the time the budget was prepared; therefore, this account is operating under a continuing resolution (P.L. 111-242, as amended). The amounts included for 2011 reflect the annualized level provided by the continuing resolution.

Program and Financing (in millions of dollars)

Identification code: 69-1301-0-1-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
00.01	Air Traffic Organization (ATO)...	7,312	7,299	7,646
00.04	Regulation and Certification...	1,240	1,234	1,283
00.05	Commercial Space Transportation......................................	15	15	27
00.06	Staff Offices.	799	802	867
00.91	Direct Program Activities, subtotal	9,366	9,350	9,823
08.01	Reimbursable program...	143	211	143
09.00	Total new obligations...	9,509	9,561	9,966
	Budget resources:			
10.00	Unobligated balance brought forward, Oct. 1.......................	84	68	....
10.21	Recoveries of prior year unpaid obligations..........................	7	....	....
10.50	Unobligated balance (total)...	91	68	....
	Budget authority:			
	Appropriations, discretionary:			
11.00	Appropriation	5,350	5,350	4,865
11.21	Transferred from other accounts (19-0113)..........................	1	....	....
11.60	Appropriation, discretionary (total).......................................	5,351	5,350	4,865
	Spending authority from offsetting collections:			
	Discretionary:			
17.00	Collected..	4,093	4,143	5,101
17.01	Change in uncollected payments, federal sources.................	58	....	....
17.50	Spending auth from offsetting collections, disc (total)..........	4,151	4,143	5,101
19.00	Budget authority (total)...	9,502	9,493	9,966
19.30	Total budgetary resources available......................................	9,593	9,561	9,966
	Memorandum (non-add) entries:			
19.40	Unobligated balance expiring...	-16	....	....
19.40	Unexpired unobligated balance, end of year..........................	68	....	....
	Change in obligated balance:			
	Obligated balance, start of year (net):			
30.00	Unpaid obligations, brought forward, Oct. 1 (gross)..............	1,725	1,634	1,342
30.10	Uncollected pymts, Fed sources, brought forward, Oct. 1......	-317	-221	-221
30.20	Obligated balance, start of year (net)..................................	1,408	1,413	1,121
30.30	Obligations incurred, unexpired accounts.............................	9,509	9,561	9,966
30.31	Obligations incurred, expired accounts.................................	36	....	....
30.40	Outlays (gross)..	-9,504	-9,853	-9,909
30.50	Change in uncollected pymts, Fed sources, expired.............	-58	....	....
30.51	Change in uncollected pymst, Fed sources, unexpired..........	154	....	....
30.80	Recoveries of prior year unpaid obligations, unexpired.........	-7	....	....
30.81	Recoveries of prior year unpaid obligations, expired............	-125	....	....
	Obligated balance, end of year (net):			
30.90	Unpaid obligations, end of year (gross)................................	1,634	1,342	1,399
30.91	Uncollected pymts, Fed sources, end of year.......................	-221	-221	-221
31.00	Obligated balance, end of year (net)....................................	1,413	1,121	1,178
	Budget authority and outlays, net:			
	Discretionary:			
40.00	Budget authority, gross..	9,502	9,493	9,966
	Outlays, gross:			
40.10	Outlays from new discretionary authority.............................	8,203	8,371	8,787
40.11	Outlays from discretionary balances.....................................	1,301	1,482	1,122
40.20	Outlays, gross (total)...	9,504	9,853	9,909
	Offsets against gross budget authority and outlays:			

	Offsetting collections (collected) from:			
40.30	Federal sources	-4,189	-4,123	-5,082
40.33	Non-Federal sources	-21	-20	-19
40.40	Offsets against gross budget authority and outlays (total)	-4,210	-4,143	-5,101
	Additional offsets against gross budget authority only:			
40.50	Change in uncollected pymts, Federal sources unexpired	-58	....	....
40.52	Offsetting collections credited to expired accounts	117	....	....
40.60	Additional offsets against budget authority only (total)	59	....	....
40.70	Budget authority, net (discretionary)	5,351	5,350	4,865
40.80	Outlays, net (discretionary)	5,294	5,710	4,808
41.80	Budget authority, net (total)	5,351	5,350	4,865
41.90	Outlays, net (total)	5,294	5,710	4,808

For 2012, the Budget requests $9,823 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 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Direct obligations:			
	Personnel compensation:			
11.1	Full-time permanent	4,423	4,542	4,808
11.3	Other than full-time permanent	44	48	50
11.5	Other personnel compensation	366	404	428
11.9	Total personnel compensation	4,833	4,994	5,286
12.1	Civilian personnel benefits	1,573	1,552	1,643
13.0	Benefits for former personnel	1	7	7
21.0	Travel and transportation of persons	188	147	147
22.0	Transportation of things	25	19	19
23.1	Rental payments to GSA	116	116	127
23.2	Rental payments to others	52	52	53
23.3	Communications, utilities, and miscellaneous charges	269	262	281
24.0	Printing and reproduction	6	5	5
25.1	Advisory and assistance services	526	483	485
25.2	Other services	1,552	1,534	1,590
26.0	Supplies and materials	144	109	110
31.0	Equipment	72	63	63
32.0	Land and structures	4	4	4
41.0	Grants, subsidies, and contributions	3	2	2
42.0	Insurance claims and indemnities	2	1	1
99.0	Direct obligations	9,366	9,350	9,823
99.0	Reimbursable obligations	143	211	143
99.9	Total new obligations	9,509	9,561	9,966

Employment Summary

Identification code: 69-1301-0-1-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
10.01	Direct civilian full-time equivalent employment	42,291	42,371	42,606
20.01	Reimbursable civilian full-time equivalent employment	263	263	263

EXHIBIT III-1

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

	FY 2010 ACTUAL	FY 2011 CR (ANNUALIZED)	FY 2012 REQUEST	CHANGE FY 2010-2012
Air Traffic Organization (ATO)	7,299,299	7,299,299	7,646,145	346,846
Aviation Safety (AVS)	1,234,065	1,234,065	1,283,568	49,503
Commercial Space (AST)	15,237	15,237	26,625	11,388
Staff Offices	801,427	801,427	866,663	65,236
TOTAL	**9,350,028**	**9,350,028**	**9,823,000**	**472,972**
FTEs				
Direct Funded	42,291	42,371	42,606	315
Reimbursable, allocated, other	263	263	263	0

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:

(1) operation on a 24-hour daily basis of a national air traffic system;
(2) establishment and maintenance of a national system of aids to navigation;
(3) establishment and survellance of civil air regulations to assure safety in aviation;
(4) development of standards, rules and regulations governing the physical fitness of airmen as well as the administration of an aviation medical research program;
(5) regulation of the commercial space transportation industry;
(6) administration of acquisition programs; and
(7) headquarters, administration and other staff offices.

OPERATIONS APPROPRIATION

Operations Summary
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**9,350,028**	**41,397**	**1,228**	**42,371**
Unavoidable Adjustments				
1. Adjustments to Base	102,244	0	0	307
2. Non-Pay Inflation	13,985	0	0	0
3. One Less Compensatory Day	-26,146	0	0	0
Total Unavoidable Adjustments	**90,083**	**0**	**0**	**307**
Uncontrollable Adjustments				
1. Adjustments to Base	196,178	0	0	-121
2. NATCA Collective Bargaining Agreement	160,690	0	0	0
3. NAS Handoff Requirement	7,900	0	0	0
4. GSA Rent/DHS Security	9,900	0	0	0
5. AVS/ASH Leases	2,000	0	0	0
6. Working Capital Increase	3,833	0	0	0
7. Increased payment to Bureau of Transportation Statistics	1,000	0	0	0
8. Capital Security Cost Sharing Program (CSCSP)	310	0	0	0
9. Workforce Attrition	-14,449	-242	0	-147
10. Technical Adjustments for Staffing	0	11	0	11
Total Uncontrollable Adjustments	**367,362**	**-231**	**0**	**-257**
Discretionary Increases				
1. Adjustments to Base	41,041	205	115	95
2. AVS NextGen Technology/Advancement	9,000	30	0	15
3. AFS Inspector Staffing	10,500	90	0	45
4. AIR Inspector Staffing	1,440	16	0	8
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	1,250	14	0	7
6. Space Incentives	5,000	0	0	0
7. Oracle 12i Delphi Conversion	5,000	0	0	0
8. Cyber Security Management Center (CSMC)	4,000	4	0	2
9. Emergency Operations, Communications, Intelligence Watch and Investigations	5,600	26	0	13
Total Discretionary Increases	**82,831**	**385**	**115**	**185**
Cost Efficiencies				
1. Adjustments to Base	-22,400	0	0	0
2. Flight Services Contract Savings	-7,900	0	0	0
3. Real Property Savings	-12,000	0	0	0
4. Administrative Efficiencies	-25,004	0	0	0
Total Cost Efficiencies	**-67,304**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0	0	0	0
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0	0	0	0
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0	0	0	0
4. Mailing and Printing (1 EOY/ 1 FTE)	0	0	0	0
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0	0	0	0
6. Graphics Program (1 EOY / 1 FTE)	0	0	0	0
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0	0	0	0
8. IT Support (1 EOY/ 1 FTE)	0	0	0	0
9. NAS Support (2 EOY/ 2 FTE)	0	0	0	0
10. Degree Completion Program (0 EOY/0 FTE)	0	0	0	0
Total Base Transfers	**0**	**0**	**0**	**0**
FY 2012 Request	**9,823,000**	**41,551**	**1,343**	**42,606**

NOTE: FTEs reflect FY2011 CR Annualized count.

OPERATIONS APPROPRIATION
Base Transfer Summary
(Whole Dollars)

Title	From	To	PC&B	Other Objects	Total	FTE	EOY
1. NextGen and Acquisitions Hiring Support	ATO	AHR	251,800	15,000	266,800	3	3
2. Labor Relations/ National Employee Safety	AEP	AHR	168,216	8,784	177,000	1	1
3. Safety and Hazardous Materials	ACR	ASH	66,057	0	66,057	1	1
4. Mailing and Printing Services	ABA	ARC	162,000	7,000,000	7,162,000	1	1
5. Civil Rights/ Diversity	ACR	AVS	95,000	0	95,000	1	1
6. Graphics Program	AOC	ARC	116,800	898,400	1,015,200	1	1
7. Audit and Evaluation	See Below	AGC	970,000	330,000	1,300,000	4	4
	ATO	AGC	630,000	165,000	795,000	3	3
	AVS	AGC	340,000	165,000	505,000	1	1
8. IT Support	ABA	AIO	178,000	0	178,000	1	1
9. NAS Support	AIO	ATO	378,000	0	378,000	2	2
10. Degree Completion Program	See Below	AHR	0	301,000	301,000	0	0
	ATO	AHR	0	190,000	190,000	0	0
	AST	AHR	0	10,000	10,000	0	0
	ABA	AHR	0	10,000	10,000	0	0
	ARC	AHR	0	20,000	20,000	0	0
	AIO	AHR	0	10,000	10,000	0	0
	AOA	AHR	0	10,000	10,000	0	0
	ACR	AHR	0	10,000	10,000	0	0
	AGI	AHR	0	1,000	1,000	0	0
	AOC	AHR	0	10,000	10,000	0	0
	AGC	AHR	0	10,000	10,000	0	0
	APL	AHR	0	10,000	10,000	0	0
	ASH	AHR	0	10,000	10,000	0	0

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OPERATIONS APPROPRIATION

Air Traffic Organization (ATO)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**7,299,299**	**31,194**	**1,030**	**32,294**
Unavoidable Adjustments				
1. Adjustments to Base	66,479			210
2. Non-Pay Inflation	10,557			
3. One Less Compensatory Day	-20,706			
Total Unavoidable Adjustments	**56,330**	**0**	**0**	**210**
Uncontrollable Adjustments				
1. Adjustments to Base	201,178			-121
2. NATCA Collective Bargaining Agreement	160,690			
3. NAS Handoff Requirement	7,900			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	1,000			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	-14,449	-242		-147
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**356,319**	**-242**	**0**	**-268**
Discretionary Increases				
1. Adjustments to Base	0			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**0**	**0**	**0**	**0**
Cost Efficiencies				
1. Adjustments to Base	-22,400			
2. Flight Services Contract Savings	-7,900			
3. Real Property Savings	-12,000			
4. Administrative Efficiencies	-22,629			
Total Cost Efficiencies	**-64,929**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	-267	-3		-3
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	-795	-3		-3
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	378	2		2
10. Degree Completion Program (0 EOY/0 FTE)	-190	0		
Total Base Transfers	**-874**	**-4**	**0**	**-4**
FY 2012 Request	**7,646,145**	**30,948**	**1,030**	**32,232**

Executive Summary: Air Traffic Organization (ATO)

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

The request of $7,646,145,000 and 30,948 FTP/32,232 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 funding for inflation ($10,557,000); pay raises associated with the National Air Traffic Controllers Association (NATCA) Collective Bargaining Agreement ($160,690,000); operation and maintenance costs for newly-commissioned National Airspace System (NAS) systems ($7,900,000); increased support to the Bureau of Transportation Statistics (BTS) ($1,000,000). The request assumes workforce attrition in air traffic controller staffing levels. The request also assumes cost efficiencies through flight services contract savings ($7,900,000); real property savings ($12,000,000); administrative efficiencies focused in the areas of travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services ($22,629,000). This request includes four base transfers that will transfer in net $874,000 and four FTE to the Assistant Administrator for Human Resources and the Office of the Chief Counsel.

Service Unit	FY 2010 Actual	FY 2012 Request	Change FY 2010 – FY 2012
Senior Vice President Operations	**6,792,938**	**7,125,267**	**332,329**
Vice President En Route & Oceanic (2)	1,780,146	1,922,724	142,578
Vice President Terminal (1) (2)	2,043,155	2,205,043	161,888
Vice President Technical Operations (1)	2,065,691	2,015,306	(50,385)
Vice President System Operations (1) (2)	587,284	478,188	(109,096)
Vice President Mission Support (1)	112,379	297,635	185,256
Vice President Technical Training	204,283	206,371	2,088
Other ATO Staff Offices	**506,361**	**520,878**	**14,517**
Vice President NextGen & Operations Planning	58,555	69,283	10,728
Vice President Finance	221,724	223,450	1,726
Vice President Strategy & Performance	152,173	153,541	1,368
Vice President Safety	48,260	48,890	630
Vice President Acquisition & Business Services	25,649	25,713	64
TOTAL	**7,299,299**	**7,646,145**	**346,846**

(1) The FY 2012 Budget reflects the realignment of shared functions from the Service Centers, Terminal, System Operations, and Technical Operations Service Unites to the Mission Support Service Unit. In addition to the three service centers (Eastern, Central, and Western), Mission Support Services now consists of Airspace Services, Aeronautical Information Management, Aeronautical Products, Litigation, Comptroller and Planning Services, and Administration.

(2) The reduction in System Operations is a result of the transfer of the Traffic Management Unit into the En Route & Oceanic and Terminal Service Units.

2. What Is The Program?

The ATO is a Performance-Based Organization (PBO) 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 15,100 air traffic controllers, 5,000 air traffic supervisors and air traffic managers, 1,100 engineers, and 6,100 maintenance technicians, directly serve our customers. The balance of our 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.

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 50,000 flights per day and help transport 700 million passengers per year, a vital part of the nation's economy. Recent data shows that civil aviation accounted for over $1.3 trillion in economic activity, making up 5.6 percent of the total U.S. economy. With earnings of over $395 billion a year, 12 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 traffic over the past two years, certain parts of the system remain congested. The high cost of fuel is a problem for airspace users, including the airlines.

In response to these challenges, ATO is building the Next Generation Air Transportation System (NextGen). 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.

In FY 2012, ATO will continue its transition to a culture of safety, and make further strides in the implementation of NextGen.

4. How Do You Know The Program Works?

ATO sets annual performance goals in safety, capacity and efficiency, 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 efficiency, 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 93 million successful flights on U.S. commercial aircraft, transporting over 6.5 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 in being removed from GAO'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, the FAA achieved 28 of our 31 performance targets in FY 2010.

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 2012, an operating budget of $7.65 billion 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 $443 million in cost savings and cost avoidance since FY 2006.

	Actual On Board FY 2010	FY 2011 Projected Controller Workforce	FY 2012 Projected Controller Workforce
Air Traffic Controllers			
Fully-Qualified	12,249	13,052	13,324
En Route	5,278	5,489	5,501
Terminal	6,971	7,563	7,823
Developmental	3,447	2,365	1,799
En Route	1,399	1,046	964
Terminal	2,048	1,319	835
Total ATCT	**15,696**	**15,417**	**15,123**
Operations Supervisors			
En Route	796		
Terminal	1,107		
Total Operations Supv	**1,903**	**N/A**	**N/A**

(1) Actual distribution between Terminal and En Route may change based on actual attrition and operational needs.
(2) Air Traffic Controller numbers include all employees, FTP, PTP, LWOP, FTT and Trainees.
(3) Operations Supervisor numbers include all employees
(4) Fully-Qualified category includes Certified Professional Controllers In Training (CPCIT)
(5) Operations Supervisor numbers are not forecasted; therefore numbers for FY 2011 and FY 2012 are unavailable.

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 2012 – En Route and Oceanic Services, AJE
($000)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 - FY 2012
En Route and Oceanic Services	$1,780,146	$1,922,724	$142,578
Total	**$1,780,146**	**$1,922,724**	**$142,578**

FAA's En Route and Oceanic Services request is $1,922,724,000 and 8,870 FTPs. This increase will provide for salaries, benefits, and non-pay activities including on-going program support costs to sustain continuing air traffic operations and also reflects the transfer of funding and staff for the Traffic Management Unit from System Operations Services. These funds also include adjustments for National Airspace System (NAS) Plan Handoff Requirements ($1.223 million) and the National Air Traffic Controllers Association (NATCA) Collective Bargaining Agreement ($72.311 million). The request is offset by reductions for workforce attrition and administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

<u>NAS Plan Handoff requirements of $1.223 million include</u>:

<u>CIP# S02.03-00 Air Traffic Control Beacon Interrogator Replacement (ATCBI-6)</u> – FAA will incur costs in the Salaries & Expenses account for operations and maintenance of newly commissioned systems in the amount of $1.223 million:

The ATCBI-6 is a secondary radar used for En Route and Oceanic air traffic control. The radar provides aircraft position information and identification to air traffic control facilities, for separation assurance and traffic management. The ATCBI-6, in conjunction with collocated primary long-range radar, also provides back-up radar approach surveillance service to numerous Terminal Radar Approach Control (TRACON) facilities in the event terminal radar services are lost or during scheduled maintenance downtime. ATCBI-6 is part of the agency's effort to upgrade equipment to provide greater system capability and reliability to reduce operating costs. The ATCBI-6 replacement program will replace existing ATCBI 4/5 equipment and establish new beacon-only sites. The program will upgrade the beacons with compatible surveillance systems, to sustain NAS safety and efficiency, and to avoid incurring unmanageable maintenance and supportability costs. Finally, ATCBI-6 will be used as the back-up strategy for Automatic Dependent Surveillance Broadcast (ADS-B) in mitigating the impact of a loss of GPS positioning source in the En Route domain. This funding will be used for:

- Second-Level Engineering ($738,000) - Provides funding for contractor support to augment FAA second-level engineering in development of software modifications, documentation, integration, regression testing, and configuration management for all operational and support systems at NAS facilities. Additional activities include maintenance and control of the operational baseline of NAS systems by authorizing and releasing all modifications of systems, subsystems, component equipment, and software programs to operational systems and facilities in the NAS.

- Environmental Remote Monitoring System (ERMS) and Remote Monitor and Control (RMC) Second-Level Engineering ($485,000) - Provides contractor support to augment FAA second-level engineering in development of modifications, documentation, integration and regression testing, and configuration management of the operational baseline for all ERMS and RMC systems at ATCBI-6 NAS facilities. This includes ensuring that appropriate documentation is developed and delivered to maintain the baseline.

If funding is not provided, the program would use capital dollars to accomplish activities normally performed with NPHO funds. This would reduce the capital funding available to continue implementation activities at the remaining sites and result in program schedule delays.

NATCA Collective Bargaining Agreement – The En Route and Oceanic Service Unit is requesting $72.311 million for the NATCA Collective Bargaining Agreement. At the direction of the White House, DOT Secretary LaHood implemented a binding arbitration process between FAA and NATCA to resolve multiple outstanding issues. The panel completed its work and provided a final settlement for the NATCA Collective Bargaining Agreement. As part of the agreement, FAA increased the pay scales for air traffic controllers over a 3-year period. These increases are binding and not subject to adjustment.

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

- Maintain daily operation of the 21 En Route Air Route Traffic Control Centers (ARTCCs) and two Center Radar Approach (CERAPs) facilities.
- Implement modifications to HOST and ERAM systems to establish a common platform for the detection and reporting of suspected loss of standard separation (LoSS) 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), En Route Automation Modernization, User Request Evaluation Tool (URET), Advanced Technologies and Oceanic Procedures (ATOP), En Route Information Display (ERIDS), 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.
- 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 budget year with the requested resources:

- Achieve an average daily airport capacity for the Nation's busiest airports of 103,068 arrivals and departures per day by FY 2011 and maintain that level through FY 2012 and FY 2013.
- Achieve a NAS on-time arrival rate of 88.0 percent at the Nation's busiest airports and maintain that level through FY 2013. FY 2012 Target: 88.00 percent.
- Sustain adjusted operational availability of En Route equipment at 99.7 percent for the reportable facilities that support the Nation's busiest airports.
- Decrease the rate of commercial air carrier fatalities per 100 million passengers on-board aircrafts by 50 percent by 2025. FY 2012 Target is 7.7.
- Provide adequate resources to support controller hiring to meet the requirements specified in the Congressional-mandated controller workforce plan.

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

- Continue air traffic operations at 21 ARTCC and two CERAP control facilities.
- Complete implementation of the Traffic Analysis and Review Program (TARP) in the En Route environment.
- Continue working the System LoSS Index (SLI) established in FY 2010, which is based on all reported radar LoSS, which accurately measures the air traffic system's conformance to standard separation. Activities will include quarterly reporting of En Route actions taken in response to Safety Service Unit's Risk Analysis Reports.
- On-going improvement and use of the Safety Management System (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.
- Continue to provide the support and technology to enable the safe increase in En Route and Oceanic capacity.
- 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 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 International Civil Aviation Organization (ICAO) and inter-organizational workgroups and decision making processes.

2. What Is This Program?

The En Route and Oceanic Services program supports the 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 2012 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 events.
    - Implement modifications to HOST and ERAM systems to support this common platform.
- Achieve the System Loss Index (SLI) target to be established for FY 2012.
    - 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 2012.
    - Enhance database source inputs and transition to a dashboard graphical user interface.
- Maintain and continuously improve the En Route and Oceanic Services 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 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 busiest airports of 103,068 arrivals and departures in FY 2012 and maintain a NAS on-time arrival rate of 88.00 percent at the Nation's busiest 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.
    - Implement ocean capacity metrics and targets, using comprehensive ATOP data collection and analysis capability and oceanic simulation and modeling capability.
    - Continue simulation and modeling activities to increase fuel efficiency in oceanic airspace.
    - Improve oceanic fuel efficiency per passenger seat for select city pairs and similar fleet by an average savings of at least 1 percent compared to the previous fiscal year's 2 year rolling average.
    - Develop a fuel burn performance metric for FY 2013 and beyond.
- Increase the percentage of oceanic airspace using reduced separation standards to 100 percent from previous fiscal year baselines.
    - Continue operational trials of Automatic Dependent Surveillance – Contract (ADS-C) Climb/Descend Procedures to grow NAS capacity in a safe and efficient manner for all users.

En Route and Oceanic Services supports the DOT outcome related to Economic Competitiveness: U.S. transportation interests advanced in targeted markets around the world. We will assist in expanding the use of performance-based systems to priority countries in support of the Next Generation Air Transportation System (NextGen).

- By FY 2013, expand the use of NextGen performance-based systems and concepts to five priority countries. FY 2012 Target: one country.
    - o Ensure harmonization of service improvements through collaboration with international and industry service providers by active participation and leadership in regional ICAO and other inter-organizational workgroups and decision making processes.

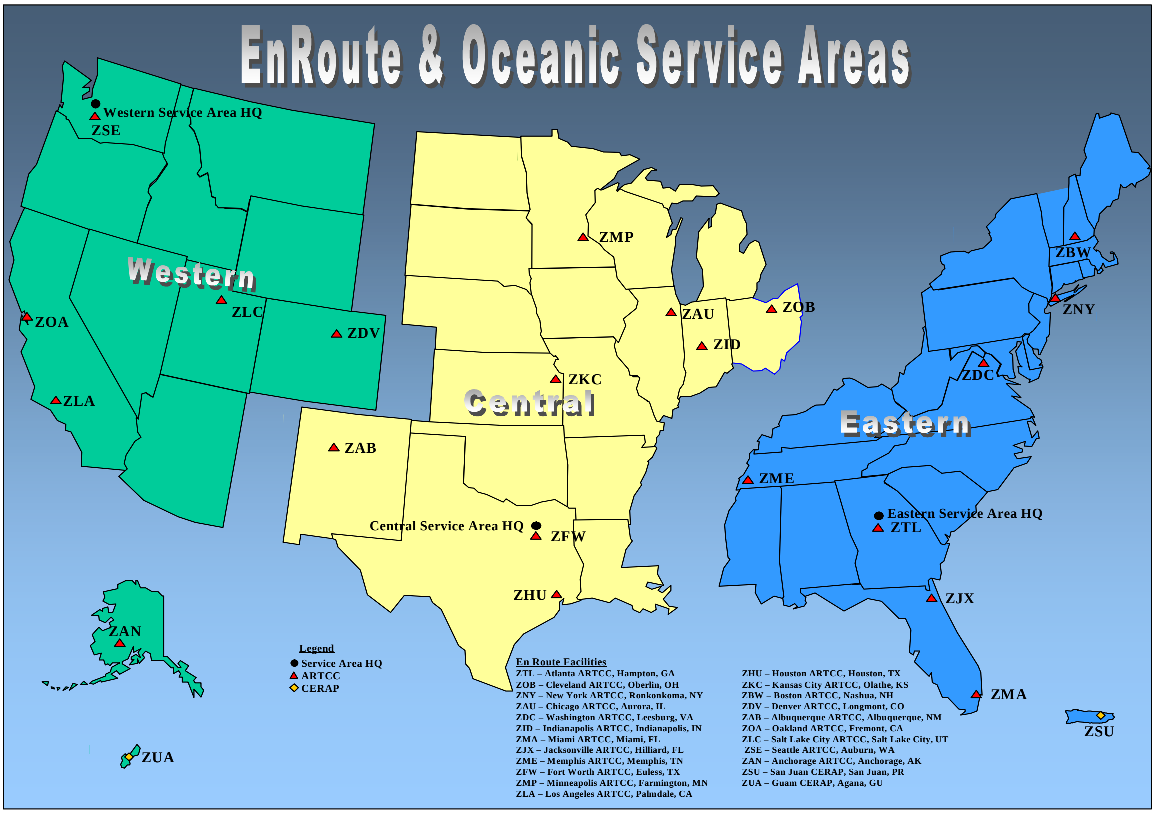
We provide air traffic control operations, systems, and facilities necessary to operate, maintain, and improve the NAS. From 23 service delivery points in the U.S., Puerto Rico, and Guam, we control more than 29 million square miles of airspace over the continental U.S. and the Atlantic and Pacific Oceans. 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. Customers include domestic and international airlines, general aviation, the Department of Defense, and the Department of Homeland Security.

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 acquisition program management, engineering, production, logistics, testing, training, and systems and procedures implementation. Since the mid-1990s, we have fielded modern communications, display, and weather systems for controller use. Major acquisition programs such as ERAM and 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.
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 2012 will maintain air traffic control (ATC) operations and support systems to ensure the safe and efficient transport of aircraft and passengers. 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 platforms by providing adequate second-level engineering and supply support as well.

In FY 2012, 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 demands.

3. Why Is This Particular Program Necessary?

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.

The En Route and Oceanic Services Unit will provide air traffic control operations and the facilities, equipment, personnel, and other services necessary to operate, maintain, and improve the NAS. 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 busiest 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 88.0 percent at the Nation's busiest airports.
- Continue to decrease the number of operational errors.
- Develop an Oceanic fuel burn performance metric for FY 2013 and beyond.
- 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.

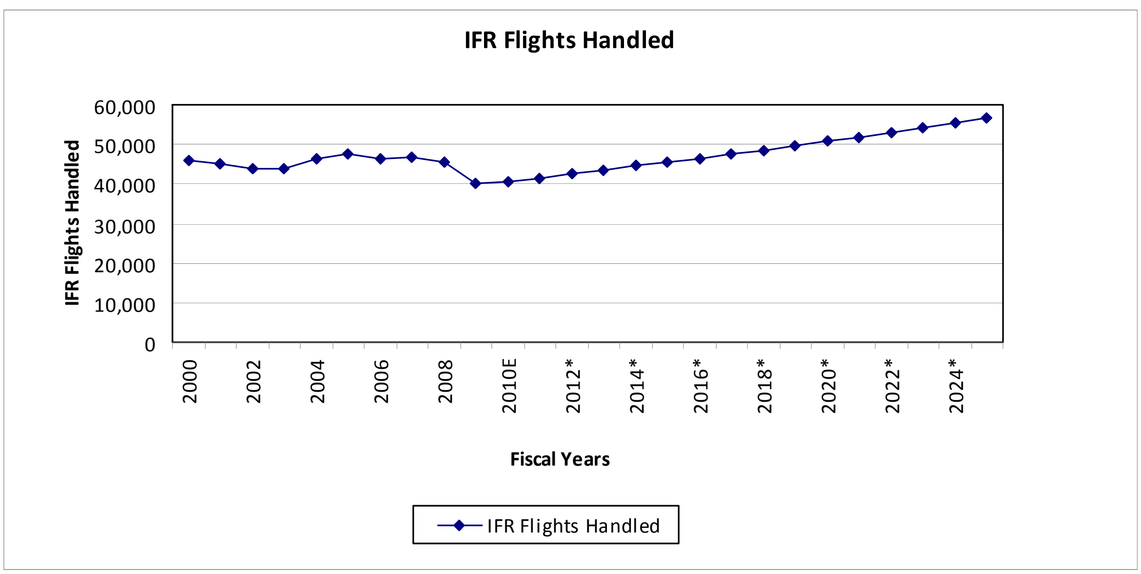
- Sustain adjusted operational availability of En Route equipment at 99.7 for the reportable facilities that support the nation's busiest airports.
- Reduce the rate commercial air carrier fatalities per 100 million passengers on-board aircrafts by 50 percent by 2025. FY 2012 Target is 7.7.
- Improve situational awareness for pilots and controllers in the NAS by providing them with additional information concerning potential conflicts and offering possible resolutions.

With the delay of ERAM, the HOST Computer System is a key component of the on-going modernization of the NAS infrastructure and will have to continue operations. The computers receive, process, coordinate, distribute, and track information on aircraft movement throughout the nation's airspace. The computers provide data interfaces to all types of FAA facilities – air traffic control towers, terminal radar approach control centers, flight service stations, and other Department of Defense activities. The architecture and processing capability provided by the computers are key to our ability to implement new services, concepts and traffic flows for the airline industry and flying public. The availability of these computers is critical to maintaining the nation's commerce. The HOST Computer is the backbone of the En Route and Oceanic Services operation. It provides the processing power for all air traffic operations. This system must be maintained until the new ERAM System becomes operational. Failure to provide adequate funding for HOST and the associated (ECG, URET, ATOP, ERID, Direct Access Radar Channel, and Display System Replacement) En Route systems will result in major delays and an increased time to repair the system. Finally, a reduction in support could lead to more operational errors and a potentially unsafe Air Traffic Control system.

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 2012, 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 busiest airports of

103,068 arrivals and departures per day in FY 2012 and a NAS on-time arrival rate of 88.0 percent at the Nation's busiest 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 Air Route Traffic Control Centers and two Combined En Route/Approach control facilities.

FY 2012 funding levels will support 8,869 En Route and Oceanic Services FTPs. It also includes the 3rd year and final costs of the NATCA Collective Bargaining Agreement ($72.311 million) that were generated as a result of the arbitration decision in 2009. The agreement requires a 3 percent guaranteed pay raise for all years of the agreement, average pay band increase of 35 percent over the term of the agreement, and reinstatement of controller incentive pay and controller-in-charge premium. This agreement costs an incremental $669 million from FY 2010 – FY 2012.

Failure to fund 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 air traffic control 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.

En Route and Oceanic Services will meet current and future capacity operation demands by meeting the following performance metrics in FY 2012. Targeted capacity increases to: 1) Achieve an average daily airport capacity for the 35 Nation's busiest airports of 103,068 arrivals and departures in FY 2012; and 2) maintain a NAS on-time arrival rate of 88.00 percent at the 35 Nation's busiest airports.

Detailed Justification for Vice President Terminal, AJT-0

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

FY 2012 – Terminal Services, AJT
($000)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 - FY 2012
Terminal Services	$2,043,157	$2,205,043	$161,886
Total	**$2,043,157**	**$2,205,043**	**$161,886**

The FY 2012 budget request for Terminal Services is $2,205,043,000 and 10,475 FTPs. The increase will provide for salaries, benefits, and estimated non-pay activities including on-going program support costs to sustain continuing air traffic operations and also reflects the transfer of funding and staff for the Traffic Management Unit from System Operations Services. This funding profile reflects uncontrollable adjustments for National Airspace System (NAS) Plan Handoff Requirements ($3.177 million), and the National Air Traffic Controllers Association (NATCA) Collective Bargaining Agreement ($88.379 million). The request is offset by reductions for workforce attrition and administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

<u>NAS Plan Handoff Requirements of $3.177 million include</u>:

<u>CIP # S03.02-01 Terminal Radar Program (ASR-11)</u> – Beginning in FY 2012, FAA will incur costs in the Salaries & Expenses account for a recurring operations and maintenance bill in the amount of $882,000:

- $142,000 for Corrective Maintenance – Funds will support additional commissioned sites in FY 2010.
- $32,000 for Systems Management Office (SMO) - All activities associated with managing and planning activities at the SMO level for corrective maintenance activities.
- $528,000 for Logistics - Increased repair costs in support of antenna failures.
- $138,000 for Second Level Engineering– All activities for hardware and software engineering support performed by contractor second-level engineering.
- $42,000 for Utilities, Building and Grounds Upkeep and Maintenance - To cover transition to OPS costs for sites commissioned in FY 2010.

The Advanced Surveillance Radar (ASR) -11 is the integrated primary and secondary radar deployed at terminal sites. The mission of the investment is to replace the aging airport radar systems with a single integrated digital primary and secondary radar system. In the areas around airports, known as the terminal environment, air traffic controllers use radars to detect, locate, and track aircraft. Primary radars locate all aircraft, commercial and general aviation, with and without on-board transponders. Secondary radars locate aircraft that have transponders (usually commercial aircraft). Currently, FAA has 225 terminal facilities that have both primary radar (ASR-9, ASR-8, or ASR-7), and a collocated, secondary radar (Mode-S, Air Traffic Control Beacon Interrogator (ATCBI, ATCBI-4, or ATCBI-5). The ASR-9 and Mode-S systems (average age 10 years) were deployed in the 1990's; ASR-8 (average age 20 years) and ATCBI-5 systems (average age 25 years) were deployed in the 1980s; and ASR-7 (average age 24 years) and ATCBI-4 systems (average age 30 years) were deployed in the 1970's.

Location	Date Commissioned	Description
Baton Rouge, LA (BTR)	10/30/09	Replacement
Green Bay, WI (GRB)	5/28/10	Replacement
Peoria, IL (PIA)	5/28/10	Replacement

CIP# S09.01-00 Airport Surface Detection Equipment – Model X (ASDE-X) – Beginning in FY 2012, FAA will incur costs in the Salaries & Expenses account for recurring operations and maintenance in the amount of $2,295,000:

- Logistics Support ($965,000) – This includes:
    a. Providing support activities and replenishment spares to support all fielded ASDE-X systems;
    b. Ordering, replenishing, exchanging, receiving, tracking, cataloging, and inventory management of replenishment spares needed in order to operate and maintain the ASDE-X systems at both the site and depot levels;
    c. Packaging, handling, storage and transportation, and on-site space allocation of material;
    d. Maintaining the Contractor Depot Logistics Support contract for depot repair support.

- Second-Level Engineering ($367,000) – This includes contract engineers to provide direct operational support via telephone technical assistance and/or on-site restoration efforts to resolve problems with the commissioned ASDE-X facilities. Their support also includes: design of modifications and performance of system optimization to improve the operational performance of the NAS ASDE-X facilities; verification that proposed software changes made by the prime contractor do not impact the operational capabilities of the system; and development of test plans and procedures to conduct system level testing of the performance of the software upgrades. Additional recurring costs include: photogrammetry (digitized and orthorectified aerial photographs) of airports that are acquired on a regular basis for the creation of new site-specific adaptations resulting from construction changes of operational movement areas; sustainment of the Program Support Facility (PSF) for organic software and hardware support; sustainment of remote connectivity between operational ASDE-X facilities and the PSF via FTI-VPN; and the contract with Sensis Corporation which is necessary to support proprietary elements of the ASDE-X system.

- System Maintenance Support ($582,000) – This includes both site and depot level corrective maintenance and repair. FAA technicians maintain the systems at the sites, but rely on contractors to provide labor, facilities support equipment, material, packaging, handling, storage, and transportation for depot level repair and support.

- Infrastructure Upgrades, including telecommunications ($381,000) – New service at the five sites listed below.

These recurring costs are for support of five additional ASDE-X commissioned systems at the sites listed below. The ASDE-X multilateration system includes remote units installed strategically throughout the airport to provide target position and identification reports for all aircraft and vehicles equipped with transponders. Multilateration is the process of determining a target's location in two or three dimensions by triangulating the transponder signal. The ASDE-X system will be implemented at sites with no surveillance capability (new), at sites where existing ASDE-3/Airport Movement Area Safety System (AMASS) systems will be replaced by ASDE-X (replacement), and at sites where existing ASDE-3/AMASS systems will be upgraded with ASDE-X capability (upgrade).

ID	Region	Airport	Commissioned	Description
MIA	ASO	Miami International Airport	08/26/09	Upgrade
IAH	ASW	George Bush Intercontinental Airport	10/19/09	Upgrade
PHL	AEA	Philadelphia International Airport	12/18/09	Upgrade
SNA	AWP	John Wayne-Orange County Airport	02/23/10	New
DFW	ASW	Dallas / Ft. Worth International Airport	02/26/10	Upgrade

NATCA Collective Bargaining Agreement – The Terminal Service Unit is requesting $88.379 million for the NATCA Collective Bargaining Agreement. 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 Collective Bargaining Agreement. As part of the agreement, FAA increased the pay scales for air traffic controllers over a 3-year period. These increases are binding on the agency and are not subject to adjustment.

The FY 2012 request will fund the following outputs and outcomes:

Safety

- Reduce the rate of fatalities of Commercial Air Carriers per 100 million passengers on-board in half by FY 2025.
- Support development of a system that integrates recorded radar and other similar data feeds to provide common platform for the detection and reporting of suspected Loss of Standard Separation (LoSS) events by providing necessary technical and administrative support to accomplish system modifications required to Terminal Radar systems including Standard Terminal Automation Replacement System (STARS), Automated Radar Terminal System (ARTS), ASDE, National Offload Program (NOP).
- Decrease Category A and B (most serious) runway incursions by FY 2010 to a rate of no more than 0.45 per million operations, and maintain or improve through FY 2013.
- 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.
- Support publication of a National Runway Safety Plan (NRSP) to achieve a 2 percent Total Runway Incursion (RI) Reduction in FY 2011, 10 percent by FY 2013.
- Continue implementation of the Safety Management System (SMS) and provide executive leadership to ensure that the safety culture in the Terminal Service Unit continues by conducting four Safety Risk Management Training Conferences, conducting three SMS Audits, and verifying mitigations have been implemented for Safety Risk Management Documents with high risk hazards.

Economic Competitiveness

- Lead the evaluation and expansion of the use of Converging Runway Display Aids (CRDAs) at airports with intersecting runways.
- Support the commissioning of nine new runway/taxiway projects, increasing the annual service volume of the nation's busiest airports by at least 1 percent annually, measured as a 5-year moving average, through FY 2013.
    - Ensure that runway capability commitments are established in partnership with stakeholders. Provide support to other FAA lines of business – Aviation Safety (AVS), Airports (ARP), and Regions and Centers (ARC) - to 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.
    - Support the cross-organizational Airport Obstructions Standards Committee (AOSC) to develop recommended standards and action plans for runway procedures

- Increase the use of NextGen technology displays to allow for greater capacity and use of parallel operations. Conduct an analysis to determine the safety of providing simultaneous parallel approaches with the use of NextGen displays.
- Study the separation minima from obstructions and terrain around airports for departures and arrivals. Ensure that terminal facilities can maximize airspace design for arrivals and departures.
- Develop tools to ensure efficient use of Area Navigation (RNAV) procedures during arrivals and departures to include display aids to assist the controller in determining separation conformance and for spacing and sequencing aircraft on or near assigned trajectory merge points. Develop Airspace and Procedures Enhancements by supporting the design and implementation of high altitude performance-based routes. This includes de-conflicting congested airports in metroplexes to provide greater efficiencies; efforts include optimizing procedures such as unrestricted climbs or Top of Descent procedures. Access year-end performance goals for New York, New Jersey, Philadelphia, and Chicago, and analyze redesign efforts for Denver, Dallas-Ft. Worth, Charlotte, and Chicago Midway to itemize benefits for redesign milestones.
- Support increasing terminal direct employee productivity by achieving the Terminal Services Productivity target of 7,386 operations per direct employee.
- Implement key work plans delivering the NextGen mid-term operational vision for flexible terminals and airports by providing capabilities necessary to increase access to and manage the separation of aircraft in the terminal environment at and around all large and small airports.

Organizational Excellence

- Maintain the air traffic controller workforce within 2 percent, above or below, the projected annual totals in the Air Traffic Controller (ATC) Workforce Plan.
    - o Implement the hiring, training, staffing analysis, and management recommendations of the ATC Workforce Plan to support FAA's safety mission and meet external stakeholder requirements.
- Achieve the Terminal Services direct/indirect staffing ratio of 8.19 percent by ensuring the efficient and effective provision of terminal services and by providing core business support functions for Mission Support.
- Update and implement the 5-Year NextGen Staffing Plan that will provide a skilled and competent workforce.

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

- Continue working the System LoSS Index (SLI) established in FY 2010 based on all reported radar LoSS that accurately measures the air traffic system's conformance to 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.
- Develop an annual review process for all sites to assess benefits for Converging Runway Display Aids (CRDA) use.
- Using the cross-organizational 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.

2. What Is This Program?

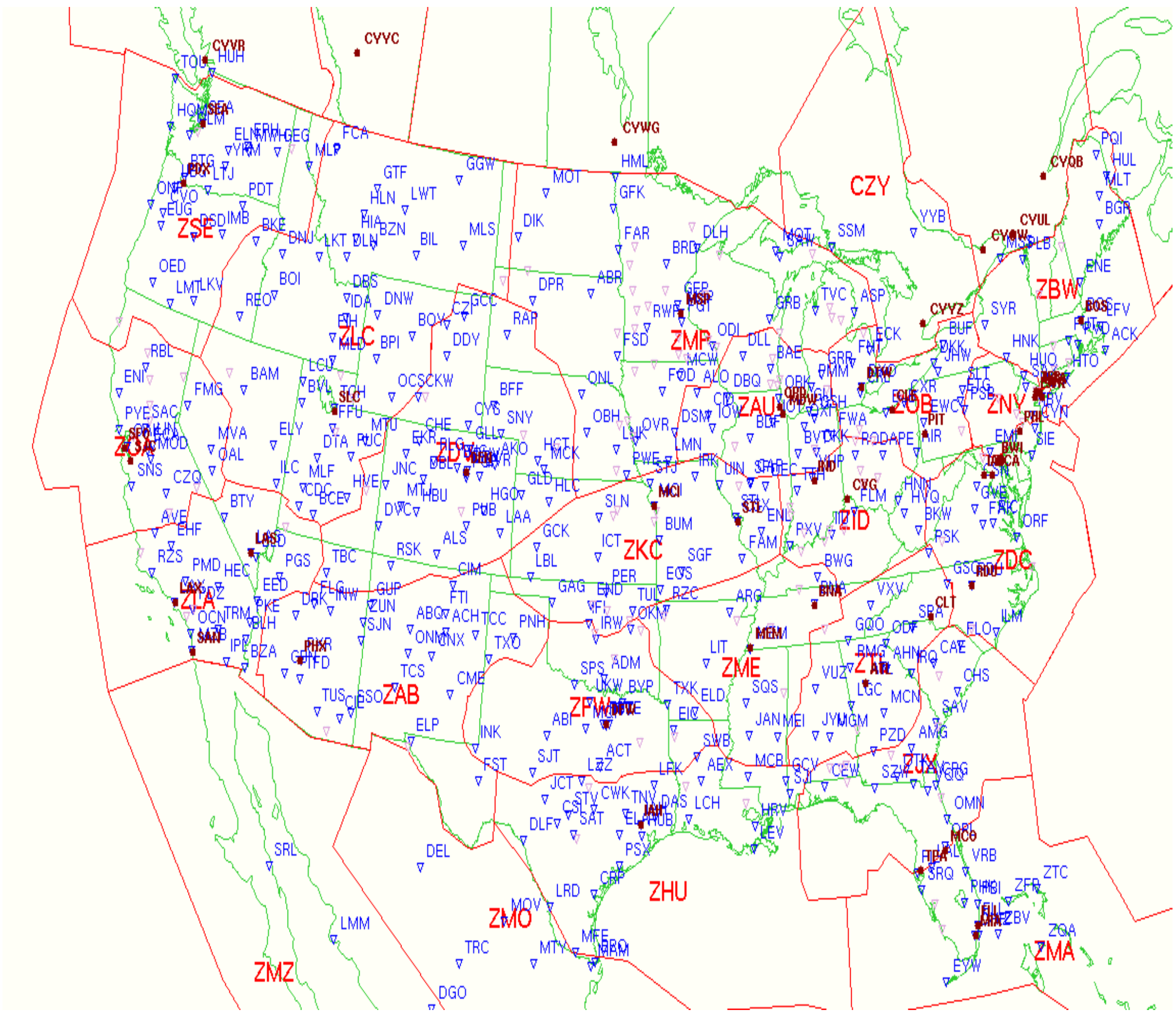
The Terminal Services Unit provides daily terminal ATC services, develops ATC capabilities, monitors operational performance, manages programs in support of these services, and serves as a liaison to customers, airports, and service area operations personnel.

Terminal ATC services include both airport surface operations and terminal area operations. Airport surface operations are conducted by controllers at 509 federal and contract towers located at the nation's busiest airports. Terminal area operations are conducted by controllers at 163 Terminal Radar Approach Control (TRACON) facilities, which routinely handle aircraft within 40 or more miles of an airport.

The Contract Towers Program provides Visual Flight Rule (VFR) air traffic control (ATC) service at 246 airports through 9 contracts (including 5 vendors) and employs over 1,290 contract controllers. This program has demonstrated significant cost benefits to FAA and airport community while maintaining an outstanding safety history.

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 147 facilities, 30 contracts (including 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 Flight Plan is the strategic plan containing long-term performance goals. The targets and timeframes in the Flight Plan are consistent with 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 busiest 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

3. Why Is This Particular Program Necessary?

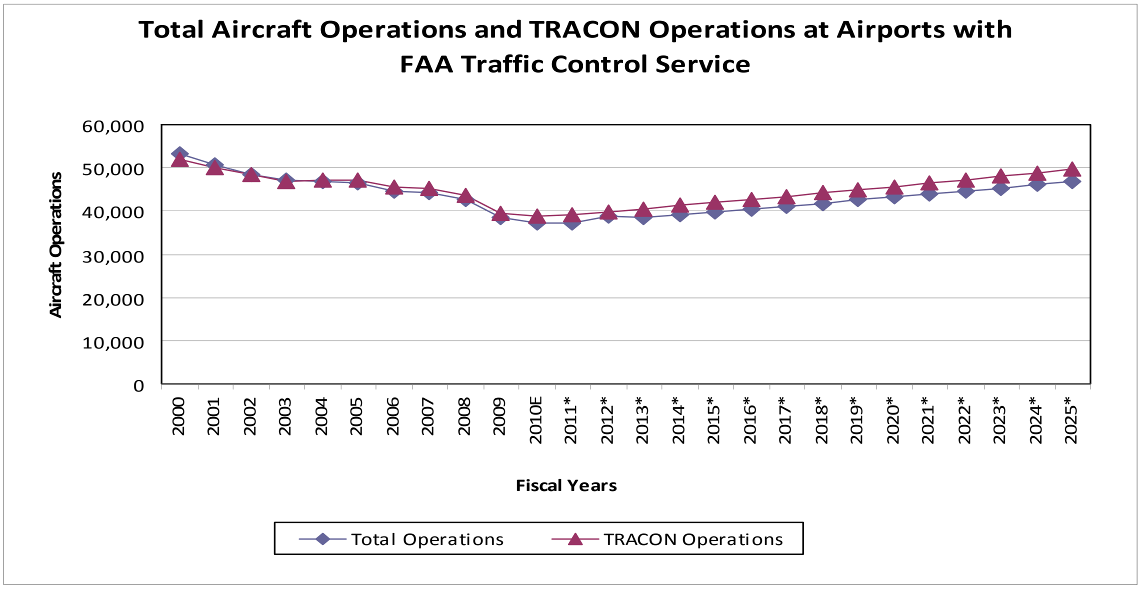
FAA's ATO handles 50,000 flights per day and helps transport over 700 million passengers per year, contributing to 5.6 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

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 goals for runway incursions and operational errors. These goals are tracked at all airports for which Terminal is responsible. We have also achieved the annual performance goals for NAS on-time arrival, adjusted equipment availability, and average daily airport capacity, which are tracked at the nation's busiest airports and eight 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 busiest 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 busiest airports. Terminal manages two supplemental safety measures that are tracked against the 264 FAA operated towers and 246 Federal Contract Towers for which Terminal is responsible for: 1) reducing the rate of runway incursions and 2) reducing the rate of operational errors. These supplemental safety goals are Terminal's leading indicators 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:

- Met all acquisition goals in FY 2009 and FY 2010.
- Met unit cost performance targets for cost per forecast operation.
- Deployed Terminal Proximity Alert (TPA) capabilities to assist controllers in safe separation.
- Installed Runway Status Lights at Los Angeles International Airport.
- Moved 767 million passengers (per Bureau of Transportation Statistics website) through 572 airports safely.
- Increased arrival/departure ability as a result of Area Navigation/Required Navigation Performance (RNAV/RNP) implementation at select airports.
- Declared initial operational capabilities for ADS-B at Louisville (SDF) and Philadelphia (PHL).

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. The Acquisition Management System process that is utilized within the Terminal program (required by all FAA programs) has helped us to become efficient in our approach to implementing projects and technology.

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.

FY 2012 funding levels will support 10,475 Terminal FTPs to ensure sufficient runway separation between aircraft landing and departing, control clearances, provide taxi instructions, and assist airborne aircraft in the immediate vicinity of the airport. Terminal air traffic control specialists at FAA towers transfer control of aircraft on instrument flights to our en route controllers when aircraft leave the terminal's airspace as well as receive aircraft from en route controllers when they are returning to a terminal's airspace.

The FY 2012 Operations request also funds the third year of the NATCA Collective Bargaining Agreement. The agreement requires a 3 percent guaranteed pay raise for all years of the agreement, average pay band increase of 35 percent over the term of the agreement, and reinstatement of controller incentive pay and controller-in-charge premium. This agreement costs an incremental $669 million from FY 2010 – FY 2012.

Overall this funding will ensure the safe and efficient delivery of Terminal Air Traffic Control Services by meeting or exceeding FAA Flight Plans Safety Goals to reduce the number and rate of Category A and B (most serious) Runway Incursions and satisfy the FAA Flight Plans Capacity Goals to achieve the specified average daily airport capacity at the 35 nation's busiest airports, the average daily airport capacity in the seven major metropolitan areas and the NAS on-time arrival rate. These FAA Safety and Capacity Goals directly support DOT's respective Strategic Goals to reduce Transportation related injuries and fatalities and to maximize economic returns on transportation policies and investments.

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

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

FY 2012 – Technical Operations Services, AJW
($000)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 -FY 2012
Technical Operations Services	$2,065,692	$2,015,306	($50,386)
Total	**$2,065,692**	**$2,015,306**	**($50,386)**

The FY 2012 budget request for Technical Operations Services is $2,015,306,000 and 8,387 FTPs. The decrease is due to the realignment of shared functions to the new Mission Support Services and will offset increases for salaries, benefits, and non-pay activities including on-going program support costs to sustain continuing air traffic operations. This request also assumes administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

Funding the FY 2012 request at this level will allow Technical Operations to:

Safety

- 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.
- Develop 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 NAS-wide common platform for the detection and reporting of suspected Loss of Standard Separation (LoSS) events in the En Route, Terminal, and Surface environments.
- Acquire Alaskan Satellite Telecommunication Infrastructure (ASTI) in accordance with the FAA Acquisition Management System (AMS). Complete Key Site Testing activities for ASTI Tech Refresh including engineering and integration work efforts.
- Evaluate and deploy runway status lights at Airport Movement Area Safety System (AMASS) and ASDE-X airports.
- Establish national contract(s) for guard services at major FAA staffed facilities for improvement in the training and performance of the guard services provided to FAA facilities through the standardization of requirements. The current approach of using numerous local contracts facilitates a wide range of performance by the companies providing guard services because of the lack of dedicated oversight.

Economic Competitiveness

- Continue development and implementation of policies/procedures and technology, coupled with strategic investment in the current National Airspace System (NAS) infrastructure, to grow NAS capacity and improve services safely and efficiently.
- Develop and implement 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.
- Continue acquisition and deployment of WAAS (Wide Area Augmentation System), NAS Voice Switch (NVS), System-wide Information Management (SWIM), Data Communication System (DataComm), and Next Generation Distance Measuring Equipment (DME) programs.
- 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.
- Develop Security Certification and Accreditation Packages (SCAPs), manage contracts, and maintain the Federal Telecommunications Infrastructure (FTI).
- 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. Deploy Voice Recorder Replacement Program (VRRP).
- Provide economies of scale with national contracts that will include small business provisions. The national contracts will reduce the number of guard service related contracts from over 70 to 7 or less. 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.

Organizational Excellence

- 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.

Key outputs expected to be achieved in 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.
- Provide Ground- and Space-Based Navigation systems for commercial and private aviation pilots by maintaining the existing ground-based equipment.
- Support the increase of the annual service volume of the Nation's busiest airports, by at least 1 percent annually, through the commission of nine new runway/taxiway projects measured as a 5-year moving average, through FY 2013. FY 2012 Target: 1 percent and one runway.
- Ensure that the Runway Template Action Plan (RTAP) schedules, milestones, and completion dates for commissioning new NextGen Air Transportation System (NextGen) runway/extensions are met.

- Support the implementation of Environmental Management Systems (EMS) by conducting internal EMS audits and management reviews and reporting the status to the Office of Environment and Energy.
- 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.

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

Safety

- Decrease the rate of fatalities per 100 million persons on-board in half by FY 2025. FY 2012 Target: 7.7.
- Reduce the fatal accident rate per 100,000 flight hours by 10 percent over a 10-year period (2009-2018). FY 2012 Target: 1.07.
- By the end of FY 2019 reduce the Rate of Fatal and Serious Injury Accidents by 10 percent in 10 years. FY 2012 Target: 1.82.
- Decrease in the number of site security discrepancies related to guard services.

Economic Competitiveness

- Commission nine new runway/taxiway projects, increasing the annual service volume of the Nation's busiest airports by at least 1 percent annually.
- Sustain adjusted operational availability of 99.7 percent for the reportable facilities that support the Nation's busiest airports through FY 2013.
- Reduce the number of people exposed to significant noise by 4 percent compounded annually through FY 2013.
- Stimulate small business involvement with the preparation and release of the National Guard Services Contract Screening Information Request.
- Support a small business or Alaskan Native owned companies with the award of a bridge contract to ensure continuity of guard services at 49 sites where the existing contracts are ending.

Organizational Excellence

- Implement cost efficiency initiatives such as: 10-15 percent savings for strategic sourcing for selected products and services.
- Annual reduction of $15 million in Information Technology operating costs; by FY 2010, reduce overhead costs 5-10 percent through automation of invoice processing. FY 2012 Target: 90 percent of targeted savings.
- Achieve zero cyber-security events that disable or significantly degrade FAA services.
- Reduce the total workplace injury and illness case rate to no more than 2.44 per 100 employees by the end of FY 2011, and maintain through FY 2013. FY 2012 Target: 2.44 per 100 employees.
- 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.

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

- Fund the production of WAAS/LPV Guidance or LP Instrument Approach Procedures.
    - Funding and delivering airport surveys to Mission Support Services.
    - Flight check RNAV GPS 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.

- Increase capacity by modifying and/or augmenting procedures, implementing new technology and increasing service efficiency for all users that include:
  - New runway commissioning
  - Acquisition and deployment of WAAS, NVS, SWIM, DataComm, and DME programs.
- 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 of a bridge contract for guard services at the 49 sites where the existing guard contracts are expiring at the end of FY 2011. The bridge contract will provide guard services to those sites while the national contract for guard services is developed.

2. What Is This Program?

The purpose of the Technical Operations Service Unit is to:

- Improve situational awareness for pilots and 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;
- Flight inspection;
- Facilities maintenance;
- Engineering and assignment of aeronautical frequency spectrum;
- Safety integration;
- 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 busiest 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 Flight Plan include NextGen development and implementation. Funding 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.

Navigation Services develops, acquires, deploys, maintains, sustains, and improves navigation 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. Through unique customer/client relationships and customer-derived requirements, Navigation Services provides solutions to meet or exceed customers' needs for providing safe, reliable, and cost effective navigation services to the NAS, its customers, stakeholders, and employees. Our full life-cycle service has the capability to define, design, build, deploy, commission, operate, support, and decommission navigation services. Based on the customers' product requirements and the service requested, we apply our capabilities to provide the most cost effective solution.

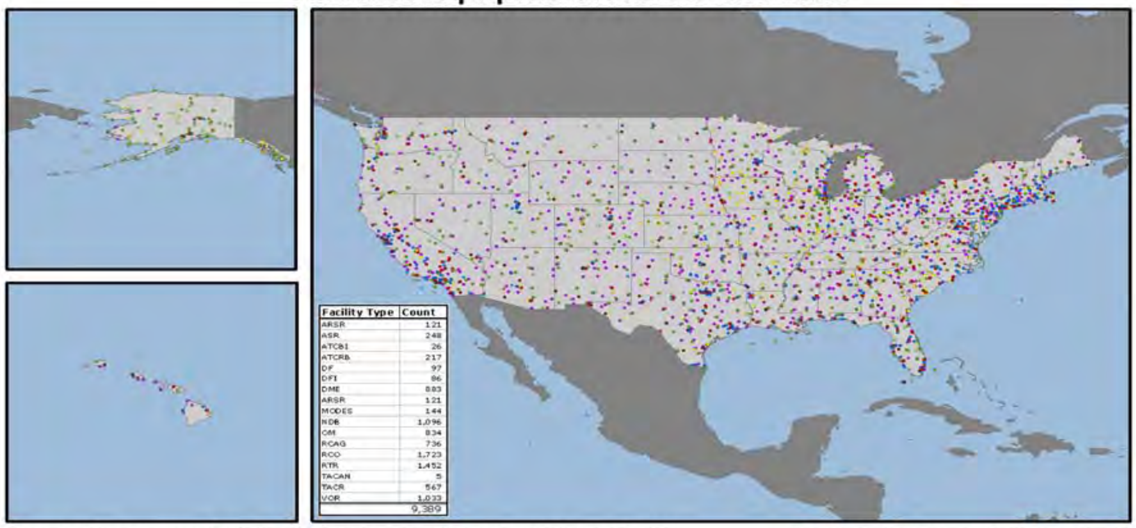
The Air Traffic Control Communications Service provides communications and telecommunications services consistent with International Civil Aviation Organization (ICAO) standards required for air traffic control within the NAS. It provides communications infrastructure and services for the DOD to ensure interoperability with the NAS.

Spectrum Engineering Services obtains, assigns, and protects radio frequencies for the FAA's communication, navigation, and surveillance programs.

The Air Traffic Control Facilities Directorate's, Facilities Security Risk Management Office provides guard services for Security Level 3 and 4 facilities. 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) is responsible for providing wide area network (WAN) services required by NAS systems as well as agency/Mission Support applications. The TSG oversees multiple contracts for telecommunications services and is responsible for the management of FAA-owned telecommunications networks including Data Multiplexing Network (DMN), Radio Communications Link/Low Density Radio Communications Link (RCL/LDRCL), Bandwidth Manager, and National Airspace Data Interchange Network (NADIN). It provides communications infrastructure and services for the DOD to ensure interoperability with the NAS. The TSG also manages the Network Enterprise Management Centers in Atlanta and Salt Lake City.

Aircraft Equipment Across the NAS



Facility Type	Count
ARSR	121
ASR	248
ATCBI	26
ATCRB	217
DF	97
DFI	86
DME	883
ARSR	121
MODES	144
NDB	1,096
OM	834
RCAG	736
RCO	1,723
RTR	1,452
TACAN	5
TACR	567
VOR	1,033
	9,389

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)
- 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
- Academia
- FAA lines of business (other ATO Service Units, AVS, ARC, ARP)
- Industry and state/local governments
- Inter-Agency Security Council

3. Why Is This Particular Program Necessary?

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.

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 being met due to adherence to FAA maintenance policies and procedures for NAS monitoring, control, maintenance, and restoration. This strict adherence optimizes service availability for the Nation's busiest 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 in 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. The Technical Operations Services Unit has established the following target for this performance goal:

Sites with guard services are audited by the FAA's security professionals. The use of guards provided under an agreement with the Federal Protective Service has resulted in an increase in professionalism that has been observed by facility managers. This is because the requirements placed on the contractors providing the guard services are more demanding and are monitored. This has also resulted in a decrease in performance-related discrepancies during security inspections.

- Sustain Adjusted Operational Availability at 99 percent for reportable facilities that support the NAS.

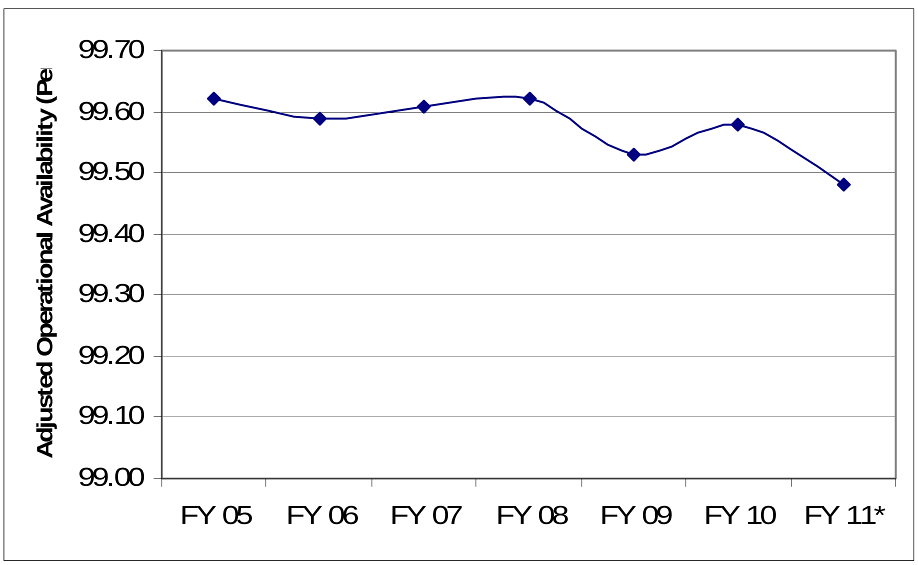


Figure 7: Adjusted Operational Availability of NAS Capabilities
Note: *FY 2011 data thru 12/31/10 (December data is preliminary)

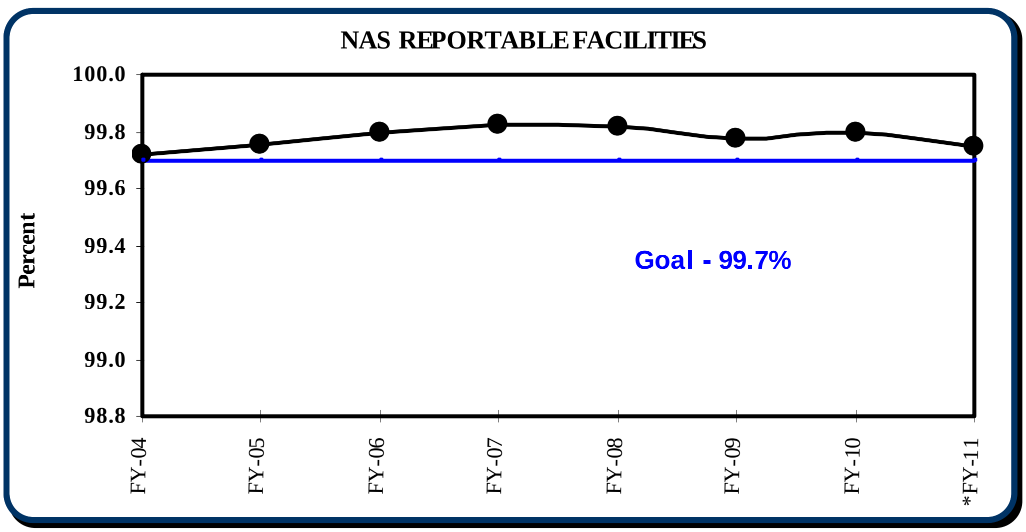
Systems Maintenance Field Maintenance Performance Indicators

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*	23,135	99.48%	99.86%

*FY 2011 data thru 12/31/10 (December data is preliminary)
**Operational facilities deemed reportable in FAA Order 6040.15, "National Airspace Performance Reporting System."

Adjusted Availability for 35 Nation's Busiest Airports
(Reportable Facilities)
FY 2011 Goal (Maintain adjusted availability of 35 Nation's Busiest Airports NAS reportable Facilities at 99.70%)

Target: 99.70%
FYTD: 99.75%
Nov 10: 99.76%
Dec 10: **99.74%**
Dec 09: 99.82%



Preliminary numbers show, for the month of December 2010, we are above the goal for adjusted operational availability. Compared to November 2010, the adjusted operational availability for the 35 Nation's busiest airports (reportable facilities) decreased by 0.015 percent, with an approximate increase of 1,800 hours in unscheduled downtime (mainly due to code 80 Equipment and code 85 Weather outages). Compared to December 2009, the adjusted operational availability for the 35 Nation's busiest airports (reportable facilities) decreased by 0.083 percent, with an approximate increase of 1,500 hours in unscheduled downtime (mainly due to code 80 Equipment and code 85 Weather outages.)

Note: Data Source – NASPAS (National Airspace System Performance Analysis System).
Official data through November 2010; Preliminary data – December 2010.

We have adjusted response time at low-level facilities to ensure service is restored first to the most critical facilities.

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 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 also plays a big 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 voice system. Technical Operations will acquire and deploy data communications and telecommunications infrastructure to meet future needs.

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.

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.

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Detailed Justification for Vice President System Operations, AJR-0

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

FY 2012 – System Operations Services, AJR
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010 - FY 2012
System Operations Services	$587,284	$478,188	($109,096)
Total	**$587,284**	**$478,188**	**($109,096)**

The FY 2012 budget request for System Operations Services is $478,188,000 and 1,298 FTPs. This decrease is attributable to the Traffic Management Unit being distributed between En Route and Oceanic Services and Terminal Services and realignment of shared function to the new Mission Support Services. Those functions consist of Airspace Services, Aeronautical Information Management, Aeronautical Products, and Litigation. This funding will provide for salaries, benefits, and estimated non-pay activities including on-going program support costs to sustain continuing air traffic operations. The request also assumes administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

The System Operations Service Unit has the following cost efficiency:

Flight Services Contract Savings – ATO will realize a total of $7.9 million in cost savings from Automated Flight Service Station contract, which is estimated to save the agency approximately $1.9 billion over a 13-year period.

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

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

Of the above directorates, two are operational directorates: ATCSCC and Flight Services.

Funding the FY 2012 request at this level will allow System Operations to improve the NAS by accomplishing the following:

- The 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 process model and share airport surface data with stakeholders. The ATCSCC will develop an airport Collaborative Decision-Making process model at a target airport in the NAS.

- The Flight Services Directorate will continue to provide flight services in the contiguous (CONUS) United States via the Automated Flight Service Stations (AFSS) contract. FAA will continue to provide Flight Services in Alaska.

- The Safety Directorate will apply Safety Risk Management (SRM) policies to assure adherence to Safety Management System (SMS) process guidelines, through safety evaluations, audits and monitoring that incorporate data collection, tracking and analysis, ensuring a reduced level of risk as indicated in associated Safety Risk Management Documentation (SRMDs). Assist, when required, in the conduct of SRM for all initiated changes to the NAS. Review a minimum of 12 preliminary pilot deviations and other air traffic incident reports each month to validate the accuracy of initial hazard classifications.

- The Safety Directorate will develop, administer, collect, and evaluate stakeholder safety awareness and satisfaction assessments/surveys. These assessments and surveys will measure the effectiveness and progress against SMS implementation plan goals and activities to enhance the quality of services provided. Conduct a minimum of one survey per month or 12 per year and develop periodic trend analysis reports from the feedback to make recommendations for improvement.

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

Flight Plan Initiatives:

- 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 busiest airports) – Achieve an average daily airport capacity for the Nation's busiest airports of 103,068 arrivals 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.
- The Collaborative Air Traffic Management Technologies (CATMT) Program will complete the CATMT Work Package 1, modeling to enhance the Flight Schedule Monitor during FY 2011. An enhancement from CATMT Work Package 2 was developed in time to include it with the last release under Work Package 1 to provide a new feature to the user community. This enhancement will provide capability to examine the impacts of both the Airspace Flow Program (ASP) and the Ground Delay Program (GDP) while preparing a planning traffic management initiative.
- Flight Services will continue to manage the AFSS contract to provide quality flight services to the CONUS, Puerto Rico, and Hawaii. Flight Services will also continue modernizing flight services automation via the MAPS program in order to standardize and improve service delivery to pilots.

Core Initiatives:

- The Safety Directorate will provide oversight and guidance for the conduct of SRM activities within System Operations. We will ensure that all System Operations-initiated SRMD and Safety Risk Management Decision Memorandum (SRMDM) are in accordance with the FAA SMS Manual, correctly reflecting proposed changes to the NAS, and accurately assessing safety risks associated with proposed changes to the NAS. We will track all SRM activities and report to management on NAS changes requiring SRMD or a SRMDM.

- The Security Directorate will continue to collaborate with the Department of Homeland Security (DHS), Department of Defense (DOD), and other security stakeholders to protect the country and its interests from threats involving the air domain. This directorate will also continue to work with its interagency partners and industry to mitigate the impact of those threats and Government responses to the same on the safety and efficiency of the NAS. The Security Directorate executes this two prong mission through the operational application of the ATO's air navigation services, particularly its air traffic and airspace management capabilities.

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

Safety:

- Reduce the fatal accident rate per 100,000 flight hours by 10 percent over a 10-year period (2009-2018). FY 2011 Target: 1.08.
- 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 busiest airports of 103,068 arrivals and departures by FY 2011 and maintain that level through FY 2013. FY 2011 Target: 103,068.
- 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. FY 2011 Target: 39,484.
- Achieve a NAS on-time arrival rate of 88 percent at the Nation's busiest airports and maintain that level through FY 2013. FY 2011 Target: 88 percent.
- 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. Long-term benefits realized include more efficient airspace management, resulting from Performance Based Navigation, which allows aircraft to fly more direct, efficient routes.
- Complete the Traffic Flow Management (TFM) -Modernization and CATMT Work Package 1 activities which will provide a modern sustainable TFM system providing four additional capability suites to improve the congestion management tools available to the Traffic Management Unit.
- Through the AFSS contract, provide pre- and post-flight briefings to pilots, to provide flight critical data such as NOTAMS, weather data and flight plans.

2. What Is This Program?

This program supports the DOT goals of Safety and Economic Competitiveness. Within these goals we support the outcomes of the reduction in transportation-related injuries and fatalities and a competitive air transportation system responsive to consumer needs.

The System Operations Service Unit consists of several directorates that 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. The AFSS contract costs will realize $7.9 million in cost savings in FY 2012. Of the $1.9 billion in total savings and cost avoidance (capital and labor) expected over the 13 years of this program, contract costs will account for $806.4 million (over the remaining 5 years of the contract, FY 2011-2015).

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 and will provide a bridge to the MAPS. MAPS will modernize and standardize the Flight Service System for the U.S. MAPS is the beginning of the investment analysis process. 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 Planning Directorate has two initiatives that will improve FAA operations. The Planning Directorate is coordinating the Budget Planning Integration Team process. The integration of budget process with planning targets will provide more clarity into the cost of FAA goals and will improve internal efficiency.

The Planning Directorate also manages the Wake Turbulence Program. The Wake Turbulence Mitigation Program is developing several NextGen tools that will maximize capacity on runways by considering weather conditions and the turbulence from different aircraft types. The program manages the research and analysis to ensure that both safety and efficiency standards reflect the best current knowledge. The state of the art is reviewed in light of technological advancements, such as Light Detection and Ranging equipment and the introduction of new aircraft such as the Airbus A380 and Boeing B747-800.

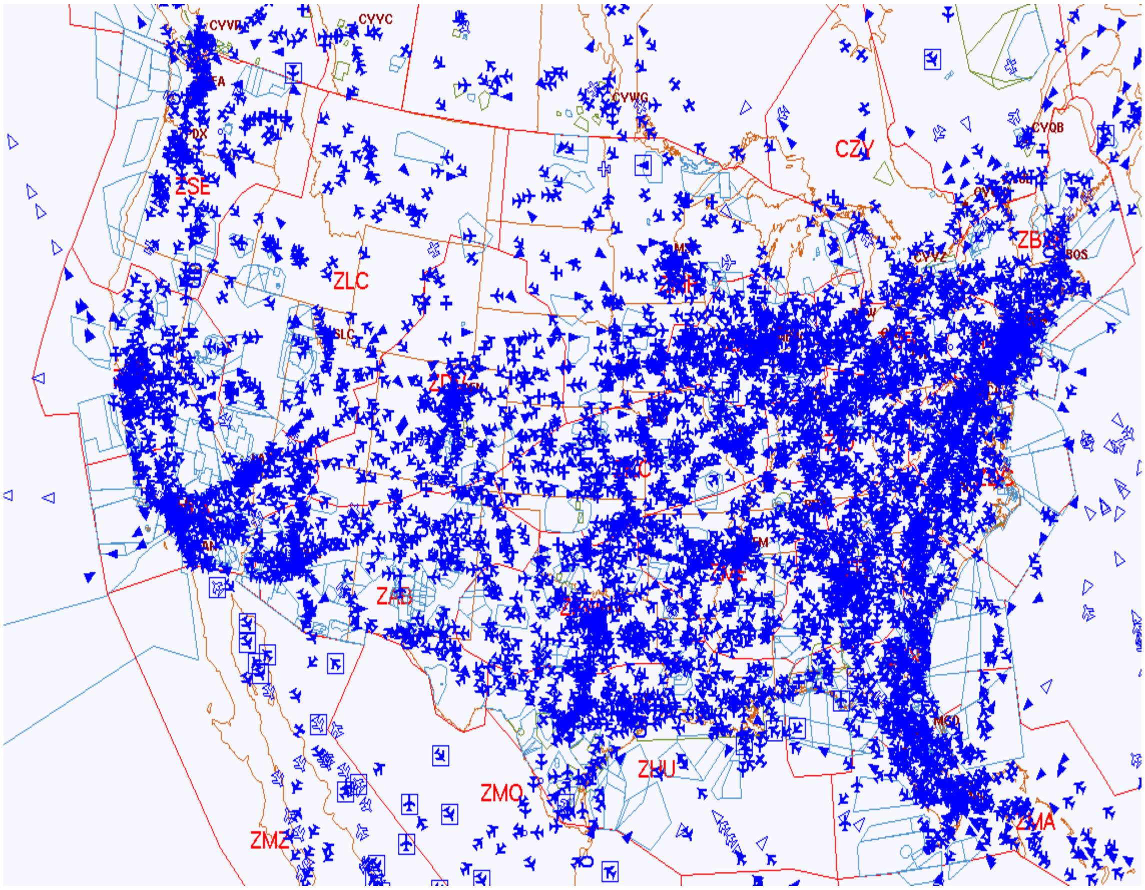
The Security Directorate orchestrates the ATO's operations focus on national defense, homeland security, law enforcement, and emergency operations (e.g., disaster response) efforts. The directorate collaborates with DHS, DOD, and other partners at the Federal, State, local, and territory/tribal level, as well as the private sector, to protect the U.S. and its interests from threats and hazards involving the air domain. These challenges range from suspicious aircraft in the NAS to catastrophic hurricanes. The directorate manages efforts to mitigate the impact of threats, as well as Government responses, on the safety and efficiency of the NAS. The directorate includes specialized air traffic security personnel who staff operation cells and liaison positions at FAA headquarters and at major national defense and homeland security nodes, including the Freedom Center in Herndon, Virginia, and the North American Aerospace Defense Command (NORAD) in Colorado Springs.

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, United States Secret Service, Customs and Border Protection, United States 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
- Department of Justice, to include the Federal Bureau of Investigation

System Operations coordinates daily with the Airline Operations Centers for Commercial Airlines, the GA Community, and DHS, to manage traffic flow and provide security in the NAS.



3. Why Is This Particular Program Necessary?

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.

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.
- System Operations Directorates balance situation-specific airflow needs with issues of altitude, noise abatement, speed, and direction, ensuring optimum use of airports with minimum public concern.
- The 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 (i.e., 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 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 defense, homeland security, and emergency operations demands while mitigating undesirable impacts on the safety and efficiency of the NAS and air commerce.
- FSS collect and disseminate 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 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 35 major airports.

Another operational area of System Operations, the management of flight services, has also been reviewed and found to be effective by the DOT Inspector General. 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 flight service stations to contract operations was effective. The System Operations Service Unit has implemented effective controls over the transition of flight service stations to contract operations.

System Operations develops annual targets to measure how effectively the service unit manages traffic flow capacity. The service unit collects and review 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 achieved an average of 42,589 arrivals and departures in FY 2010, exceeding the target by an average of 3,105 per day.
- System Operations will achieve an average daily airport capacity for the Nation's busiest airports of 103,068 arrivals and departures per day by FY 2011 and maintain that level through FY 2013. The FY 2010 target is an average of 102,648 per day. 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, standardized processes to manage safety risk.

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

System Operations consists of two operational directorates. The ATCSCC Directorate optimizes the capacity of the NAS by coordinating the daily air traffic flow and assures on- time departure and arrival for the flying public.

The Flight Services Directorate provides essential flight services, flight planning NOTAMS, and weather data to pilots. Both ATCSCC and Flight Services directorates provide essential services directly to the flying public.

The requested funding level will pay the salaries of System Operations personnel, including personnel assigned to FAA's ATCSCC and Flight Services directorates. The ATCSCC balances air traffic demand with system capacity in the NAS. The 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 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 managed by the Flight Services Program Operations Directorate.

Funding requested in the FY 2012 submission will continue our transition to NextGen. Collaborative Air Traffic Management Tools (CATM) will be upgraded to support NextGen operations. A reduction in the requested level of funding will slow down delivery of these necessary products, slowing implementation of NextGen capabilities.

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Detailed Justification for Vice President Technical Training, AJL-0

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

FY 2012 – Technical Training Services, AJL
($000)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 - FY 2012
Technical Training Services	$204,282	$206,371	$2,089
Total	**$204,282**	**$206,371**	**$2,089**

The Technical Training Services Unit is requesting $206,371,000 and 379 FTPs in Operations to meet its mission in FY 2012. The increase will provide for salaries and, benefits, as well as estimated non-pay activities including on-going program support costs to sustain air traffic operations. The request also assumes administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

Key outcomes expected to be achieved in 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;
- Improve safety;
- Expand technology for training development and delivery;
- Reduce travel costs related to training for field personnel;
- Improve training life cycle management; and
- Transition from information-based training to performance-based training.

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

- Updated 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; and
- Maximum training content reusability enabling content for flexible publishing (e.g., web, instructor-led, mobile, student guides, instructor guides, books, etc.).

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

- Achieve at least 1,000 new hire air traffic controller training completions;
- Expand ATO infrastructure to improve training delivery and management systems;
- Complete functional requirements and Facilities and Equipment (F&E) program requirements for the Learning Content Management System (LCMS) to support rapid course design, development, and management;
- Redesign the Airway Transportation System Specialists (ATSS) concepts courses to eliminate redundancies in equipment and content; and
- Redesign both the basic and advanced Terminal Radar Approach Control (TRACON) courses at the FAA Academy to equip trainees with a visible and progressive knowledge/proficiency improvement opportunity.

2. What Is This Program?

The Technical Training Services Unit supports the DOT's Organizational Excellence goal. 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.

The ATO Office of 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 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 Next Generation Air Transportation System (NextGen).

The Office of 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.

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

3. Why Is This Particular Program Necessary?

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.

The Technical Training Services Unit is the only organization within FAA that provides the technical training to air traffic controllers, airway transportation system specialists, and engineers required to perform their duties to the prescribed standards in a safe and efficient manner. 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 National Airspace System (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.

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

The structure of the new Office of Technical Training has been designed to enhance performance. The Office of Technical Training is expanding an evaluation and reporting toolset (i.e., monthly metrics reporting and drill down data) to measure AJL training performance.

We have completed certification of nearly 3,000 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 Flight Plan goals and we anticipate meeting our FY 2012 Flight Plan 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 US;
- 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; and
- Establishing training partnerships with ATO business units, including the bargaining units, to enhance communications on training initiatives throughout the training community.

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

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 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. Both air traffic controllers and support specialists 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 field training.

The Office of Technical Training is leading efforts to modernize and reduce costs for FAA's training delivery methods from instructor led classroom training to high fidelity simulation sessions and OJT instruction in the field. 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 Technical Training programs impacts the development and implementation of NextGen. Controllers and technicians need significant training to operate and maintain NextGen systems. The Office of Technical Training has partnered with the NextGen program office to ensure that training is an integral part of 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.

Technical Training manages their 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.

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 2012 – Mission Support Services, AJV
($000)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 – FY 2012
Mission Support Services	$112,378	$297,635	$185,257
Total	**$112,378**	**$297,635**	**$185,257**

The FY 2012 budget request for Mission Support Services is $297,635,000 and 646 FTPs. In FY 2011, the ATO realigned specific mission support functions and incorporated them into a single unit under the Mission Support Services. This action merged the entire Service Center Service Unit with selected functions from Terminal, Technical Operations, and System Operations. The purpose of Mission Support Services is to provide shared services across ATO operational service units. In addition to the three service centers (Eastern, Central, and Western), Mission Support Services now consists of Airspace Services, Aeronautical Information Management, Aeronautical Products, Litigation, Comptroller and Planning Services, and Administration. The increase will provide for salaries, benefits, and estimated non-pay activities including on-going program support costs to sustain continuing air traffic operations. The request also assumes administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

Funding the FY 2012 request at this level will allow Mission Support Services to improve the National Airspace System (NAS) by accomplishing the following:

- Develop an implementation plan for high-altitude airspace operational improvements, including realignment, re-stratification, and/or re-sectorization. Complete an implementation plan for high altitude operations for transition to mid-term operational concepts.
- Continue to develop and implement integrated procedures for performance-based navigation (PBN), incorporating airspace redesign, and environmental analysis.

Flight Plan Initiatives:

- Complete analyses of Stage 3 of the New York/New Jersey/Philadelphia implementation, Northgate departure changes, and implement initial portions of Stage 3 of the Chicago Airspace Project, changing westbound departure routes.

Strategic Initiatives Supporting the Flight Plan:

- Implement the PBN roadmap by continuously developing and implementing Area Navigation (RNAV) routes, Standard Instrument Departures (SIDs), and Standard Terminal Automation Replacement System (STARs). We will publish 50 RNAV SIDs and STARs and 12 RNAV routes annually.

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.
- 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 by managing hiring plans, personnel and position movements, strategic planning and analysis of staffing requirements, objectives, and programs.
- 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.

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

- 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.
- 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.

Economic Competitiveness:

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

2. What Is This Program?

Mission Support Services support the DOT Strategic Plan's Organizational Excellence Goal, specifically contributing toward the improved financial performance outcome.

The three ATO service centers provide shared services to promote standardization of processes, efficiency, and effectiveness which achieve results for the En Route and Oceanic, Technical Operations, Terminal, and Systems Operations Service Units. 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.

To ensure the optimal use of airports, while minimizing public concern, Mission Support continually implements new routes and procedures that leverage emerging aircraft navigation capabilities (including PBN), in a effort to balance situation-specific airflow needs with issues related to altitude, noise abatement, speed, and direction. The Mission Support Services Unit is also responsible for authorizing the operation of unmanned aircraft (UA) in the NAS, ensuring that the high-level of security required for other aviation, the public, and property on the ground is not compromised by the approvals to fly UAs.

Area Navigation (RNAV)/Required Navigation Performance (RNP)

PBN is a framework for defining navigation performance requirements (embodied in "navigation specifications") that can be applied to an air traffic route, instrument procedure, or defined airspace. PBN includes both RNAV and RNP specifications, and provides a basis for the design and implementation of automated flight paths as well as for airspace design and obstacle clearance. Once the required performance level is established, the aircraft's own capability determines whether it can safely achieve the specified performance and qualify for the operation.

Through NextGen, FAA is addressing the impact of air traffic growth by increasing NAS capacity and efficiency while simultaneously improving safety, reducing environmental impacts, and increasing user access in the NAS. FAA will achieve NextGen goals by continuing implementation of PBN that leverages emerging technologies and aircraft navigation capabilities.

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.

OPD procedures are designed to reduce fuel consumption, emissions, and noise by allowing pilots to set aircraft engines near idle throttle while they descend. OPDs use the capabilities of the aircraft flight management system to fly, to the maximum extent possible, a continuous, descending path without level segments. OPDs on RNAV STARs are being implemented, where possible, to make them environmentally friendly.

Certain RNP operations require advanced features of the on-board navigation function and approved training and crew procedures. These operations must receive approvals that are characterized as Special Aircraft and Aircrew Authorization Required (SAAAR) similar to approvals required for operations to conduct Instrument Landing System (ILS) Category II and III approaches. Note: The FAA is transitioning from SAAAR to the designation "Authorization Required" (AR) to harmonize with International Civil Aviation Organization (ICAO) terms.

RNAV and RNP specifications facilitate more efficient design of airspace and procedures, which collectively result in improved safety, access, predictability, operational efficiency, and environmental effects. Specifically, improved access and flexibility for point-to-point operations enhance reliability and reduce delays by defining more precise terminal area procedures. They can also reduce emissions and fuel consumption.

RNAV procedures provide benefit in all phases of flight, including departure, en route, arrival, approach, and transitioning airspace. RNAV arrivals and departures can: increase predictability of operations; reduce controller/aircraft communications; reduce fuel burn; reduce miles flown; and reduce interaction between dependent traffic flows. RNP AR procedures, as noted above, formerly referred to as RNP SAAAR approach procedures, offer additional design flexibility and enhanced performance, allowing us to mitigate the impact of obstacles on flight paths and to de-conflict traffic.

The Mission Support Services Unit will begin integrated 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 Taskforce 5 recommendations, maximizing benefits, and accelerating NextGen concepts.

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.

The FY 2012 budget includes $32.3 million (the same level as requested in FY 2010) for RNAV/RNP legacy work. Increases for NextGen related RNAV/RNP activities are requested in the Facilities and Equipment budget.

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

3. Why Is This Particular Program Necessary?

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.

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.

Mission Support Directorates balance situation-specific airflow needs with issues of altitude, noise abatement, speed, and direction, ensuring optimum use of airports with minimum public concern. We are also implementing new routes and procedures that leverage emerging aircraft navigation capabilities, including PBN.

We are responsible for authorizing UA operations in the NAS to ensure that approvals to fly UAs do not compromise the high level of safety for other aviation, the public, and property on the ground.

We conduct 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.

We are continuing implementation of 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.

We redesign 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.

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. In FY 2006, ATO estimated that the shared services concept would provide savings and cost avoidance of $360 to $460 million over a 10-year period. The Service Center roll-out took place in FY 2006; to date a net savings and cost avoidance of nearly $215 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 final report was completed in the 1st quarter of FY 2010. 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 2011.

AMP also delivered the Chicago Airspace Project facility design. Collaboration with industry via simulation resulted in a design with associated "profile descent" from FL270 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, airspace agreements and SRM documentation.

The RNAV/RNP program continues to move toward integrated procedure design by implementing RNAV SIDs, STARs, OPD arrivals, and RNP AR approach procedures in support of NextGen. In FY 2010, the RNAV/RNP Program published 13 RNAV routes, 43 RNAV SID and STARs procedures, and 13 RNP AR approach procedures. As of March 2010, the FAA had published more than 775 routes and procedures, including more than 345 RNAV procedures at 118 airports in 30 states. The program completed two PBN international seminars, an ICAO-FAA-EUROCONTROL PBN Seminar in St. Petersburg, Russia, and an ICAO Asia-Pacific Region PBN Implementation Seminar in Hong Kong, China.

In Alaska, the Weather Camera Program installed 24 additional weather camera sites in FY 2010. The cameras improve safety by providing views of weather conditions in passes and airports to pilots prior to take off.

Mission Support began participation in the Unmanned Aircraft System (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 AIM Program implemented the digital Notices to Airmen (NOTAM) System at Atlantic City (ACY). ACY, located at the FAA's 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.

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 2012 submission will assure continued contributions in the transition to NextGen by allowing for the continued development of PBN criteria and procedures (RNAV and RNP). A reduction in the requested level of funding will slow down the delivery of these necessary procedures, thereby slowing implementation of NextGen capabilities to aircraft and the flying public. In addition to this funding, $19.5 million is proposed in F&E to continue implementation of Optimization of Airspace and Procedures for Metroplexes (OAPM) deliverables that were recommended by the RTCA Task Force 5.

The requested levels of FY 2012 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. Without the requested level of funding, diminished administrative, financial, support service will occur

Detailed Justification for NextGen and Operations Planning Service Unit, AJP-0

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

FY 2012 – NextGen and Operations Planning Services, AJP
($000)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 - FY 2012
NextGen and Operations Planning Services	$58,555	$69,283	$10,728
Total	**$58,555**	**$69,283**	**$10,728**

The NextGen and Operations Planning Services Unit is requesting $69,283,000 and 192 FTP to meet its mission in FY 2012. The increase will provide for salaries, benefits, and estimated non-pay activities including on-going program support costs to sustain continuing air traffic operations. This funding profile reflects an uncontrollable adjustment for the National Airspace System (NAS) Plan Handoff ($3.5 million). The request also assumes administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

NAS Plan Handoff requirements of $3.5 million include:

12C.109D – Core Business Initiative: Traffic Alert and Collision Avoidance System (TCAS) – This request includes $2.5 million for the transition of 20 TCAS Remote Monitoring sites (TRAMs) to ATO-Technical Operations for sustainment. These sites include the following airports: Philadelphia (PHI), New York (JFK), Los Angeles (LAX), Dallas-Fort Worth (DFW), John Wayne (SNA), Long Beach (LGB), Oakland (OAK), Louisville (SDF), St. Louis (STL), and Atlanta (ATL). TCAS certification support will remain in the Next Generation Air Transportation System (NextGen) and Operations Planning organization at this time. We are requesting $1.0 million for this effort.

Funding the FY 2012 request at this level will allow the NextGen and Operations Planning Services Unit to:

- Publish the annual Next Generation 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 the FAA; and
- Strategically link funding requests with the acquisition of research and development products or services that support FAA's transition to NextGen.

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

- Contract Management Services; SETA/SE2020 – Contracts Management Services are dedicated to providing NextGen and Operations Planning and other FAA organizations with multiple technical and research support services contracts that are used to perform activities essential for accomplishment of mission goals and responsibilities. We provide resource vehicles and services to ensure that NextGen and Operations Planning and its customers meet their Flight Plan Goals and NextGen initiatives.

  Target 1: Establish management reporting and tracking system to manage contract resources assigned to AJP.
  Target 2: Provide for proper staffing and establishment of management reporting systems for contracts within AJP.

- Perform Analyses Necessary to Initiate Integrated Arrival and Departure Operations **–** Determine implementation requirements of the Integrated Arrival and Departure Operations concept.

  Target 1: Conduct initial site survey for implementation of integrated arrival and departure operations.

Target 2: Deliver final report on airspace analysis to determine requirements for integrated arrival and departure operations.

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.
- Ensure that project space agreements and program directive schedules include Automatic Dependent Surveillance Broadcast (ADS-B), Wide Area Augmentation System, Runway Status Lights, and Airport Surface Detection Equipment, Model-X (ASDE-X) ADS-B.
- 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.

By the end of FY 2012, the accomplishments of the NextGen and Operations Planning Services Unit 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 Line of Business.
- Strategically link funding requests with the acquisition of research and development products or services that support FAA's transition to NextGen.

2. What Is This Program?

The NextGen and Operations Planning Services Unit executes the mission of the FAA and ATO. As a member of the Executive Council, we establish ATO 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 NextGen Integration and Implementation 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 William J. Hughes Technical Center (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:

- Other ATO Business Units, Service Units, and Offices
- Other FAA Offices and Lines of Business
- International Civil Aviation Organization (ICAO)
- Airlines and other aircraft operators

Included in their request for the NextGen and Operations Planning Services Unit funding is the program item for Technical Center Operations ($26,812 thousand). 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 Technical Center.

Additionally, this program item provides funding for the FAA's WJHTC utility costs, which includes: electric, natural gas, and water/sewer.

3. Why Is This Particular Program Necessary?

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.

The ATO's NextGen and Operations Planning Service Unit supports the Flight Plan Organizational Excellence 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 oversee the measuring and reporting of ATO performance, complete the Strategic Management Process through the Executive Level, and link performance plans to operations planning and flight plan goals.

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 in 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 March 2010, the ATO NextGen and Operations Planning Services Unit published the NextGen Implementation Plan (which can be found at: http://www.faa.gov/about/initiatives/nextgen/media/NGIP_3-2010.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 agency's response to the

RTCA Task Force 5 recommendations, as well as a comprehensive listing of the projects already underway that support NextGen.

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

The NextGen and Operations Planning Service Unit provides the ATO 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. This service unit includes research and development, technology development, performance analysis and system engineering. We also maintain the NextGen plan, develop planning documentation for 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 service 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 Technical Center including land, buildings, and infrastructure.

ATO is building the NextGen. This includes adding a suite of air traffic technologies and procedures that will help reduce delays, expand air traffic capacity, and mitigate aviation's impact on the environment, while ensuring that all safety needs are met. We have already begun to deploy one of NextGen's core 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. We also anticipate the emergence of unmanned aircraft and commercial space launches. Before these enterprises can flourish, the ATO must positively determine that all safety risks have been identified and mitigated.

The requested level of FY 2012 Operations funding will pay the salaries of the personnel assigned to NextGen and Operations Planning. 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.

The NextGen and Operations Planning Services Unit supports FAA's Flight Plan goals by providing executive direction and infrastructure support for NextGen. NextGen initiatives are embedded in the goals of Safety, Capacity, and International Leadership. We support the Flight Plan's Organizational Excellence 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 Flight Plan goals.

Detailed Justification for Finance Service Unit, AJF-0

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

FY 2012 – Finance Services, AJF
($000)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 - FY 2012
Finance Services	$221,724	$223,450	$1,726
Total	**$221,724**	**$223,450**	**$1,726**

The FY 2012 budget request for Finance Services is $223,450,000 and 360 FTPs. The increase will provide for salaries, benefits, and estimated non-pay activities including on-going program support costs to sustain continuing air traffic operations. This request includes funding for the FAA ATO Corporate Account. It also reflects a $795,000 base transfer (3 EOY/3 FTE) to the Office of Chief Counsel for the Audit and Evaluation staff and $378,000 (2 EOY/2 FTE) base transfer from the Office of Information Services. The request also assumes administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

Funding the FY 2012 request at this level will allow Finance Service Unit to accomplish/manage:

- Air Traffic Controller (ATC) Workforce Plan: We support the ATC Workforce Plan goal by analyzing and refining the financial 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.
- Cost Control: Our Finance Office monitors productivity and financial metrics such as cost per controlled flight and ATO overhead rates, and reports out quarterly to the Assistant Administrator for Financial Services. Other cost controls include documented best-practices in Business Case Analysis and continued efforts to achieve greater levels of cost avoidance through the use of Cost Accounting and Labor Distribution systems.
- Information Security Program: We are protecting the ATO's information infrastructure using advanced cyber defense strategies to achieve zero cyber security events that disable or significantly degrade ATO systems. Our strategy includes implementing a risk management framework for ATO information technology.
- Centralized ATO Information Technology (IT) Management Functions: ATO-IT is developing a complete multi-year strategy and road map to establish itself as the single manager of non-National Airspace System (NAS) systems. They are also responsible for systems inventory, systems development staffing plans development, and governance and performance measurements plans for systems implementation.
- Ensuring effective and efficient ATO financial processes and tools: Six Sigma efforts will continue to assess high priority processes and financial tools and implement change for continued improvement.
- ATO Financial Management Systems Modernization: This effort improves budget planning and execution for all ATO appropriations through concentrated efforts in systems modernization to Oracle 12i, integrating data and toolsets such as 'cuff' systems to the FAA enterprise 'core' systems, and consolidating data warehouses.
- Institute Financial Management Processes and Procedures: Standardized processes such as funds certification, financial management, financial training, internal controls, and purchase card use across the ATO.

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

- The ATC Workforce Plan for 2012 – 2021 is a projection of changes in air traffic forecasts, controller retirements, and staffing requirements ranges for our air traffic control facilities.
- Cost Control Efficiency data collected from multiple sources and analyzed to identify trends in operational and overhead costs by facility and in aggregate such as cost per controlled flight and ATO overhead rate.

- A cyber security program in accordance with the Federal Information Security Management Act of 2002.
- Documentation that defines the multi-year strategy to establish ATO-IT as the single manager of all ATO non-NAS systems.
- Documentation that identifies the current inventory of ATO financial process and tools; a prioritization of mainstream processes for assessment, a project plan with milestones; and documentation of the "as-is" state.
- Systems modernization to Oracle 12i, integrating data and toolsets such as 'cuff' systems to the FAA enterprise 'core systems'.
- Data warehouse consolidation.
- A suite of formal financial training classes hosted across the ATO to standardize operating procedures, internal controls, purchase card use, and fund certification.

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

- Advise Congress on the appropriate level of FAA controllers through publication and transmittal of the annual ATC Workforce Plan.
- 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.
- Zero cyber security events that disable or significantly degrade ATO systems.
- Stronger ATO-IT governance through development of an inventory of ATO-IT systems; staffing plans to match organizational needs and improved information delivery service.
- Improved budget planning and execution of all ATO appropriations through systems modernization to Oracle 12i.
- Standardized financial processes that ensure consistent compliance with the proper distribution of appropriations.
- Streamlined financial processes to improve transaction volume and reduce error-prone work.
- Greater collaboration in the workforce through training classes that create career paths for Finance Service financial teams.

By the end of FY 2012, the accomplishments for Finance Staff Office include:

- Publish the ATC Workforce Plan which includes the hiring, training, staffing analysis, and management recommendations to support FAA's safety mission to meet external stakeholder 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.
- Implement FAA CIO Council approved software development standards and significantly enhanced Enterprise Data Center (EDC) disaster recovery (DR) plan and execution.
- Enhance global leadership position of ATO by providing analytical support to the Civil Air Navigation Services Organization (CANSO) in producing the Annual Benchmarking Report.
- Establish Project Performance Reviews auditing and accounting practices for 1-year funding obligations of at least $5 million. Successfully complete five audits.
- Complete successful management of contracts awarded under the American Reinvestment and Recovery Act (ARRA).
- Complete cost control targets of quarterly reporting on comprehensive measures of operating efficiency including Cost-Per-Controlled-Flight and Overhead Rate Efficiency Measure.

2. What Is This Program?

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

We are responsible for establishing and maintaining effective internal controls and financial management systems that meet the objectives of the Federal Managers Financial Integrity Act; Office of Management and

Budget (OMB) Circular A-123, Management's Responsibility for Internal Control. These objectives are to ensure the following:

- Effective and efficient operations
- Compliance with applicable laws and regulations
- Reliable financial reporting

We are the financial management team that ensures consistent delivery of best-in-class finance and information technology products and services across the ATO. We continue to find ways to better execute and manage the budget resources that Congress provides for Operational spending. We have successfully integrated best practices from the corporate world and aggressive strategies to improve performance. We continue to implement strategies to address the need for cost avoidance, improved financial management, system tools, and personnel training.

The ATO-IT group is aligned with the DOT 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. ATO-IT also ensures the reliability of all ATO 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.

The IT Office is responsible for delivery and sustainability of non-NAS IT capability to the ATO and many of the other FAA Lines of Business. Currently, the IT Office provides network operations, hardware and software support, and maintenance and life-cycle management to Air Traffic Organization, Information Services/Chief Information Officer, Human Resources Management, Financial Services, Office of the Administrator, and Office of the Associate Administrator customers in 1,026 locations spread across the United States.

The IT Office 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 750 servers, over 2,500 switches, over 263 systems and applications, 33,037 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

3. Why Is This Particular Program Necessary?

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.

ATO's Finance Services Unit is a hybrid organization comprising operational support, policy, and oversight units; and plays an increasingly important role in the efforts to launch NextGen while at the same time ensuring the continued and efficient operations of the ATO during transition to the new technology.

Our office has oversight responsibilities for all appropriations in the ATO, including, budget formulation and execution, audit, and review services. We are responsible for providing policy, internal controls guidance, and training to ensure that the funding appropriated to the ATO is used expeditiously and judiciously. Our organization takes a key role in development of metrics and cost control strategies. We are responsible for investment analysis and business case evaluation for the ATO including the NextGen programs. Our services include the analysis and benchmarking of labor related data to support bargaining unit negotiations and cost efficiency in FAA. We are also responsible for managing the ATO's reimbursable, capitalization, corporate work planning, and financial tracking and monitoring systems.

Our Office of Information Technology is the only operational unit in ATO which 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 ATO electronic information across the non-NAS environment. This unit provides IT risk management and information assurance security services to ATO systems to ensure that ATO security threats, vulnerabilities, and risks are mitigated in a cost beneficial manner, supporting ATO real-time security incident decision making. Additionally, IT professionals develop, deploy, and manage business and technical systems to facilitate alignment of IT services with ATO business goals.

Again, our IT Office is the only ATO operational unit with responsibility for implementation and compliance with federal, DOT, FAA, and ATO standards in collaboration with AIO to ensure IT delivery excellence and cost efficiencies. This unit supports FAA's goals of Safety and Organizational Excellence by collecting, analyzing, and presenting aviation and management data. We support 263 applications representing an annual investment of more than $80 million to ensure safety and efficiency throughout the NAS.

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 in 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 ATO's Finance Services Unit's policies work, as evidenced by the Office of Safety and Transportation Audit on FY 2009. The OST Audit rated the risk associated with Financial Controls as low. The Control Activities comment reads:

> "The control activities management has identified as necessary are actually being applied properly. Appropriate policies, procedures, techniques, and control mechanisms have been developed and are in place ensuring efficient and effective operations and adherence to established directives."

In addition, policies addressed as low-risk in the audit include:

- Financial Policies: Our Office of Financial Policy has actively promoted the use of a "one stop shop" website that is heavily used throughout the ATO. The site publishes or links to FAA Policy and directives and to the ATO Standard Operating Procedures (SOP). SOP have been developed and adhered to by the users.
- National Service Center (NSC): We have completed the consolidation of the IT help desk services and established the NSC based in Oklahoma City. The NSC standardizes support and process for IT Services.
- Reimbursable Agreements: We have established a national multi-organizational workgroup to update national policy on the establishment and management of Reimbursable Agreements.
- Purchase Card: In FY 2009, we implemented an automated system (PCPS) for tracking and approving purchases.

- Network Access Control: In FY 2009, we implemented the network access control process to verify IT access to the FAA network and ensure secure access by authorized users.

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

The Office of Finance Services provides a wide range of financial and technology services to the Air Traffic Organization and the FAA. Finance Services plays a significant role in the development and analysis of requirements for the NextGen program. We provide analysis of data pertinent to the costs associated with the negotiation of bargaining unit contracts. We are responsible for oversight and tracking for all appropriations in the ATO and, in the case of F&E and RE&D, for FAA as a whole. We are instrumental in the development of financial management policy, internal controls, and financial management training which ensure proper use of taxpayer funding. We are responsible for managing the ATO's reimbursable, capitalization, corporate work planning, and financial tracking and monitoring systems. The work efforts provided by Finance Services have been cited as one of the major component reasons for FAA's removal from the GAO High Risk List.

In addition to financially related services, this service unit is responsible for the vast majority of ATO's non-NAS information technology. In fact, many FAA lines of business beyond the ATO receive services from the Finance Services' Office of Information Technology. These services include application development and maintenance, provision of data center and hosting environments, and development and over sight of the enterprise architecture to facilitate the delivery and exchange of ATO 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 the ATO and 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 the DOT Strategic and FAA Flight Plan Goals. However, there are several goals that are heavily supported by Finance Services: Critical Acquisitions on Budget, Critical Acquisitions on Schedule, Unqualified Audit, Air Traffic Controller Workforce Plan, Information Security, Continuity of Operations and Cost Control, which tie to the DOT goals of Organizational Excellence.

A reduction to the Finance Services budget could result in a reduction in efforts to look at cost controls and business process reengineering.

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Detailed Justification for Strategy and Performance Service Unit, AJG-0

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

FY 2012 – Strategy and Performance Services, AJG
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010 - FY 2012
Strategy and Performance Services	$152,272	$153,541	$1,269
Total	**$152,272**	**$153,541**	**$1,269**

The FY 2012 budget request for Strategy and Performance Services is $153,541,000 and 156 FTPs. The increase will provide for salaries, benefits, and non-pay activities including on-going program support costs to sustain continuing air traffic operations. The request also assumes administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services. This request includes one base transfer to the Office of Human Resource Management for the Degree Completion Program and provides for an additional $1 million transfer to the Bureau of Transportation Statistics for the Airline Statistics Program.

Funding the FY 2012 request at this level will allow Strategy and Performance Service Unit to:

- Evaluate the effectiveness of weather information in reducing delays, coordinating cross-agency and with the aviation community to update the Next Generation Air Transportation System (NextGen) Implementation Plan annually.
- Update our projections on which metropolitan areas will have the greatest impact on the total system for delays and provide support in the determination of any necessary changes to the target areas and airports.
- Track the average flight and surface times within the National Airspace System (NAS) to provide a consolidated gate-to-gate measurement and analysis capability. Participate in the Future Airport Capacity Team (FACT) which works with aviation stakeholders to develop a strategy for implementing solutions from the toolbox developed for each airport projected to have a capacity shortfall in 2025.
- Identify airports forecasted to have chronic delays by projecting near-term demand on a quarterly basis, for the nation's busiest airports, and compare year-over-year changes in demand, identifying airports showing unusually large growth. We will complete an initial demand projection for FY 2012 and will update the projections every 3 months thereafter.
- Plan and coordinate international activities and events for nations considering adoption of enabling systems, such as the Global Navigation Satellite System and Automatic Dependent Surveillance – Broadcast (ADS-B), to improve safety of flight operations.
- Develop and implement capacity enhancing applications such as Performance-Based Navigation, embracing current operational capabilities to the maximum extent possible.
- Report progress on meeting air traffic controller (ATC) actual-on-board monthly targets as indicated in the Federal Personnel Payroll System.
- Support the development of comprehensive operating plans that enable Air Traffic Organization (ATO) service units to meet target levels of performance.
- Increase participation in the ATO Outreach programs with emphasis on recruiting qualified professional for the Next Generation Airspace Transportation System (NextGen) and Acquisitions.
- Develop and implement a Recruitment and Outreach Program to attract a diverse applicant pool for ATO mission-critical occupations in FY 2012.
- Track and report quarterly on actions taken in support of the Secretary of Transportation's fiscal year goal that 3 percent of all new hires are individuals with targeted (severe) disabilities.
- Provide executive direction and leadership to the organizations and service units of the ATO for a wide range of strategic and tactical labor issues. Standardize policy processes for the ATO labor strategies.
- Develop national standard operating procedures and policies for ATO training procurement requests.

- Maintain the FY 2011 Airways Transportation Systems Specialists (ATSS) complement per requirements and targets provided by Technical Operations, in accordance with the ATSS Hiring Plan.

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

- Improve operator and passenger access to the DOT's Delay Reporting System by updating the NextGen Implementation Plan.
- Assure accurate and consistent workload planning and NAS modeling for investment analysis by delivering detailed demand forecasts at the service delivery point (SDP) level.
- Develop, implement, and assess strategies to develop a results-oriented and performance-based ATO organization by the end of 2017. Measure of Success: The results of the employee engagement survey will improve by an average of 20 percent from the baseline administration in 2010/2011, by 2017. An interim measure will be an average increase of 5 percent over the baseline by 2012.
- Ensure that operational performance information is available by the 8th of each month via the appropriate tools**.**

2. What Is This Program?

Strategy and Performance supports the DOT Strategic Plan's Organizational Excellence goal. We recruit, develop and retain a diverse and collaborative workforce by providing an all encompassing career progression plan and leadership development 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 a strategy 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.

3. Why Is This Particular Program Necessary?

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.

The Strategy and Performance Services Unit 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.

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 Strategy and Performance Services Unit reported satisfactory performance on all FY 2010 planned activities and met all performance measures.

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

The ATO is a performance-based organization, and Strategy and Performance makes sure 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 ATO Strategy and Performance's Performance Analysis and Strategy organization supports the Flight Plan Capacity 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 Strategy and Performance 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 ATO Strategy and Performance organization also supports the Flight Plan Organizational Excellence 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.

Appropriate funding allows the Strategy and Performance Services Unit to support key initiatives such as meeting OPM Hiring Standards and maintaining the air traffic controller workforce at optimum levels.

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Detailed Justification for Office of Safety, AJS-0

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

FY 2012 – Office of Safety, AJS
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010 - FY 2012
Office of Safety	$48,260	$48,890	$630
Total	**$48,260**	**$48,890**	**$630**

The FY 2012 budget request for the Office of Safety is $48,890,000 and 76 FTPs. The increase will provide for salaries, benefits, and non-pay activities including on-going program support costs to sustain continuing air traffic operations. The request also assumes administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

By the end of FY 2012, the accomplishments for the Office of Safety include:

- Reduce the total number of runway incursions, especially the number of Category A&B (most serious) Runway Incursions.
- Implement a National Runway Safety Plan.
- Install Runway Status Light (RWSL) and Airport Surface Detection Equipment Model-X (ASDE-X), and test low cost ground surveillance systems at numerous airports.
- Develop a system to accurately measure reported/detected Loss of Standard Separation (LoSS) and provide recommended mitigations to identified causal factors.
- Conduct System Risk Event Rate to reduce risks in flight by limiting the rate of most serious losses of standard separation.
- Complete national implementation of the Air Traffic Safety Action Plan (ATSAP).
- Complete initial training to all new airway transportation system specialist personnel.
- Complete initial ATSAP training to all new air traffic control personnel.
- Upgrade the Traffic Analysis Review Program (TARP) 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 Comprehensive Electronic Data Analysis Report (CEDAR) platform.
- Conduct an FAA-sponsored International Runway Safety Summit.
- Continue to refine and implement enhanced safety metrics for runway safety and losses of Instrument Flight Rules (IFR)-IFR within the international aviation community.

2. What Is This Program?

The Office of Safety supports the DOT safety goal of reducing transportation-related injuries and fatalities and is also the lead for FAA's Priority Goal – Reduction of Runway Incursions.

Established in 2004, the Office of 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 rather than "who" made the mistakes. The Office of 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 National Airspace System (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 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.
- Implementing Safety Management System (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.
- Incorporating the aerospace performance factor methodologies in all Air Route Traffic Control Centers (ARTCC).
- 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.
- Promoting international activities with the International Civil Aviation Organization (ICAO), Civil Air Navigation Service Organization (CANSO), EUROCONTROL, and other international bodies.

Our partners and stakeholders include, among others:

- Air Traffic Organization (ATO) /ATO Service Areas
- Airports (ARP)
- Aviation Safety (AVS)
- Aviation Policy Planning and Environment (AEP)
- Communications (AOC)
- Financial Services (ABA)
- Government and Industry Affairs (AGI)
- Human Resource Management (AHR)
- Information Services/Chief Information Officer (AIO)(CIO)
- FAA Regions
- Enterprise Services Center (ESC)
- FAA Academy
- Center for Management and Executive Leadership (CMEL)
- 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, the Office of 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 Office of 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 the Office of Safety and the ATO.

3. Why Is This Particular Program Necessary?

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.

The ATO's Office of Safety 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 the Office of 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. 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 Office of Safety 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. 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.

We have made the NAS safer as follows:

- In FY 2010 (the latest reportable FY), Category A&B Runway Incursions were well below the 0.450 target with a total of 0.117.
- In FY 2009, Category A&B Runway Incursions were also well below the 0.472 target, with a total of 0.228. At the end of FY 2008, serious runway incursions were down 53 percent since FY 2001.

- 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 2009 there were 951 total runway incursions, 48 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.
- ASDE-X systems are currently installed at 33 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 will begin 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. Three new directives establishing QA and Quality Control (QC) responsibilities and procedures have been drafted and are in comment and coordination phase of publication.

We have established and met many highly visible performance measures. Our goals are set in support of the Flight Plan goal of Safety. We have guided the implementation a National Runway Safety Plan, as the ATO 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 airway transportation system specialist personnel; and completed initial ATSAP training to all new air traffic control personnel. We have used our expertise in technology to upgrade the Traffic Analysis Review Program "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 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.
- Contributing to the building of trust, understanding, and cooperation at the front-line level of FAA through crew resource management training at 33 facilities in FY 2010 and a total of 94 facilities to date (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 Event Review Committee 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, in February 2010, the Office of 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 Quality Assurance/Quality Control--our critical function of measuring and trending safety performance.
- Consolidation of Safety Management System (SMS) promotion and Safety Risk Management 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.
- 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?

The Office of Safety 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. The Service Unit 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, the Office of 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 operational testing and evaluation, 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.

The Office of Safety 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, the Office of Safety 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 and mitigation strategies to prevent future incidents. As we transition to NextGen, the Office of Safety 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.

The Office of Safety directly supports the DOT's Safety goal of reducing transportation-related injuries and fatalities. This organization is the lead for FAA's High 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, and technology. 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 safety as a whole.

Detailed Justification for Acquisition & Business Service Unit, AJA-0

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

FY 2012 – Acquisition and Business Services, AJA
($000)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 - FY 2012
Acquisition and Business Services	$25,649	$25,713	$64
Total	**$25,649**	**$25,713**	**$64**

The FY 2012 budget request for Acquisition and Business Services is $25,713,000 and 109 FTPs. The increase will provide for salaries, benefits, and estimated non-pay activities including on-going program support costs to sustain continuing air traffic operations. The request also assumes administrative efficiencies in the following areas: travel and transportation of personnel, transportation of things, supplies and materials, equipment, and other services.

Funding this FY 2012 request at this level will allow our Service Unit to:

- Determine the number of cost reimbursable contracts with an estimated value of $100 million or more; and request Defense Contract Audit Agency (DCAA) audits on those over $100 million.
- Close 89 percent of Cost Reimbursable contracts eligible for close-out and report quarterly. Close prior year Information Technology (IT) Audit Findings no later than the second quarter of each fiscal year.
- Correct high and medium vulnerabilities and receive no Significant Deficiencies related to new IT Notices of Findings and Recommendations (NFRs).
- Evaluate compliance with published Acquisition Management System (AMS) standards for the contractor exit process through National Acquisition Evaluation Program (NAEP).
- Award at least 25 percent of total direct procurement dollars to Small Businesses.
- Fund program management contract for the requirements definition and development oversight of the Unified Contracting System (UCS).

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

- Improved management of cost reimbursable contracts through oversight controls and the DCAA audit process.
- Audit cost reimbursable contracts over $100 million and report on audit status quarterly.
- Compliance evaluations based on published AMS standards for the contractor exit process through NAEP.
- Annual update of FAA's Acquisition Workforce Plan.

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

- Close 89 percent of the number of cost reimbursable contracts eligible for close-out and report quarterly. Close prior year IT Audit Findings not later than the second quarter of each fiscal year.
- Maintain Acquisition Workforce within 5 percent of projected annual staffing requirement in the Acquisition Workforce Plan.
- Award at least 25 percent of the total direct procurement dollars to small businesses.
- Publish annual update of FAA's Acquisition Workforce Plan.

By the end of FY 2012, the accomplishments for Acquisition & Business Service Unit include:

- Evaluate compliance with published AMS standards and implement corrective actions where required.
- Certify program/project managers and contracting officers/specialists at requisite levels.

- Publish annual update of FAA's Acquisition Workforce Plan and build a high performing acquisition workforce capable of successfully supporting Next Generation Air Transportation System (NextGen) and the transformation of our National Airspace System (NAS).

2. What Is This Program?

The Office of Acquisition and Business 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 2010 through more than 46,000 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.

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

We serve as the executive agent for the FAA's AMS, investment decision process, Acquisition Workforce Plan, 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 manage the Earned Value Management and Post-Implementation Review processes on behalf of the agency in accordance with Office of Management and Budget (OMB), General Accountability Office (GAO), and AMS policy requirements.

We are in the process of developing an automated business process management system for procurement called the UCS. UCS 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 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. FAA is exempt from the Federal Acquisition Regulation (FAR) so FAA-provided training builds upon federal acquisition training and certification standards to provide training specific to FAA's AMS. 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 the 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.

3. Why Is This Particular Program Necessary?

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.

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 2010. The number and complexity of the contracts associated with the NextGen effort will substantially increase our workload in FY 2012. 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 also 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

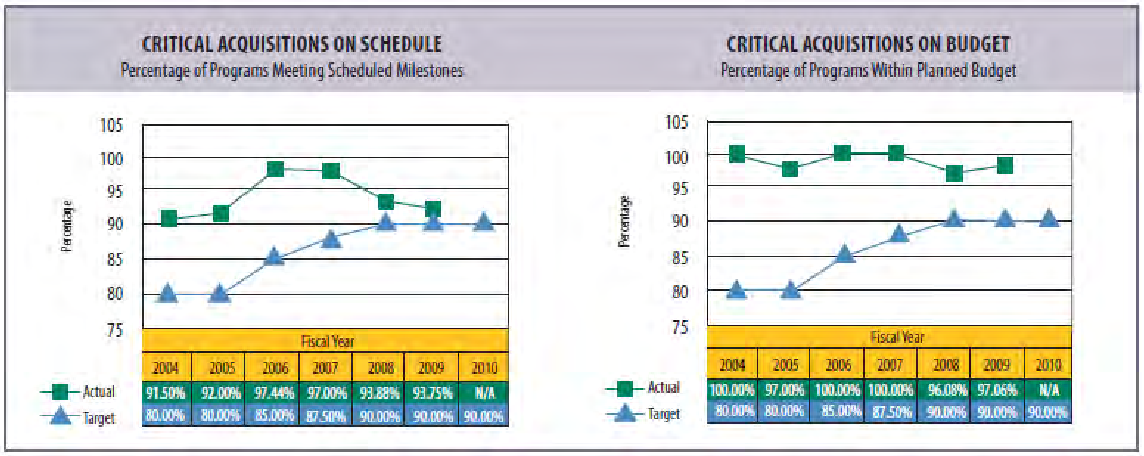
Our partners and stakeholders include both internal and external customers. Internally, we provide agency-wide support on acquisition and contracts management support as well as quality assurance on major NAS Systems contract deliverables to FAA. We are an integral part of the NextGen development and 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, Office of the Inspector General, 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?

ATO sets annual performance goals in key categories including safety, capacity, efficiency, finance, international leadership, and organizational excellence, including in 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 ATO's Acquisitions and Business, 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. As a result of these and other improvements, we have consistently exceeded our milestones and goals for major systems acquisition programs in the areas of cost and schedule.



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 reduce time and labor costs on contract management 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 acquisition workforce, as identified by the FAA, includes contracting officers and specialists; program/project managers; engineers and researchers/systems engineers; business and financial analysts; contracting officer's technical representatives; test and evaluation specialists; integrated logistics specialists; and acquisition attorneys. The funding in this request allows Acquisition and Business Services to conduct effective workforce planning and to train, develop, and certify personnel in these 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 Acquisition and Business Services 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 Flight 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 which tie to the DOT goals of Organizational Excellence.

The FY 2012 budget request will allow this service unit to perform its mission. Current staffs are already being asked to pick up a larger work load because of the NextGen activities. 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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Explanation of Funding Changes for Air Traffic Organization (ATO)

	Dollars ($000)	FTE
Air Traffic Organization (Net change from FY 2010 Enacted Level)	**$346,846**	**-62**
Overview: For FY 2012, ATO requests $7,646,145,000, 30,948 FTPs, and 32,232 FTEs in the Operations appropriation to meet its mission of moving air traffic safely and efficiently. This is an increase of $346,846,000 (4.8 percent) and a decrease of 62 FTEs from the FY 2010 enacted level. The FY 2012 request level reflects inflation, uncontrollable adjustments for NAS Handoff requirements, $160.6 million for NATCA contract costs, offset by savings of $7.9 million for the Flight Services contract, $12.0 million for real property, $14.4 million for workforce attrition, and $22.6 million in administrative efficiencies. The FY 2012 FTE request includes a net reduction of 62 FTEs. It reflects reductions in controller staffing, along with two base transfers of three FTEs each, one to the Office of General Counsel to fully resource the Office of Audit and Evaluation, and the other to the Office of Human Resources to support NextGen and acquisition hiring. In addition, two FTEs from the Office of Information Services are transferring to the Senior Vice President of Finance for NAS Support.		
Unavoidable Adjustments		
Adjustments to Base: This adjustment provides for uncontrollable cost increases not funded in prior year budgets.	66,479	210
Non-Pay Inflation: This increase is needed to provide for inflationary cost increases consistent with OMB guidance that uses the FY 2011 GDP price index (year over year) of 0.5 percent.	10,557	
One-Less Compensatory Day: This decrease is due to the loss of one compensable day in FY 2012 (260 in FY 2012 versus 261 in FY 2011).	-20,706	
Uncontrollable Adjustments		
Adjustments to Base: This adjustment provides for unavoidable cost increases not funded in prior year budgets.	201,178	-121

	Dollars ($000)	FTE
NATCA Collective Bargaining Agreement: 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 has completed its work and has provided a final settlement for the NATCA Collective Bargaining Agreement. As part of the agreement, FAA will increase the pay scales for air traffic controllers over a 3-year period. These increases are binding on the agency and are not subject to adjustment. Under this agreement, in FY 2012, the air traffic controller payroll costs will increase $160.6 million.	160,690	
NAS Handoff Requirements: This $7.9 million request consists of the following three components, with their corresponding amounts:	7,900	
Logistics Support: All activities associated with depot level support to NAS prime mission equipment and associated support equipment.	1,493	
Second-Level Field Maintenance Support: All activities required for the in-service management phase, including directly operating, providing maintenance function s(both scheduled and unscheduled), and furnishing technical and logistics support for maintenance of FAA systems, sub-systems, service or equipment. All engineering activities in support of the delivery of service, to include development of modifications, documentation, testing, and implementation of technology refresh initiatives. Also includes associated travel time required to support systems. Major systems include: ATCBI-6, TCAS, ASR-11, and ASDE-X.	6,026	
Leased Telecommunications: All activities associated with maintaining, upgrading, or modifying operational and administrative communications services required to sustain the operation and maintenance of the NAS facilities. It also includes leases and other recurring telecommunication costs for ASDE-X and other programs.	381	

	Dollars ($000)	FTE
BTS Increase: In FY 2012, ATO will provide a total of $5 million to the Bureau of Transportation Statistics (BTS) for the Airline Statistics Program. This reflects an increase of $1 million above prior year funding levels. BTS is a component of the Research and Innovative Technology Administration (RITA). BTS creates, manages, and shares transportation statistical knowledge with public and private transportation communities and the Nation. This mission is served be developing quality transportation data, promoting transportation knowledge through statistical products, and advancing effective use of this knowledge by public and private transportation decision-makers, researchers, and the American public.	1,000	
Workforce Attrition: The ATO expects to realize $14.4 million in savings through workforce attrition. Since 2002, the FAA has published an annual staffing plan for the air traffic controllers. Each year's update has adjusted the annual staffing targets to ensure air traffic control facilities are staffed appropriately for anticipated traffic levels and for attrition. In FY 2012, we expect total required controller staffing levels to decline slightly to 15,123, a reduction of 294 positions and 147 FTE from FY 2011 levels. The staffing levels are consistent with the controller workforce plan which will be released in March 2011. In the past few years, several trends have been identified that allowed us to adjust the staffing number downwards. In FY 2008, ATO hired more controllers than what was projected in the Controller Workforce Plan. At the same time, the economic downturn led to lower traffic and attrition levels. This created an advanced hiring reserve that reduced the need for hiring in later years. Traffic levels are down more than 20 percent since reaching their peak in 2000 and are not expected to return to those levels until 2024. Currently, controller staffing is above the level it was in 2000 when traffic peaked. All of these conditions allow us to reduce the planned FY 2012 controller staffing levels while still ensuring we have enough trained controllers to meet projected demands.	-14,449	-147
Cost Efficiencies		
Adjustment to Base: This adjustment provides for unavoidable cost decreases not credited in prior year budgets.	-22,400	
Flight Services Contract Savings: ATO will realize a total of $7.9 million in cost savings from the Automated Flight Service Station contract. The contract is estimated to save the agency approximately $1.9 billion over a 13-year period.	-7,900	

	Dollars ($000)	FTE
Real Property Savings: The ATO Corporate Real Estate Office continues its effort to assess technical space requirements throughout ATO field facilities. When we determine that the space/property occupied does not align with our actual requirements, we take the appropriate action. These actions include downsizing leased properties, establishing leases for less expensive property, consolidating multiple operations into a single facility, and the disposition of unnecessary property. In most cases the opportunity to realize savings occur in concert with the expiration and subsequent re-negotiation of the property leases.	-12,000	
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, staffing efficiencies, and utilization of contracts such as SAVES. 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.	-22,629	
Base Transfers		
NextGen and Acquisition Hiring Support: ATO faces human resource challenges associated with its transition to NextGen. In the near term, it will be recruiting and hiring technical and acquisition personnel to assist in the development and deployment of systems, equipment, and procedures, as well as program management and acquisition. This base transfer of 3 FTEs to the Office of Human Resources plus contractor support will provide additional support for NextGen and acquisition hiring.	-267	-3

	Dollars ($000)	FTE
Audit and Evaluation: In FY 2010, FAA established the Office of Audit and Evaluation to oversee safety-related issues. The Office was established to centralize programs and entry points for disclosures and recommendations on safety-related and personnel issues, including whistleblower issues. Over the first year of operation, senior management determined that additional resources were needed to optimize the operation of the office. To fully resource the Office of Audit and Evaluations, the Air Traffic Organization and Aviation Safety line of business will transfer $1.3 million and four FTEs to the office of the Chief Counsel. The ATO is transferring $795,000 and three FTEs.	-795	-3
NAS-Related IT Support: The Assistant Administrator for Information Services/Chief Financial Officer will transfer two FTEs and $378,000 to the Air Traffic Organization to support NAS-related IT systems.	378	2
Degree Completion Program: ATO will transfer $190,000 to the Assistant Administrator for Human Resource Management for the Degree Completion Program. The FAA Learning and Development Council (L&D Council), chaired by the Chief Learning Officer with executive participation from across the FAA, conducted a study of policy, procedure, and funding options for tuition assistance in the FAA. As a result of the study, the decision was made to develop and implement a corporate approach to tuition assistance and degree completion that is phased in gradually. This phased approach will enable strategic development of initiatives that support employee performance of the FAA Mission and Vision, including NextGen success.	-190	

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Traditional Tables for Air Traffic Organization (ATO)

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

Controller Workforce FY 1981 Through FY 2012

FY 1981	6,578	FY 1989	14,340	FY 1997	14,588	FY 2005	14,540
FY 1982	11,290	FY 1990	14,645	FY 1998	14,966	FY 2006	14,618
FY 1983	11,980	FY 1991	14,976	FY 1999	15,096	FY 2007	14,874
FY 1984	12,213	FY 1992	15,147	FY 2000	15,153	FY 2008	15,381
FY 1985	12,968	FY 1993	14,970	FY 2001	15,233	FY 2009	15,770
FY 1986	12,615	FY 1994	14,953	FY 2002	15,478	FY 2010	15,696
FY 1987	13,007	FY 1995	14,614	FY 2003	15,691	FY 2011 Est.	15,417
FY 1988	13,960	FY 1996	14,360	FY 2004	14,934	FY 2012 Req.	15,123

NOTES:
(1) Actuals include Controllers and Academy students
(2) FY 1986 thru FY 1988 data as if October 31st. September reports were not available for those years.

System Maintenance Overtime ($000)

		2010 Actual	2011 Estimate	2012 Request
Field Maintenance				
	Hours	385	396	408
	Amount	21,190	21,826	22,480
Program & Technical Support				
	Hours	45	46	48
	Amount	2,429	2,502	2,577
TOTAL				
	Hours	430	442	456
	Amount	23,619	24,328	25,057

NAS PLAN HAND-OFF
(Dollars in Thousands)
Air Traffic Organization

	CIP	Service Unit	NAS Logistics	Systems Maintenance	Training	Leased Telecom	Flight Inspection	Security & Haz Materials	Aviation Safety	Total
S02.03-00	Air Traffic Control Beacon Interragator Replacement (ATCBI-6)	En Route and Oceanic Services		1,223						1,223
										1,223
12C.109D	Traffic Alert and Collision Avoidance System (TCAS)	NextGen and Operations Planning		3,500						3,500
										3,500
S03.02-01	ASR-11	Terminal	528	354						882
S09.01-00	Airport Surface Detection Equipment - Model X (ASDE-X)	Terminal	965	949		381				2,295
										3,177
	Total		1,493	6,026	-	381	-	-	-	7,900

OPERATIONS APPROPRIATION

Aviation Safety (AVS)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**1,234,065**	**7,403**	**110**	**7,211**
Unavoidable Adjustments				
1. Adjustments to Base	30,066			112
2. Non-Pay Inflation	1,229			
3. One Less Compensatory Day	-3,947			
Total Unavoidable Adjustments	**27,348**	**0**	**0**	**112**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**0**	**0**	**0**	**0**
Discretionary Increases				
1. Adjustments to Base	4,000	42		14
2. AVS NextGen Technology/Advancement	9,000	30		15
3. AFS Inspector Staffing	10,500	90		45
4. AIR Inspector Staffing	1,440	16		8
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**24,940**	**178**	**0**	**82**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	-2,375			
Total Cost Efficiencies	**-2,375**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	95	1		1
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	-505	-1		-1
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	0			
Total Base Transfers	**-410**	**0**	**0**	**0**
FY 2012 Request	**1,283,568**	**7,581**	**110**	**7,405**

Executive Summary: Aviation Safety (AVS)

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

The request of $1,283.6 million and 7,405 FTEs allows FAA/AVS to promote aviation safety by regulating and overseeing the continued airworthiness of aircraft, certification of pilots, mechanics and others in safety-related positions; and airlines, repair stations, and other aviation organizations. The request includes base funding of $1,258.7 million plus programmatic increases of $24.9 million and 82 FTEs. The programmatic increases provide for additional safety inspectors and safety critical staff to support NextGen and increased surveillance.

2. What Is The Program?

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

3. Why Is This Particular Program Necessary?

In three of the last four calendar years, US airlines had had no fatal accidents. The standards set by the Aviation Safety organization, as well as the continued oversight and surveillance to assure compliance with those standards, are key contributors to this outstanding safety record.

4. How Do You Know The Program Works?

AVS programs continue to contribute to the unparalleled safety of American aviation. The commercial air carrier's 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 us to continually reduce the risk of flying while improving the efficiency of the system. This funding level will assure continued safety oversight while supporting safe implementation of NextGen.

Detailed Justification for – Aviation Safety (AVS)

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

**FY 2012 – Aviation Safety
($000)**

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
Flight Standards Service (AFS)	822,795	855,492	32,697
Aircraft Certification Service (AIR)	200,983	209,533	8,550
Office of Aerospace Medicine (AAM)	53,774	55,378	1,604
Office of Rulemaking (ARM)	5,907	6,148	241
Air Traffic Safety Oversight Service (AOV)	24,328	26,870	2,542
Accident Investigation and Prevention Service (AAI)	19,978	20,758	780
Office of Quality, Integration and Executive Service (AQS)	106,300	109,389	3,089
Total	**1,234,065**	**1,283,568**	**49,503**

The request of $1,283,568,000 (a 4.0 percent increase over the FY 2010 level) and 7,405 FTEs enables FAA to promote aviation safety regulation and oversight of the civil aviation industry. This request includes base funding of $1,258,628,000, (includes two base transfers for a net decrease of $410,000), and programmatic increases of $24,940,000 and 82 FTEs for AVS NextGen Technology /Advancement and safety and support staff increases. Descriptions about these increases follow:

AVS NextGen Technology/Advancement:

In FY 2012, FAA requests an increase of $9 million and 15 FTEs to support the implementation of several NextGen initiatives including efficient aircraft designs, revolutionary cockpits, data link communications, new interactive instrumentation, Safety Management System (SMS), and Aviation Safety Information Analysis and Sharing (ASIAS). These positions will enable AVS to review and process new NextGen-related technology applications from aircraft manufacturers and operators, as well as evaluate the safety aspects of changes in the airspace system proposed by the FAA's Air Traffic Organization (ATO).

The number of new technology applications will increase as NextGen is implemented. This will challenge the current Aviation Safety workforce to provide adequate evaluation and oversight of initiatives such as automatic dependent surveillance (ADS-B), data communications (Datacomm) and low visibility operations. 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. In March 2010, AVS published its Work Plan for NextGen. The work plan charts a course for AVS involvement during a period of significant change and lays out major deliverables AVS will contribute toward the successful implementation of NextGen. Consistent with the work plan, AVS is requesting an increase of 15 FTE to contribute to the successful integration of new technologies into the existing operational structure. A reduction in these positions will result in a delay in the approval and implementation of initiatives identified in the FAA NextGen Implementation Plan.

The Budget also requests resources for AVS to develop new procedures for evaluating Next Gen technologies. Adequate technical support is essential to ensuring that the appropriate safety considerations are reflected in AVS standards, guidelines for testing, evaluation and training, and the safety evaluation criteria. FAA requests funding for the development of adequate training materials to complete a hand-off of the transformational NextGen initiatives to the existing safety oversight workforce; access to specialized subject matter experts and testing facilities; and harmonization of international standards.

Flight Standards Safety Inspector Staffing:

In FY 2012, FAA requests an increase of $10.5 million and 45 FTEs to support the implementation or revision of flight procedures, operation methods, airmen qualifications and proficiency, aircraft maintenance, and maintenance aspects of continued airworthiness programs and Air Carrier Evaluation Program functions. In FY 2010, FAA implemented the Aviation Safety Staffing Tools and Reporting System. Our budget request is based on analysis from the staffing tool as well as our assessment of our ability to hire qualified candidates.

Aircraft Certification Safety Inspector Staffing:

FAA requests an increase of $1.44 million and eight FTEs to support surveillance and certification activities. These resources will conduct surveillance of existing production approval holders and designees and will be responsible for new type certifications, production and airworthiness certification activities in support of anticipated industry changes in demand for services. These inspectors will conduct conformity inspections of new designs, oversee the production of new aircraft and aircraft parts and perform activities pertaining to the original airworthiness certification of aircraft and aircraft parts.

AVS FY 2012 key initiatives include:

- Develop policies, procedures and approval processes to enable operation of unmanned aircraft systems.
- Develop, manage and coordinate Helicopter Emergency Medical Services 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 accident rate by focusing on flight standardization for certification, fleet characteristics and provide recommendations for revisions to training and operations guidance.
- Conduct certification and surveillance activities including production, airworthiness, air operator and air agency across the U.S.
- Provide certification, services 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 general aviation accident rate by focusing on certification, production and fleet characteristics of aircraft manufacturers
- Plan and implement 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 general aviation accident rate by focusing on medical certification and surveillance of airmen.
- Plan and implement continuity of operations including inspections, surveillance, and investigation and auditing activities.
- Provide overall planning, direction, management and evaluation of AVS programs.
- Direct and manage the implementation of an International Organization for Standardization (ISO) - 9001:2000 based QMS for all AVS services and offices to establish integration policy and process for safety systems.

2. What Is This Program?

AVS consists of seven distinct organizational elements employing slightly below 7,600 full time 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:

Flight Standards Service (AFS) promotes aviation safety and ensures compliance with the operations and maintenance safety standards and certification standards for air carriers, commercial operators, air agencies, airmen, and civil aircraft, including aircraft registration. Anticipated accomplishments include:

- Conduct/participate in the following: Pilot Seminars and Flight Instructor Refresher Courses, Commercial Flight Instructor/Designated Pilot Examiner refresher courses, at both towered and non-towered airports.
- Develop appropriate policy, procedural guidance, and aircraft certification programs for the emerging technologies needed to transition and operate in the NextGen environment.
- Validate the effectiveness of initiatives, interventions, and recommendations implemented by the general aviation loss of control workgroup and the amateur-built flight standardization board in FY 2011 to mitigate loss of control causes in general aviation.
- Implement the new safety standards required in Public Law HR 5900

Aircraft Certification Service (AIR) promotes aviation safety by developing and ensuring compliance with safety standards governing the design, production, and original airworthiness certification of aircraft, engines, propellers, appliances and noise level certification. Anticipated accomplishments include:

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

Office of Aerospace Medicine (AAM) promotes aviation safety through medical standards and certification for airmen (pilots and air traffic controllers) and compliance and enforcement of drug and alcohol programs for employees in safety-sensitive positions both in the aviation industry and FAA. Anticipated accomplishments include:

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

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

- Develop and implement a strategic plan to address the recommendations received from the Independent Review Team.
- Continue to implement a strategic plan to address the recommendations received from the Independent Review Team.
- Process 80 percent of exemption requests within 120 days.

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 safety management systems principles and sound safety data analysis and process sharing, incorporating future hazardous/emerging risk assessments affecting the entire air transportation system and industry. Anticipated accomplishments include:

- Lead ongoing agency effort to effectively address National Transportation Safety Board (NTSB) recommendations issued to the FAA.
- Collect safety data at a national level and consolidate the data under ASIAS.
- Conduct investigations of at least 85 percent of all General Aviation (GA) accidents and 90 percent of all fatal GA accidents.
- Assist China with the adoption of Commercial Aviation Safety Team enhancements to maintain China's safety performance during rapid growth of the aviation systems.

Air Traffic Safety Oversight Service (AOV) provides safety oversight of ATO, including oversight of safety management systems, new acquisitions, air traffic control procedures and operations, technical operations, and personnel certification criteria. Anticipated accomplishments include:

- Conduct risk-based audits at 50 Air Traffic Control Facilities.
- Conduct risk-based audits at 10 Technical Operations Air Traffic Organization Facilities.

Office of Quality, Integration, and Executive Services (AQS) provides overall planning, direction, management, and evaluation of AVS programs. This office also directs and manages the implementation of an ISO-9001:2000 based Quality Management System for all AVS services and offices and establishes integration policy and processes for safety systems. Anticipated accomplishments include:

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

AVS supports the DOT Strategic Plan's Safety Goal – specifically contributing toward the outcome of reduced 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 and AVP partner with other AVS organizations, FAA lines of business and other aviation agencies to assist with NextGen implementation. We also promote safety of flight of 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 works 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, monitor air traffic control procedures and operations, technical operations and facilities, personnel certification criteria, establishes standards and manages the credentialing of ATO safety personnel, including air traffic controllers and airway transportation specialists, executes approvals, acceptances, or updates of new ATO safety standards, waivers, or modifications and monitors 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 implementation of an ISO-9001:2000 based Quality Management System for all AVS services and offices and establishing integration policy and processes for safety systems.

3. Why Is This Particular Program Necessary?

AVS ensures that certificate holders meet the safety requirements, standards and regulations of their original certificate for U.S. air carriers and foreign air carriers operating in and over the U.S. We also provide certification of commercial, industrial, private and general aviation operations including rotorcraft.

As technology increases and anticipated operational changes within the NAS, AVS plays a critical in managing the agency's rulemaking process and the Aviation Rulemaking Advisory Committee, accident and incident investigation service and analysis of safety data, and process integration, information technology, human and financial resource management and organizational planning to the agency safety workforce.

NextGen is a wide ranging transformation of the entire national air transportation system - not just certain pieces of it - to meet future demands and avoid gridlock in the sky and in the airports. Within Aviation Safety, the Flight Standards and Aircraft Certification Services are responsible for setting, overseeing and enforcing safety standards for all parts of the aviation industry. The agency's strategic goal is to increase capacity to meet projected demand and reduce congestion. Our role in NextGen is to support the implementation through aviation safety standards and oversight of the aircraft operators.

AFS and AIR 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 AFS component of AVS Staffing Tool and Reporting System (ASTARS) became operational in FY 2010. The staffing request for FY 2012 is based on initial model results as well as an assessment of our ability to hire qualified candidates. Our strategic goal for inspector 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, general aviation operations and repair stations. The requested positions will provide support for additional oversight, audit and certification activities for FAR Parts 121, 135, and 145. The AIR component of ASTARS was also used partially to develop the staffing request for inspectors to support increased inspections of production manufactures.

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 following an accident, incident, or other unwished-for circumstances, while our successes often go unnoticed. AVS is moving from diagnostic to prognostic identification of risks factors that are casual 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 (commercial and general aviation,) as well as longer life expectancy of the current fleet has heightened public, Congressional and DOT-Office of Inspector General scrutiny regarding aviation safety concerns. The additional resources requested will assist in mitigating these concerns.

AVS programs continue to contribute to the unparalleled safety of American aviation. The commercial air carrier's 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?

As the number of aircraft flying in the NAS grows, and new aircraft models and technologies are introduced, it will be critically important for operators and controllers not only to know precisely where an aircraft is at any given moment, but also where it's going, how fast it's moving and how long it's going to take to reach its destination. NextGen satellite technologies will make this information available to both pilots and controllers, with levels of accuracy and precision unattainable by radar. Even though planes will be flying closer together, the precise information provided by NextGen will increase safety by allowing pilots to know exactly where their aircraft is located in relation to other aircraft throughout all phases of flight.

Without the implementation of requested resources, AVS will have to reduce critical safety staffing below the requirement level. The limitation of additional resources will prevent AVS from increasing services such as conducting certification, surveillance and oversight of air carriers, general aviation operations and repair stations.

Explanation of Funding Changes for Aviation Safety

	Dollars ($000)	FTE
Aviation Safety (Net Change from FY10 Enacted)	**$49,503**	**194**
Overview: For FY 2012, the Associate Administrator for Aviation Safety requests $1,283,568,000 and 7,405 FTEs to meet its respective mission. The FY 2012 request corresponds to an increase of $49,503,000 (4.0 percent) and an increase of 194 FTEs (2.7 percent) over the FY 2010 Enacted level. The FY 2012 request level reflects unavoidable adjustments and non-pay inflation; programmatic increases and two FAA base transfers.		
Unavoidable Adjustments		
Adjustments to Base This adjustment provides for unavoidable cost increases not funded in prior year budgets.	30,066	112
Non-Pay Inflation This increase is needed to provide for inflationary cost increases consistent with OMB guidance that uses the FY 2012 GDP price index (year over year) of 0.5 percent.	1,229	
One Less Compensatory Day This adjustment factors in one less compensable day in FY 2012.	-3,947	
Discretionary Increases		
Adjustments to Base This adjustment provides for discretionary cost increases not funded in prior year budgets.	4,000	14
AVS NextGen Technology /Advancement Aviation Safety will play an integral role in several NextGen initiatives, including efficient aircraft designs, revolutionary cockpits, data-link communications and new interactive instrumentation. AVS NextGen support is a critical element in FAA's goal of reducing the commercial accident rate. The Agency's use of Safety Management Systems is an integral part of the Joint Planning Development Office strategy to provide greater capacity and safety through implementation of NextGen. Flight Services, Aircraft Certification and Air Traffic Safety Oversight Services staff will play a role in FAA's NextGen initiative. As new products are introduced for use in advancing the technology, AVS will establish regulations and standards for the use of these products. Certification and safety oversight efforts will also be conducted	9,000	15

	Dollars ($000)	FTE
throughout the process. This request provides for 15 FTE, contract services and related resources to support AVS' efforts in support of NextGen.		
AFS Inspector Staffing The Flight Standards (AFS) inspector staffing request will support the implementation or revision of flight procedures, operation methods, airman qualifications and proficiency, aircraft maintenance, and maintenance aspects of continued airworthiness programs and Air Carrier Evaluation Program functions. This request provides for 45 FTE, contract services and related resources for the hiring of new AFS inspectors.	10,500	45
AIR Inspector Staffing The Aircraft Certification (AIR) inspector staffing request will support surveillance and certification activities within FAA Aircraft Certification Service. The resources will conduct surveillance of existing production approval holders and designees and will be responsible for new type, production, and airworthiness certification activities in support of an anticipated growing industry demand. These AVS/AIR safety inspectors will conduct conformity inspections of new designs, oversee the production of new aircraft and aircraft parts, and perform activities pertaining to the original airworthiness certification or aircraft and aircraft parts. This request provides for 8 FTE, contract services and related resources for the hiring of new AIR inspectors.	1,440	8
Cost Efficiencies		
Administrative Efficiencies: Aviation Safety (AVS) will achieve administrative efficiencies of $2,375,000 through cost reductions and avoidance in contractual services, supplies and travel. These cost efficiencies will be achieved by utilizing procurement vehicles that enable multiple tasks to be performed within a single contract, streamlining and standardizing the supply processes and monitoring travel costs.	-2,375	
Base Transfers		
Civil Rights/ Diversity: The Office of Civil Rights will transfer one FTE and $95,000 to Aviation Safety.	95	1
Audit and Evaluation The Air Traffic Organization and Aviation Safety will transfer FTEs and funds to the Office of the Chief Counsel to resource the Office of Audit	-505	-1

	Dollars ($000)	FTE
and Evaluation. The office was established in FY 2010. Functions previously performed in AVS now reside in this newly-created AGC division.		

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

Air Operator Certificates: 6,110
116 Major Air Carriers -- (e.g. United Airlines)
2,350 Commuter Air Carriers/On Demand Air Taxis
161 Commercial Operators (e.g. Baltimore Orioles)
454 Foreign Air Carriers (e.g. Lufthansa)
331 External Load (Logging/Oil Platform)
2,189 Agricultural Operators
509 Public Use Authorities (State/City/Police)

Air Agency Certificates: 5,803
554 Pilot Training Schools
4,957 Repair Stations
171 Maintenance Training Schools
121 Pilot Training Centers

Aircraft: 319,549
7,705 Air Carrier Aircraft
576 Commuter Air Carrier Aircraft
12,504 On Demand Air Taxi Aircraft
207,087 General Aviation Aircraft
91,677 Inactive Aircraft

Aviation Authorities - other countries
30 Bilateral Agreements
105 Foreign Carrier Aviation Authorities
188 Accident Investigation Authorities

Check Airmen: 7,592
5,590 Part 121
201 Parts 121/135
1,801 Part 135

Designees: 11,095
4,656 Aircraft Certification
1,444 Flight Standards
4,995 Aerospace Medicine

Mechanics with Inspection Authority: 20,458

Active Pilots: 747,775
149,951 ATP
139,766 Commercial
242,597 Private
260 Recreational
2,557 Sport
85,663 Student
126,981 Foreign Pilot

Non-Pilot Air Personnel: 721,400
368,548 Mechanics & repairmen
41,948 Control Tower Operator
154,440 Flight Attendant
74,997 ground instructors
81,847 other (dispatchers/flight navigators/ parachute riggers/flight engineers)

Flight Instructors: 93,612

Airmen Medical Examinations: 438,699
21,946 Special Issuances
416,753 Special Issuances

Approved Manufacturers: 1,647

Aviation Industry Entities Covered by Anti-Drug & Alcohol Programs: 7,200

National Transportation Safety Board
75 Safety Recommendations (5-year average)
30 Major Investigations (avg/yr)(new)

ATCS Medical Clearance Exams: 17,326
17,598 Air Traffic Controller Workforce
71 Flight Service Station Workforcce

Occupational/Employee Health Services
48,853 FAA Employees

Resource Summary
($ in Thousand)

		FY 2010 Actual	FY 2011 Annualized	FY 2012 Request
Flight Standards	PC&B	674,394	681,812	706,884
	O.O.	151,882	140,983	148,608
	Total	826,276	822,795	855,492
Aircraft Certification	PC&B	178,727	180,728	187,868
	O.O.	21,820	20,255	21,665
	Total	200,547	200,983	209,533
Aerospace Medicine	PC&B	41,856	42,275	43,635
	O.O.	12,419	11,499	11,743
	Total	54,275	53,774	55,378
Rulemaking	PC&B	3,907	3,946	4,122
	O.O.	2,112	1,961	2,026
	Total	6,019	5,907	6,148
Air Traffic Safety Oversight	PC&B	18,229	18,502	20,584
	O.O.	6,276	5,826	6,286
	Total	24,505	24,328	26,870
Accident Investigation and Prevention Service	PC&B	9,050	10,395	10,675
	O.O.	7,642	9,583	10,083
	Total	16,692	19,978	20,758
Quality, Integration, and Executive Services	PC&B	34,403	34,754	35,687
	O.O.	77,044	71,546	73,702
	Total	111,447	106,300	109,389
Total, Aviation Safety	PC&B	960,566	972,412	1,009,456
	O.O.	279,195	261,653	274,112
	Total	1,239,761	1,234,065	1,283,568

Safety Critical / Operational Support Staffing (End-of-Year Employment - FTP)

	FY 2010 Actual	FY 2011 Annualized	FY 2012 Request
Flight Standards			
Engineers	11	8	12
Aviation Safety Inspectors	4,112	4,082	4,162
Safety Technical Specialist	461	446	458
Operational Support	706	684	700
Total	5,290	5,220	5,332
Aircraft Certification			
Manufacturing Safety Inspectors	248	248	268
Pilots, Engineers, and CSTAs	727	728	738
Safety Technical Specialist	169	169	171
Operational Support	154	155	158
Total	1,298	1,300	1,335
Aerospace Medicine			
Physicians, Physician Assistants, Nurses	57	55	56
Alcohol/Drug Abatement Inspectors	65	68	68
Safety Technical Specialist	214	207	210
Operational Support	38	39	40
Total	374	369	374
Air Traffic Safety Oversight			
AOV Safety Inspectors	0	0	0
Air Traffic Controllers	60	58	63
Safety Technical Specialist	65	68	85
Operational Support	6	7	9
Total	131	133	157
Rulemaking			
Safety Technical Specialist	30	32	33
Operational Support	3	3	3
Total	33	35	36
Accident Investigation and Prevention Service			
Air Safety Inspectors	10	10	10
Safety Technical Specialist	48	48	48
Operational Support	10	9	10
Total	68	67	68
Quality, Integration, and Executive Services			
Safety Critical Staff	130	120	120
Operational Support	149	159	159
Total	279	279	279
Totals			
Safety Critical Staff	6,407	6,347	6,502
Operational Support	1,066	1,056	1,079
Total	7,473	7,403	7,581

Staffing Information

Direct FTEs	FY 2010 Actual	FY 2011 Annualized	FY 2012 Request
Flight Standards	5,083	5,083	5,216
Aircraft Certification	1,273	1,273	1,308
Aerospace Medicine	363	363	370
Rulemaking	33	33	35
Air Traffic Safety Oversight	127	127	139
Accident Investigation and Prevention	62	62	66
Quality, Integration, and Executive Services	270	270	272
Total	7,211	7,211	7,405

End-of-Year Employment (FTP)	FY 2010 Actual	FY 2011 Annualized	FY 2012 Request
Flight Standards	5,290	5220	5,332
Aircraft Certification	1,298	1300	1,335
Aerospace Medicine	374	369	374
Rulemaking	33	35	36
Air Traffic Safety Oversight	131	133	157
Accident Investigation and Prevention	68	67	68
Quality, Integration, and Executive Services	279	279	279
Total	7,473	7,403	7,581

Workload Indicators

Flight Standards

Workload	FY 2010 Actual	FY 2011 Estimate	FY 2012 Estimate
Airmen Certification Activities	170,931	204,933	184,532
Operator Certification/Certificate Management Activities	92,833	92,826	90,581
Investigation Activities	35,821	40,643	43,535
Non-ATOS Air Operator/Air Agency Surveillance Activities*	210,833	117,684	101,867
ATOS Operator Surveillance Activities	84,173	123,950	137,447
Enforcement Investigation Activities	11,598	14,644	16,055
Education & Safety	5,030	10,760	10,650
Aircraft Registration Examinations	132,185	207,497	236,117
Airmen Certification Examinations	380,215	335,744	345,816

Percent Change	FY09 - FY10 Actual	FY10 - FY11 Estimate	FY11 - FY12 Estimate
Airmen Certification Activities	1.7%	-4.7%	-10.0%
Operator Certification/Certificate Management Activities	4.0%	0.0%	-2.4%
Investigation Activities	0.7%	4.2%	7.1%
Non-ATOS Air Operator/Air Agency Surveillance Activities*	-32.2%	-24.0%	-13.4%
ATOS Operator Surveillance Activities	26.0%	17.3%	10.9%
Enforcement Investigation Activities	1.3%	6.5%	9.6%
Education & Safety	-14.4%	-3.1%	-1.0%
Aircraft Registration Examinations	1.6%	18.8%	13.8%
Airmen Certification Examinations	3.5%	3.0%	3.0%

* Includes other than Part 121 carriers

Aircraft Certification

Workload	FY 2010 Actual	FY 2011 Estimate	FY 2012 Estimate
TC/STCs Issued	1,000	1,000	1,020
Other Design Approvals Issued	3,066	3,066	3,106
Production Approvals Issued	65	65	65
Airworthiness Directives Issued	350	350	355
Certificate Management Audits	2,337	2,337	2,378

Percent Change	FY09 - FY10 Actual	FY10 - FY11 Estimate	FY11 - FY12 Estimate
TC/STCs Issued	-16.2%	0.0%	2.0%
Other Design Approvals Issued	-11.4%	0.0%	1.3%
Production Approvals Issued	-36.3%	0.0%	0.0%
Airworthiness Directives Issued	7.7%	0.0%	1.4%
Certificate Management Audits	-18.8%	0.0%	1.8%

Workload Indicators (cont.)

Aerospace Medicine

Workload	FY 2010 Actual	FY 2011 Estimate	FY 2012 Estimate
Applications Processed/Received	400,000	410,000	420,000
DWI/NDR Applications Processed	17,415	17,589	17,589
Number of AMEs	4,000	4,027	4,027
Anti-Drug and Alcohol Registrations Completed	355	360	360
Anti-Drug and Alcohol MIS Annual Reports	3,000	3,300	3,600
Compliance and Enforcement Inspections	1,617	1,500	1,500
Number of Drug Tests	11,000	11,027	11,027
Number of Alcohol Tests	2,418	2,791	2,791

Percent Change	FY09 - FY10 Actual	FY10 - FY11 Estimate	FY11 - FY12 Estimate
Applications Processed/Received	0.0%	2.5%	2.4%
DWI/NDR Applications Processed	1.0%	1.0%	0.0%
Number of AMEs	1.2%	0.7%	0.0%
Anti-Drug and Alcohol Registrations Completed	31.5%	1.4%	0.0%
Anti-Drug and Alcohol MIS Annual Reports	28.2%	10.0%	9.1%
Compliance and Enforcement Inspections	-21.1%	-7.2%	0.0%
Number of Drug Tests	-12.2%	0.2%	0.0%
Number of Alcohol Tests	3.0%	15.4%	0.0%

Accident Investigation and Prevention

Workload	FY 2010 Actual	FY 2011 Estimate	FY 2012 Estimate
NTSB Recommendations Received	130	157	172
Accidents/Incidents Investigated	48	50	55
Follow-Up Investigations	221	225	230
Special Accidents/Incidents Investigations	310	315	320
NTSB Hearings Participated In	3	4	4
FAA Recommendations Received	371	375	379
NTSB Requests Received	348	400	450

Percent Change	FY09 - FY10 Actual	FY10 - FY11 Estimate	FY11 - FY12 Estimate
NTSB Recommendations Received	34.0%	9.0%	10.0%
Accidents/Incidents Investigated	71.4%	4.2%	10.0%
Follow-Up Investigations	31.5%	1.8%	2.2%
Special Accidents/Incidents Investigations	184.4%	1.6%	1.6%
NTSB Hearings Participated In	-25.0%	33.3%	0.0%
FAA Recommendations Received	-8.2%	1.1%	1.1%
NTSB Requests Received	167.7%	14.9%	12.5%

Workload Indicators (cont.)

Rulemaking

Workload	FY 2010 Actual	FY 2011 Estimate	FY 2012 Estimate
Exemptions	374	400	420
Petitions for Rulemaking	20	20	20
Rulemaking Projects	32	30	30
Aviation Rulemaking Advisory Committee:			
Tasks	3	2	2
Recommendations	2	2	2

Percent Change	FY09 - FY10 Actual	FY10 - FY11 Estimate	FY11 - FY12 Estimate
Exemptions	1.9%	7.0%	5.0%
Petitions for Rulemaking	-4.8%	0.0%	0.0%
Rulemaking Projects	-5.9%	-6.3%	0.0%
Aviation Rulemaking Advisory Committee:			
Tasks	50.0%	-33.3%	0.0%
Recommendations	-33.3%	0.0%	0.0%

Air Traffic Safety Oversight

Workload	FY 2010 Actual	FY 2011 Estimate	FY 2012 Estimate
Safety Analysis and Audits	122,598	153,400	168,500
Safety Incident Investigations	12,569	12,569	12,569
Air Traffic Change Approvals	17,598	17,598	10,400
Safety Report Reviews	18,295	18,295	24,599
Airmen Credentialing/Examination	27,899	27,899	27,899
Education and Safety	76,521	46,985	52,500

Percent Change	FY09 - FY10 Actual	FY10 - FY11 Estimate	FY11 - FY12 Estimate
Safety Analysis and Audits	27.8%	7.0%	7.0%
Safety Incident Investigations	0.3%	457.2%	0.0%
Air Traffic Change Approvals	0.5%	-41.9%	0.0%
Safety Report Reviews	1.7%	-21.3%	0.0%
Airmen Credentialing/Examination	0.6%	-33.1%	0.0%
Education and Safety	-27.0%	-75.1%	0.0%

OPERATIONS APPROPRIATION

Commercial Space Transportation (AST)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**15,237**	**72**	**1**	**71**
Unavoidable Adjustments				
1. Adjustments to Base	164			
2. Non-Pay Inflation	25			
3. One Less Compensatory Day	-41			
Total Unavoidable Adjustments	**148**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**0**	**0**	**0**	**0**
Discretionary Increases				
1. Adjustments to Base	5,000	50		25
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	1,250	14		7
6. Space Incentives	5,000			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**11,250**	**64**	**0**	**32**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-10			
Total Base Transfers	**-10**	**0**	**0**	**0**
FY 2012 Request	**26,625**	**136**	**1**	**103**

Executive Summary: Commercial Space Transportation (AST)

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

The request of $26.63 million and 103 FTE allows AST to ensure protection of public, property, and the national security and foreign policy interest of the United States during commercial space launch or entry activities and to encourage, facilitate and promote U.S. commercial space transportation. The request includes base funding of $15.4 million plus programmatic increases of $11.23 million and 32 FTE to develop and implement additional safety processes and requirements specifically for commercial human spaceflight and space traffic management as well as incentivize advancements in low-cost access to space. Key outputs of the request include a projected 6 license and permit applications, 40 launch or reentry operations inspections, 8 launch site inspections, 5 environmental assessments, plus new rulemaking products and the Center of Excellence for Commercial Space Transportation.

2. What Is The Program?

AST regulates commercial space launch and reentry operations. Safety is our top priority, and includes 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. AST also 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. The publication of the new National Space Policy signals an even greater role for the commercial space industry in America's overall space strategy and space traffic management and AST's activities support the 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 204 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*). This expansion will directly affect the AST regulatory safety role. The 2012 Budget request supports AST's growing responsibilities. In addition, the 2012 Budget request supports the Presidential Task Force on Space Industry Workforce and Economic Development's recommendation that FAA establish a Commercial Spaceflight Technical Center. The Technical Center will provide safety and technical support for future commercial space launch activities and support the continued development of standards and regulations for commercial spaceflight. Due to a projected increase in commercial space transportation launches, AST funding will be used to conduct appropriate research and develop necessary regulations related to commercial human spaceflight to ensure public safety.

Detailed Justification for – Commercial Space Transportation

What Do I Need To Know Before Reading This Justification?

NASA will retire the Space Shuttle in 2011. This shifts responsibility for the International Space Station (ISS) cargo delivery from NASA shuttles to the commercial space launches sponsored by NASA, and thus into the AST licensing regime. 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 2012 – Commercial Space Transportation
($000)

Program / Component	FY 2010 Actual	FY 2012 Request	Change FY 2010- FY 2012
Commercial Space Transportation (AST)	15,237	26,625	11,388
Total	**$15,237**	**$26,625**	**$11,388**

FAA's Commercial Space Transportation Program requests $26,625,000 and 103 FTE for FY 2012. This is an increase of $11.4 million and 32 FTE over the FY 2010 enacted level. The request includes base funding of $15.4 million plus programmatic increases of $11.23 million and 32 FTE to develop and implement safety requirements for commercial human spaceflight and foster development of low-cost space launches. This funding will allow AST to ensure the protection of the public, property, and the national security and foreign policy interest of the United States during commercial space launch or reentry activities and to encourage, facilitate and promote U.S. commercial space transportation.

On August 15, 2010, the Presidential Task Force on Space Industry Workforce and Economic Development recommended that the FAA establish a Commercial Spaceflight Technical Center at the NASA Kennedy Space Center in Florida. The Technical Center will provide safety and technical support for future commercial space launch activities and support the continued development of safety processes, standards, and regulations for commercial spaceflight. Our FY 2012 request allows us to hire 50 personnel (25 FTE) for the Technical Center in FY 2012 with the remaining 25 FTE annualized in FY 2013.

In addition, $5 million is requested to establish a program for incentivizing advancements in space transportation by non-governmental organizations. The Low Cost Access to Space Incentive would provide a $5 million award designed to jump-start the creation of an entirely new market segment, with immediate benefits to private industry, NASA, the Department of Defense, and academia. Consistent with the America COMPETES Reauthorization Act of 2010, FAA shall consult widely both within and outside the Federal Government, in defining the scope and criteria for the competition. This program also supports the President's Directive for "agencies to increase their ability to promote and harness innovation by using policy tools such as prizes and challenges." (M-10-11, Guidance on the Use of Challenges and Prizes to Promote Open Government, March 8, 2010)

The FY 2012 budget request provides for the licensing and regulatory oversight of commercial space transportation operations. We expect to complete evaluations for 6 license and permit applications, 40 launch and reentry operations inspections, 8 launch site inspections, 5 environmental assessments, and the development of new rulemaking products related to commercial human spaceflight activities.

The requested funding will enable AST to make determinations for both new licenses and for license renewals. All launches and reentries by U.S. citizens except those "by and for the U.S. Government" require a license from the 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 license modifications.

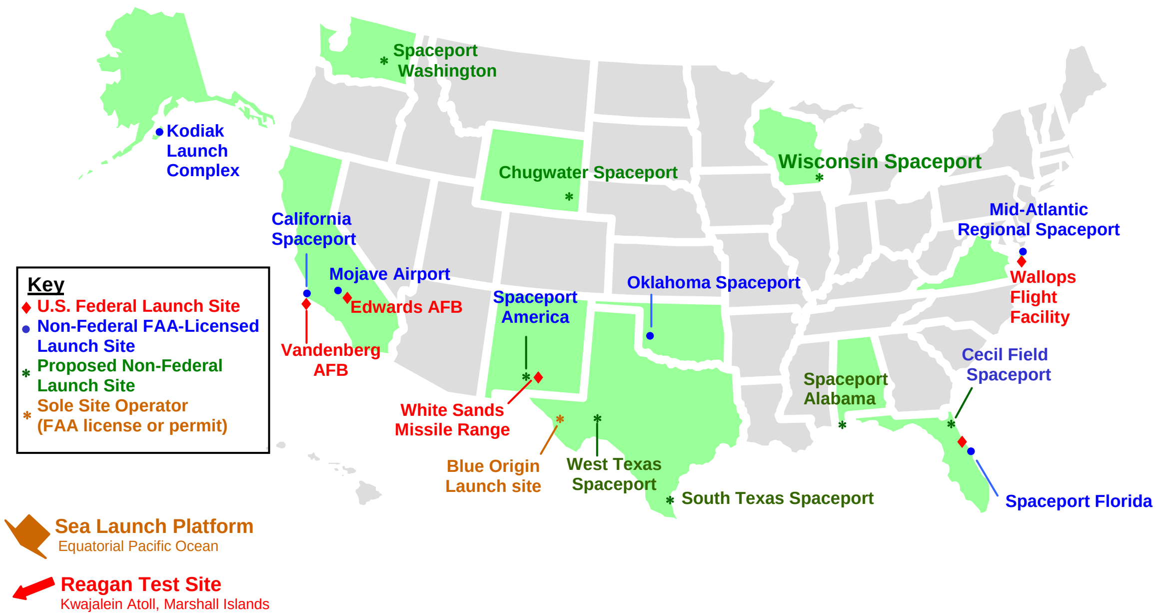
The request also allows us to continue collaborating with DoD and NASA through the Common Standards Working Group to maintain common launch safety requirements at Air Force launch sites and to aid DoD's understanding of commercial space entrepreneurial capabilities and potential to fulfill military requirements. Since 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. 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 FY 2012 request includes programmatic increases of staffing and research and development for regulatory oversight, and grants for industry support. This includes $1.25 million for 7 FTE for development and implementation of safety requirements and human factors for HSF to support the development of commercial crew transportation systems and missions. This effort will require conducting research and the development of 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 desire 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. Starting in 2012, however, FAA will be allowed to issue regulations to ensure the safety of spaceflight participants and crew members. It is critical that we focus our research on HSF now in order to be prepared to promote the continuous improvement of the safety of launch vehicles designed to carry humans just at the time when the public comes to expect greater safety for crew and spaceflight participants from the industry.

SAFETY – FY 2012 Key Outputs and Outcomes

- Continue working with other government agencies in the development of space traffic management concepts for the protection of public and national security space-based assets, directly supporting activities defined in the National Space Policy of the United States of America, June 28, 2010.
- Execute the licensing process for reusable launch vehicles that will carry people on suborbital trajectories.
- Process a renewal application for Atlas V launches from Cape Canaveral Air Force Station and launch site operations at Mid-Atlantic Regional Spaceport (MARS).
- Inspect and monitor licensed operations to ensure license holder compliance with license terms and conditions during licensed launch and reentry operations.
- Make experimental permit determinations within 120 days of receiving an acceptable permit application, to make license determinations within 180 days of receiving an acceptable permit application, and safety approval determinations within 180 days of receiving a complete application.
- Develop safety 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 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 2012 Key Outputs and Outcomes

- Execute 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 (EFP) U.S. commercial space transportation. Safety is our highest priority. The new National Space Policy and current NASA direction reflect a greater reliance by the Federal Government on commercial space industry to accomplish national objectives.

SAFETY: Our safety activities include conducting inspections, granting licenses and experimental permits, developing and issuing regulations, issuing safety approvals, accident investigation and prevention, and supporting federal range operations and space traffic management. These activities directly support the DOT Safety goal.

AST has an outstanding safety record. Since 1989, we have licensed 202 commercial launches without any loss of life, serious injuries, or significant property damage to the general public. We conduct safety inspections to ensure that licensees and permittees are adhering to the 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.

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 safety inspectors are credentialed and carry these AST safety inspector 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 (FTS) installation and checkout, investigate accidents, 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 and directly links to the DOT safety goal. 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 FY 2012 request reflects the addition of crew and passenger safety to our regulatory activities. The Commercial Space Launch Amendments Act of 2004 gave FAA the specific responsibility of regulating commercial human spaceflight, but prohibits FAA from regulating crew and passenger safety before December 23, 2012.

AST is also responsible for licensing the operation of launch sites or "spaceports." Since 1996 we have licensed the operation of the California Spaceport at Vandenberg Air Force Base; Spaceport Florida at Cape Canaveral Air Force Station; the Mid-Atlantic Regional Spaceport at Wallops Flight Facility in Virginia; Mojave Air and Space Port in California; Kodiak Launch Complex on Kodiak Island, Alaska; the Oklahoma Spaceport in Burns Flat, Oklahoma; Spaceport America near Las Cruces, New Mexico; and in January 2010, Cecil Field in Jacksonville, Florida.

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.
A Center of Excellence for Commercial Space Transportation (COE-CST) was established in 2010. The goal of this endeavor is to create a cost sharing partnership of academia, industry, and government that will focus on research areas of primary interest to the 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.), the private sector, and academic institutions to create a world class consortium that will foster research leading to the development of effective polices, procedures, and supporting technologies for the advancement of safe, efficient commercial space transportation in accordance with national policies and Congressional direction. The AST expects the COE-CST to perform basic and applied research through a variety of analyses, development, and prototyping activities.

Our Commercial Space Transportation Advisory Committee (COMSTAC) provides guidance in identifying and determining R&D projects that will help us keep pace with emerging space industry developments so that we can appropriately regulate and support the industry. We publish an Industry Developments and Concepts Report, a comprehensive Commercial Space Transportation Forecast (Low Earth Orbit, Non-Geosynchronous, and Geosynchronous Launches), and quarterly launch reports to provide information about significant changes in commercial space transportation. We also maintain the STAR database, considered the "gold standard" for commercial space transportation information.

COMMERCIAL SPACEFLIGHT TECHNICAL CENTER: On August 15, 2010, the Presidential Task Force on Space Industry Workforce and Economic Development's recommended that FAA establish a Commercial Spaceflight Technical Center at the NASA Kennedy Space Center in Florida. The main purpose of the Technical Center will be to develop safety processes and requirements related to commercial human spaceflight (HSF), along with related research necessary to support HSF regulations and requirements. Primary focus areas at the Technical Center include Spaceflight Safety, Spaceflight Engineering and Standards, and Space Traffic Management. Specific regulatory research projects include explosive siting, trajectory dispersion methodology for piloted Reusable Launch Vehicles and the potential application of GPS and ADS-B to space transportation technologies.

PARTNERS AND STAKEHOLDERS: 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 (NTSB), Academia (via COE-CST), plus industry, and state/local governments (via COE-CST and Spaceport grants).

Anticipated accomplishments for Commercial Space Transportation include:

- Complete evaluations for renewals of four launch operator licenses and two launch site operator's licenses.
- Make determinations on two launch operator licenses and two reentry operator's licenses to support NASA's Commercial Orbital Transportation Services Contract. In addition, at least two other companies have informed AST that they plan to apply for launch licenses.
- Execute the initial projects awarded under the Space Transportation Infrastructure Matching Grants (STIM) program in FY 2010.
- Establish the FAA Commercial Spaceflight Technical Center at the NASA Kennedy Space Center in Florida to provide safety and technical support for future commercial space launch activities.
- Issue experimental permits to Scaled Composites, Blue Origin, Masten Space Systems, and Armadillo Aerospace to conduct research and development launches.
- Continue Rulemaking efforts onpart 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?

We are currently on the threshold of a new era in space transportation: commercial human spaceflight, and specifically, suborbital space tourism. 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 know that not all of the companies engaged in this effort will be successful. Some will encounter technical difficulties. Others will have financial challenges. But AST is already seeing both 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. Utilization of 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. And finally, President Obama recognized the inherent value of commercial space transportation in his submission of the FY 2011 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 about to undergo a very significant change. With the retirement of the Space Shuttle, NASA will be relying on private industry to launch cargo and supplies, and eventually astronauts, to the International Space Station. Since those missions will involve commercial launches, the FAA will be responsible for granting the necessary licenses. This will be a challenging new responsibility, but we look forward to working with our NASA partners 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 204 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 new 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 spaceport in six states within the congressional timelines in every instance upon receipt of a complete application.
- Passed every internal and external audit of it Environmental Management System.
- Implemented a new, 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. These include:
    - Identification of faulty electro-explosive devices employed in the Flight Termination System safe and arm ordnance for the Atlas V, Delta IV, and Falcon 9 launch vehicles.

  - Verification of inadequate acceptance and qualification testing of Falcon 9 launch vehicle flight termination hardware.

- Awarded in FY 2010 the first-ever Congressionally-created Safety Approval to NASTAR a commercial spaceflight training facility.
- 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 its 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 eliminating essential support services related to environmental compliance, air traffic integration, and future regulatory development authority. Deeper cuts would necessitate terminating essential research as well. These would, in turn, prevent timely implementation of adoption of commercial space transportation support to NASA and other federal government agencies' missions. They would also delay implementation of the President's vision for commercial space transportation under the current legal and regulatory framework.

All commercial space transportation activities rely on FAA's licensing and permitting for safety oversight; and 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 for Commercial Space Transportation (AST)

	Dollars ($000)	FTE
Commercial Space Transportation (Net Change from FY 2010 Enacted)	$11,388	32
Overview: For FY 2012, the Associate Administrator for Commercial Space Transportation requires $26,625,000 and 103 FTEs 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 2012 request corresponds to an increase of $11,388,000 and an increase of 32 FTEs over the FY 2010 Enacted level. The FY 2012 request level reflects an increase for a national space program, unavoidable adjustments and non-pay inflation, as well as two other discretionary increases for the development of safety requirements for commercial human space flight and to establish a Low-Cost Access to Space Incentive program that would challenge industry to develop and demonstrate a low-cost launch vehicle.		
Unavoidable Adjustments		
Adjustments to Base This adjustment provides for unavoidable cost increases not funded in prior year budgets.	164	0
Non-Pay Inflation: This increase is needed to provide for inflationary cost increases consistent with OMB guidance that uses the FY 2012 GDP price index (year over year) of 0.5 percent.	25	0
One Less Compensatory Day This adjustment factors in one less compensable day in FY 2012.	-41	0
Discretionary Increases		
Adjustments to Base This adjustment provides for uncontrollable cost increases not funded in prior year budgets.	5,000	25
Development and Implementation of Safety Requirements for Commercial Human Space Flight. The FY 2012 request includes programmatic increases of staffing and research and development for regulatory oversight, and grants for industry support. This includes $1.25 million for 7 FTE for development and implementation of safety requirements and human factors for HSF	1,250	7

	Dollars ($000)	FTE
to support the development of commercial crew transportation systems and missions. This effort will require conducting research and the development of 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).		
Space Incentives The requested funding is to establish a program for incentivizing advancements in space transportation by non-government organizations. This Low-Cost Access to Space Incentive program would challenge industry to develop and demonstrate technologies that meet specific criteria defined in consultation with the relevant stakeholders.	5,000	0
Base Transfers		
Degree Completion Program The Associate Administrator for Commercial Space will transfer $10,000 to the Assistant Administrator for Human Resource Management for the Degree Completion program The FAA Learning and Development Council (L&D Council), chaired by the Chief Learning Officer with executive participation from across the FAA, conducted a study of policy, procedure, and funding options for tuition assistance in the FAA. As a result of the study, the decision was made to develop and implement a corporate approach to tuition assistance and degree completion that is phased in gradually. This phased approach will enable strategic development of initiatives that support employee performance of the FAA Mission and Vision, including NextGen success.	-10,000	0

Resource Summary

AST

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	9,889	10,709	97	4,975	15,781
Other Objects					
Contracts	3,852	3,908	44	6,265	10,217
Travel/Transportation	529	480	2	-	482
Other Services[2]	804	140	5	-	145
Total	5,185	4,528	51	6,265	10,844
Total	**15,074**	**15,237**	**148**	**11,240**	**26,625**
Staffing					
EOY (FTP)	72	72	-	64	136
OTFTP	1	1	-	-	1
Total FTEs (Includes FTP and OTFTP)	66	71	-	32	103

[1] FY 2010 derived from actual obligations.
[2] Rents, Communications, Utilities, Printing & Reproduction Services, Supplies & Materials, Equipment, Land & Structures, and Insurance Claims & Indemnities.

OPERATIONS APPROPRIATION

Staff Offices
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**801,427**	**2,728**	**87**	**2,795**
Unavoidable Adjustments				
1. Adjustments to Base	5,536	0	0	-15
2. Non-Pay Inflation	2,174	0	0	0
3. One Less Compensatory Day	-1,452	0	0	0
Total Unavoidable Adjustments	**6,258**	**0**	**0**	**-15**
Uncontrollable Adjustments				
1. Adjustments to Base	-5,000	0	0	0
2. NATCA Collective Bargaining Agreement	0	0	0	0
3. NAS Handoff Requirement	0	0	0	0
4. GSA Rent/DHS Security	9,900	0	0	0
5. AVS/ASH Leases	2,000	0	0	0
6. Working Capital Increase	3,833	0	0	0
7. Increased payment to Bureau of Transportation Statistics	0	0	0	0
8. Capital Security Cost Sharing Program (CSCSP)	310	0	0	0
9. Workforce Attrition	0	0	0	0
10. Technical Adjustments for Staffing	0	11	0	11
Total Uncontrollable Adjustments	**11,043**	**11**	**0**	**11**
Discretionary Increases				
1. Adjustments to Base	32,041	113	115	56
2. AVS NextGen Technology/Advancement	0	0	0	0
3. AFS Inspector Staffing	0	0	0	0
4. AIR Inspector Staffing	0	0	0	0
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0	0	0	0
6. Space Incentives	0	0	0	0
7. Oracle 12i Delphi Conversion	5,000	0	0	0
8. Cyber Security Management Center (CSMC)	4,000	4	0	2
9. Emergency Operations, Communications, Intelligence Watch and Investigations	5,600	26	0	13
Total Discretionary Increases	**46,641**	**143**	**115**	**71**
Cost Efficiencies				
1. Adjustments to Base	0	0	0	0
2. Flight Services Contract Savings	0	0	0	0
3. Real Property Savings	0	0	0	0
4. Administrative Efficiencies	0	0	0	0
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	267	3	0	3
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0	0	0	0
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0	0	0	0
4. Mailing and Printing (1 EOY/ 1 FTE)	0	0	0	0
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	-95	-1	0	-1
6. Graphics Program (1 EOY / 1 FTE)	0	0	0	0
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	1,300	4	0	4
8. IT Support (1 EOY/ 1 FTE)	0	0	0	0
9. NAS Support (2 EOY/ 2 FTE)	-378	-2	0	-2
10. Degree Completion Program (0 EOY/0 FTE)	200	0	0	0
Total Base Transfers	**1,294**	**4**	**0**	**4**
FY 2012 Request	**866,663**	**2,886**	**202**	**2,866**

Executive Summary: Staff Offices

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

The request of $866,663,000 and 2,866 FTEs allows FAA Staff Offices to provide executive leadership, policy and planning, legal counsel, financial services, human resource management, information systems and personnel security services, facilities management, and other administrative services in support of FAA's mission. The request includes base funding of $820.1 million plus programmatic increases of $46.6 million and 15 FTEs to provide a greater level of support to the entire agency. Key outputs of the request include, cyber security, conversion to Oracle 12i, a financial system upgrade and increased personnel security capacity.

2. What Is The Program?

The Staff Offices of FAA include the Office of the Administrator, Chief Counsel and nine assistant administrators. They provide mission support services to the four lines of business, including legal counsel, personnel management, economic trend analysis, financial resource management, IT system security, diversity leadership, government and industry liaisons, communications and public relations.

3. Why Is This Particular Program Necessary?

Staff Offices provide services and resources necessary for the operations of our business. Without these services, lines of business would not have the resources needed to meet their goals. From hiring personnel to performing mission-critical services, receiving guidance and counsel on regulatory or legal issues, or managing annual appropriations, Staff Offices make a significant contribution to the mission of FAA.

4. How Do You Know The Program Works?

Through the leadership of the Administrator, FAA successfully manages the most complex and safest aviation system in the world. FAA has the staff to conduct its mission. We have no violations of laws or regulations while carrying out the mission. We are in sound financial condition, exhibited by consecutive years of unqualified opinions of our audited financial statements. Staff offices are responsible for these achievements.

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. An under-resourced human resources office impedes our ability to hire personnel. An inadequately funded IT organization puts NAS systems and data at risk. Without the request level of funding for facility management, we cannot meet space requirements for our mission-critical staff on the regions. Our request is the funding level we need to support the lines of business.

OPERATIONS APPROPRIATION

Financial Services (ABA)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**113,681**	**162**	**0**	**162**
Unavoidable Adjustments				
1. Adjustments to Base	650			
2. Non-Pay Inflation	467			
3. One Less Compensatory Day	-79			
Total Unavoidable Adjustments	**1,038**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0	5		5
Total Uncontrollable Adjustments	**0**	**5**	**0**	**5**
Discretionary Increases				
1. Adjustments to Base	0			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	5,000			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**5,000**	**0**	**0**	**0**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	-7,162	-1		-1
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	-178	-1		-1
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-10			
Total Base Transfers	**-7,350**	**-2**	**0**	**-2**
FY 2012 Request	**112,369**	**165**	**0**	**165**

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 implementing a DOT standardized accounting code structure and business process transformation activities. The upgrade of the core accounting system must operate on a currently supported platform of Oracle software.
- The re-implementation means that numerous interfacing systems will also need to be re-engineered. In addition, over 5,000 users must receive training in the use of a significantly expanded accounting code 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 2012 – Financial Services
($000)**

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010- FY 2012
Financial Services	$113,681	$112,369	-$1,312
Total	**$113,681**	**$112,369**	**-$1,312**

The FY 2012 budget request of $112,369,000 and 165 FTEs (increase of three FTE) will support the ABA program. This is a decrease of $1,312,000 (-1.1 percent) over the FY 2010 enacted level. 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. This reflects a base transfer of $7,162,000 and one FTE of the Mail and Printing program to Regions and Center Operations, $178,000 base transfer and one FTE for information technology operational support services, a $10,000 base transfer to the Human Resource office for the Degree Completion program. This request also includes a $5,000,000 increase for Oracle 12i updates as well as modifications to FAA systems and processes to accommodate required system changes that result from the Oracle upgrade. The increase will cover the FY 2012 activities and acquisitions necessary to support the BTT/Oracle 12i financial transformation activities.

Our FY 2012 key outputs and outcomes include:

- Continue to improve and simplify business processes.
- Obtain a clean audit opinion.
- 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.

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 (ABU) 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. ABA ensures that budget needs are well justified and explained and manages Congressional activities with the appropriation committee/subcommittee including programmatic briefings, hearing, reports 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 agreement program. This includes issuing guidelines for spending, lines of business/staff office allowances, tracking obligations versus allowances throughout the year, as well as preparing and coordinating with external authorities about 50 apportionment requests and approximately 1400 reimbursable agreements annually for all FAA organizations. ABU issues and maintains funds control policy, systems and processes for all budgetary activities, proposed and enacted legislation, OMB circulars and appropriation law.

The overall financial management 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. ABA 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, ABA 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.

AFC provides all financial analyses required by the Administrator and prepares economic analyses of planned IT spending to support any approval decisions of the IT Executive Board. This office also reviews all contracts above $10 million to ensure that cost estimates are reasonable, contract types are justified and contracts are competitively bid. ABA 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, cell phone contracts, etc. We also oversee billing and collection of over $65 million in annual overflight charges and the annual Federal Activities Inventory Reform Act submissions for the agency.

Our Information Systems and Technology 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.

Key activities expected to be achieved:

- Continue to improve DELPHI enhancements to budget execution to better track about 10,000 capital project authorizations.
- Obtain an unqualified audit opinion on agency financial statements with no material weaknesses.
- 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 OMB's December 8, 2009 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 transparent and detailed reporting to the public required on numerous fronts including: OMB Circular A-123, Executive Order 13520 "Reducing Improper Payments and Eliminating Waste in Federal Programs", and reporting to the public activities related to the American Recovery and Reinvestment Act of 2009 and the Federal Funding Accountability and Transparency Act of 2006.
- Implement FAA's proposal to update Overflight Fee collections based on more recent cost accounting data.
- Present effective budget requests and conduct effective program oversightEnsure that the 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 $200 million in reimbursable work.

3. Why Is This Particular Program Necessary?

ABA leads the agency's efforts to achieve the Cost Control Program and Clean Audit 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 that we are able to 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. As part of the upgrade, DOT has determined it is necessary to implement a standardized account code structure. This supports the Administration's initiative for transparent government that supplies better services to its citizens. The implementation of a standardized account structure will require FAA to re-engineer its mixed financial and program management reporting systems to continue to support the financial and program management needs of the agency. As a result of the core accounting system upgrade, we must train over 5,000 users on the standardized accounting code 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 accounting code structure to ensure that our managers and employees are able to use and interpret timely and accurate financial data to make program management decisions.

We are a major component supporting FAA and DOT's goal of enhanced cyber security and privacy and improved governance of IT resources. 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.

4. How Do You Know The Program Works?

In recent years, FAA has implemented oversight of proposed acquisitions 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, CAS, and the 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 2009 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 that the American people can understand how we are using our tax dollars to serve them. The recently awarded CEAR marks the sixth time that we have received this award.
- We have received unqualified opinions on our consolidated financial statements since FY 2007. That we received a qualified opinion in FY 2006 following five years of unqualified opinions, was a pointed reminder that financial processes must be routine, sustainable, and continuously and carefully monitored through rigorous internal controls functions such as those required under A-123.
- Our external auditors have not reported any material weaknesses in the agency's internal controls in FY 2008 through FY 2010 financial statement audits.
- The cost control program resulted in $115 million in cost savings/avoidance during FY 2010. Since its FY 2005 inception, the program has achieved over $500 million in cumulative annual savings. One of the signature programs, the Strategic Sourcing for Various Equipment and Supplies program, has resulted in over $60 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 includes base funding of $113,681,000 plus programmatic increases of $5,000,000 and $1,038,000 in unavoidable adjustments, less $7,350,000 in base transfers. It is essential that ABA is able 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 increase will support the initial activities toward the re-implementation of DOT's core accounting system and upgrade to Oracle 12i. The implementation of the standardized account code structure is central to the DOT decision to re-implement with the upgrade to Oracle 12i Federal Financials. The FAA will be the first DOT operating administration to accomplish the upgrade. 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. Implementing the standardized accounting code 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.

Funding below the requested level would prohibit the implementation of the DOT mandated account code structure changes. If FAA does not receive funding to support the conversion to a standardized account code, the agency will not be able to successfully implement Oracle 12i, ABA will not be able to train agency staff on the new accounting code structure, 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 DOT account code configuration, 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 its 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.
- 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.

OPERATIONS APPROPRIATION

Human Resources (AHR)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**100,428**	**595**	**32**	**624**
Unavoidable Adjustments				
1. Adjustments to Base	795			
2. Non-Pay Inflation	138			
3. One Less Compensatory Day	-285			
Total Unavoidable Adjustments	**647**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	305			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**305**	**0**	**0**	**0**
Discretionary Increases				
1. Adjustments to Base	0			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**0**	**0**	**0**	**0**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	267	3		3
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	177	1		1
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	301			
Total Base Transfers	**745**	**4**	**0**	**4**
FY 2012 Request	**102,125**	**599**	**32**	**628**

Detailed Justification for - Office of Human Resource Management (AHR)

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

FY 2012 – Office of Human Resource Management (AHR)
($000)

Program / Component	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
Office of Human Resource Management (AHR)	$100,428	$102,125	$1,697
Total	**$100,428**	**$102,125**	**$1,697**

The FY 2012 budget request of $102,125,000 (1.68 percent increase over the FY 2010 enacted level) and 628 FTEs will support the AHR program. The increase will provide for salaries and benefits as well as estimated non-pay AHR activities including the comprehensive system of policies, procedures and systems necessary for managing FAA's most important asset: its people. This request reflects an adjustment to base of $794,000 and four FTEs. The request also includes $305,000 for a working capital fund increase and $301,000 for the Degree Completion Program.

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 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 streamline FAA hiring process and recruit top talent, in keeping with the current Administration's flagship personnel policy reform initiative. We will continue to fund the strategic management of human capital, which helps FAA make certain they have the skilled workforce needed to transform to NextGen. In FY 2012, 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 2012 will support the following outputs:

- Streamline hiring process to achieve 80 percent of FAA's external hires that will be filled within OPM's 45-days standard for government hiring.
- 400 employees to be trained under the Program for Emerging Leaders. In FY 2012, 200 participants will graduate out of the Program by either promotion into front-line manager positions or completion of the Program requirements. Additionally, 200 applicants will be selected for, and begin participating in, the Program, to graduate later in the Fiscal Year.
- Maintain the reduction of grievance processing time by 30 percent (to an average of 102 days).
- Maintain air traffic controller workforce within two percent above or below the projected annual target.

2. What Is This Program?

The Office of Human Resource 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 628 FTEs located in FAA headquarters and 11 regional offices and centers throughout the United States. The staff manages a complex network of policies, programs and systems designed to address all the 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 accomplishments:

- Provide corporate agency guidance and consultation as necessary to monitor and assess the implementation of FAA Organizational Excellence Action Plans to address employee feedback and engagement.
- Provide 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.
- Manage the operation and maintenance within FAA of personnel and payroll automated processing by the Federal Personnel and Payroll System (FPPS), and expand and enhance the Selections within Faster Times (SWIFT) automated suite to all mission-critical positions and those positions that cross-organizational lines, i.e., finance, budget, human resources, and information technology.
- Provide 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 program, benefits, awards, training and human resources automation.
- Monitor nationwide grievance processing time against the baseline measured through the grievance electronic tracking system.
- Manage 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 the requirements, setting quality standards and monitoring the effectiveness of corporate training, addressing the 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.

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 that 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.

Implementing President Obama's hiring reform agenda is an AHR-led effort. State-of-the-art recruitment and marketing programs will be implemented to attract high performing and highly qualified candidates. 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. Our hiring process notifies applicants at four points in the process and uses plain language in our top 10 mission critical job announcements. AHR will implement an onboarding solution, developed in FY 2010 and piloted in FY 2011, to orient and better prepare new employees for FAA's fast-paced environment. Both managers and employees benefit from this solution.

One of the key challenges 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 will implement the NextGen talent acquisition and management strategy, having developed career framework proposals integrated with NextGen requirements and potential changes to FAA workforce structure. AHR evaluates and identifies changes to the qualification requirements for air traffic controllers in the emerging NextGen system. AHR provides guidance and support in developing new and revising existing hiring programs, ensuring applicants are qualified to work in the new NextGen environment. 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. 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. AHR assesses the executive cadre annually on current and desired future bench strength for entry-level executive positions and updates the information in the Executive Leadership Succession Management Plan. Development activities are delivered through the Forum for Executive Excellence, featuring 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. In FY 2008, AHR launched a new Program for Emerging Leaders (PEL), targeted to full performance non-supervisory employees who aspire to management. This program offers 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. Based on results of the 2008 Federal Human Capital Survey, the Employee Engagement Steering Committee, spearheaded by HR, was formed. The Committee is charged with implementing strategies to get employees excited about working for FAA and strengthening their commitment to the mission, values and shared values of the agency. Much of the groundwork (such as HR's benchmarking of best places to work) for developing strategies designed to increase FAA-wide positive response rate in Leadership and Performance Culture was completed in FY 2010. 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. Employee engagement training will be incorporated into the Frontline Manager curriculum. Using the on-boarding process for new hires will build employees' affiliation and strengthen engagement and commitment to FAA. Using this process benefits managers in that it accelerates the time-to-productivity for new hires. AHR will monitor the progress on achieving FAA's performance culture objective by assessing the results on relevant employee survey items. 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, developed in FY 2009 in response to the President's Executive Order to create labor-management forums and provide a platform for gathering frontline ideas on improving the delivery of our mission. 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?

AHR efforts to build leadership within FAA have been successful since launching the agency-wide SLDP in May 2007. Of the first group of 29 participants aspiring to executive level positions, 26 graduated in FY 2009. A second group (25 participants) was selected in FY 2009 and will create their individual development plans in FY 2011. Building on the success of that leadership program, AHR expanded FAA efforts to tap into the potential of our full performance, non-supervisory employees who seek managerial positions. To date, 1,227 applications have been submitted for the PEL program. Of those, 238 participants have been placed into four PEL cohorts and 19 participants have been promoted into Frontline Manager positions. AHR updated FAA's Frontline Manager curriculum to include emerging issues such as employee engagement.

FAA adopted the OPM 45-day hiring standard in FY 2008. Anticipating a retirement bubble and addressing competition for attracting a skilled workforce, measuring hiring time was a critical step in improving the efficiency in our hiring process. In 200X, AHR filled 81 percent of FAA external hires within 45 days, exceeding the performance target of filling 65 percent of FAA external hires within 45 days. . In FY 2010, the target was raised to 80 percent and FAA met that target by filling x percent of FAA external hires within 45 days.

Reducing workplace injuries and illnesses leads to improved productivity and quality of life for FAA's workforce and lower costs for the agency. All FAA lines of business and staff offices partner with AHR in achieving this target by training employees on working safely, inspecting workplaces to identify hazards, correcting them and conducting safety program evaluations. The agency's injury and illness rate totaled 1.66 cases per 100 employees, exceeding the goal of 2.60 cases per 100 employees.

Grievance processing time represents the average number of days to process a grievance. Reducing grievance processing time is conducive to better labor-management relations and enables faster correction of non-compliance with FAA's collective bargaining agreements, thus contributing to agency efficiency. AHR met the performance targets of reducing processing time by 25 percent to 110 days from the 2006 baseline of 146 days. AHR averaged 38 days in processing time for a 74 percent reduction.

AHR is a significant contributor to FAA's cost control performance target. To date, AHR has realized a cost avoidance of $11,900,000 through resolution of workers' compensation claims.

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

Reductions to the requested level would require AHR's personnel compensation and benefits funding to be reduced causing us to not be able to fill vacancies or to provide services to FAA employees. A reduction to the budget limits the agency's ability to meet the requirements in the Department of Transportation Strategic Plan.

OPERATIONS APPROPRIATION

Regions and Center Operations (ARC)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**341,977**	**780**	**29**	**822**
Unavoidable Adjustments				
1. Adjustments to Base	2,115			-15
2. Non-Pay Inflation	1,204			
3. One Less Compensatory Day	-393			
Total Unavoidable Adjustments	**2,926**	**0**	**0**	**-15**
Uncontrollable Adjustments				
1. Adjustments to Base	-5,000			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	9,900			
5. AVS/ASH Leases	2,000			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**6,900**	**0**	**0**	**0**
Discretionary Increases				
1. Adjustments to Base	15,000			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**15,000**	**0**	**0**	**0**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	7,162	1		1
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	1,010	1		1
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-20			
Total Base Transfers	**8,152**	**2**	**0**	**2**
FY 2012 Request	**374,955**	**782**	**29**	**809**

Detailed Justification for Staff Offices – Regions and Center Operations (ARC)

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

FY 2012 – Regions and Center Operations
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
Region and Center Operations	$341,977	$374,955	$32,978
Total	**$341,977**	**$374,955**	**$32,978**

For FY 2012, $374,955,000 and 809 FTE are requested for FAA's Assistant Administrator for Regions and Center Operations. This is an increase of $32,978,000 and a decrease of thirteen FTEs under the FY 2010 enacted level. The budget includes three base transfers totaling $8,152,000 and two FTEs. ARC is transferring $20,000 to Human Resources for the Degree Completion Program and receiving two FTEs and $8,172,000 in base transfers for the Graphics, Printing, and Photography Program from the Office of Communications and the Mail Program from the Assistant Administrator for Financial Services. This request also includes uncontrollable adjustments of $6,900,000.

The request will enable us to begin efforts associated with relocating Service Center headquarters facilities, fund administrative lease cost increases within our GSA Rent program, and expand administrative space housing for Aviation Safety (AVS) and for Security and Hazardous Materials (ASH) staff. As Congress has appropriated additional funding for Flight Standards hiring, some of the existing leased facilities can no longer effectively accommodate additional staff and must relocate into larger space. For FY 2012, a portion of the additional funding is being requested for a space lease in Atlanta that consolidated the Atlanta FSDO and other Flight Standards organizations into a single, stand-alone facility.

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.

Function	Functional Description	Key Actions
Acquisition / Real Estate / Material Management	Conduct acquisition, real estate and material management activities	▪ Manage a portfolio of real property assets exceeding $7 billion replacement cost. ▪ Acquire service and construction contracts for National Airspace System (NAS) customers valued at approximately $1 billion annually. ▪ Manage FAA personal property assets valued at $11.4 billion from capitalization to disposal.
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.
Hangar 6	Operate an FAA-owned Gulfstream G-IV and two leased Cessna Citations housed at Ronald Reagan Washington National Airport's Hangar 6.	▪ Safely conduct flight operations

2. What is the Program?

Through a combination of organizations at the Mike Monroney Aeronautical Center in Oklahoma City, Oklahoma, each of the nine regions and at headquarters, ARC 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.
- Operating three jet aircraft (an FAA-owned Gulfstream G-IV and two leased Cessna Citations) housed at Ronald Reagan Washington National Airport's Hangar 6.
- 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 managerial and executive training as well as technical training and related support services for the agency and other aviation organizations, both domestic and international. The Center for Management and Executive Leadership (CMEL), located in Palm Coast, Florida, plays a vital role in developing and delivering state-of-the-art management and executive training. CMEL provides 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.

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 acquisition services in support of all regions and the Aeronautical Center. We provide a variety of acquisition, realty and personal property management services throughout FAA. As an example, the Aeronautical Center awards approximately almost $600 million annually in contracts for equipment, material and services in support of the National Airspace System. Nearly half of these dollars are awarded to small businesses. 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. In prior fiscal years, we:

- Administered over 850 active contracts/leases with a total estimated potential value of well over $2 billion.
- Overseen over 221,000 purchase card transactions valued at more than $90 million.
- Developed and delivered training has significantly improved purchase card policy compliance.
- Supported by 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 initiative. 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 are 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.

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, 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.

The Service Center leases for Seattle, Ft. Worth and Atlanta will expire between 2011 and 2013. Along with lease expirations, each Service Center has seen extensive growth due to the Air Traffic Organization realignment, mandated Flight Standards hiring, and Logistics support realignment. To accommodate the growth, additional satellite locations were acquired in each of the Service Centers. These additional locations increase lease costs, security costs, and Information Technology (IT) infrastructure costs. To improve overall efficiency, new Service Center facilities are being planned that would consolidate the satellite locations and the existing Service Center headquarters into three new facilities.

In FY 2008, management of FAA's Washington Flight Program (Hangar 6) transferred to ARC from the Air Traffic Organization (ATO). This program operates three jet aircraft (an FAA-owned Gulfstream G-IV and two leased Cessna Citations) housed at Ronald Reagan Washington National Airport's Hangar 6. Over twenty FAA employees staff the facility. The aircraft are used for National Transportation Safety Board (NTSB) accident investigations, authorized training/currency flights for FAA headquarters personnel, transporting high-level DOT officials, and some Research and Development (R&D) projects. In addition, Hangar 6 supports eighteen different federal agencies through Memoranda of Agreement.

We will continue to chair the multidiscipline Airport Obstruction Standards Committee (AOSC) which serves as the vehicle to transform outdated, inconsistent obstruction standards practices to future policy that balances operational safety, effectiveness, and economic benefit. This committee develops coordinated standards and action plans for operational improvements such as runway-taxiway separation and end-around taxiways, and also works to enhance databases and data collection tools and models to improve airport flight operations. Successful capacity implementation projects require a strong commitment to integration, collaboration, accountability and a strategic vision from all stakeholders. ARC has a proven track record of successfully delivering complex and critical projects at both OEP airports and airports within major metropolitan areas. Regional Administrators have established Horizontal Integration Teams and cultivated relationships with key stakeholders at OEP airports and other metropolitan areas. ARC has repeatedly facilitated and resolved numerous critical issues that cut across multiple FAA organizations. The results have been increased levels of accountability, resource leveraging, communication and cooperation. ARC's lead role on new runway projects will focus limited agency resources on meeting key milestones needed to deliver full operational capability on these critical capacity improvement efforts. ARC has a proven track record with the advance planning, ongoing accountability and performance reviews required to meet new OEP runway capability commitments established in partnership with stakeholders. Use of the RTAP process continues to be a success, thus far yielding 10 OEP runways delivered since 2001 with full operational capability on schedule.

4. How Do You Know the Program Works?

We continually evaluate our operations to achieve customer satisfaction and to be more effective and efficient in the services and products we provide. For training, the FAA Academy constantly reviews its training operations through student, manager, and customer feedback to evaluate its effectiveness. Key performance indicators include technical and management training satisfaction and on-time course delivery. The Academy has developed a program allowing Airway Transportation System Specialists (ATSS) to spend more time disassembling and assembling NAS equipment in a safe learning environment at the Academy. Each student completes a proficiency exam at the end of training resulting in a better trained employees returning to their field facilities for certification and reducing the time it takes for students to certify at a facility responsible for air traffic. The Academy constantly evaluates training delivery methods with its customers following an Instructional Systems Design (ISD) process that includes specialists who analyze proposed training and student requirements, develop and recommend training delivery and assess costs. The Academy does not compromise effectiveness and ensures efficiency by splitting courses into multiple training to minimize the time students spend away from their duty station.

We plan to implement a new automated NAS supply chain system and improve NAS logistics support programs and performance to ensure the operational availability of NAS equipment and systems. The Logistics Center strives to continually improve the quality and delivery of parts and reduce customer costs by improving processes and tracking performance. 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 Customer Care Center is available 365 days a year, 24 hours a day, 7 days a week, to address customer issues or concerns of NAS support requirements. The Logistics Center has implemented strategic sourcing to reduce acquisition time and resources required for purchases, reducing time to procure by approximately 36%. A cannibalization and reclamation program identifies opportunities to use parts from decommissioned NAS assets to support legacy systems has a validated savings of $1 million. The Logistics Center metal shop set up, reduction, and standardization process reduced labor requirements by 53% and cycle time by 63% for glide slope reflectors with a validated savings of $193,000 annually. The Logistics Center bench stock program improved process to allow visibility of items needed in repair that reduced wait time by 96 percent and costs by 52 percent, with a validated savings $318,000. Leveraging these techniques on other systems is expected to reap additional benefits.

We provide cross-organizational leadership and deliver shared services throughout FAA. Evidence of our program effectiveness is the achievement of FAA performance goals, resourced and supported through this program. For example, we contributed to the successful achievement of FAA's Runway Incursions Reduction goal by providing real-time advocacy through the Runway Safety Program, participating in Runway Safety Council meetings and providing logistics support to various systems that ensure runway safety. Other goals for which we made significant contribution to successful achievement are our Annual Service Volume and NAS On-Time Arrivals performance targets. ARC supports the deployment of the ADS-B System, FAA Service Monitor, and the Wide Area Multilateration through the Logistics Center. We integrate operational initiatives to reduce delays in the New York Metropolitan airports, ensure runway commitment activities are completed and develop recommended standards and action plans. The FAA again was provided an unqualified audit opinion for FY 2010. We contribute toward this success through the timely capitalization of assets and maintenance of the real estate management system for the entire Department's real property inventory. This, again, is evidence of our program effectiveness. ARC's efficiency is evidenced by our on-going commitments to reduce or avoid unnecessary costs. The Aeronautical Center was awarded the *Closing the Circle Award* from the White House for its environmental stewardship -- the most prestigious environmental honor given to federal offices. The center recycled more than 100 tons of cardboard and saved taxpayers thousands of dollars by using less electricity and fuel. For instance, we are converting its fleet of golf cart-style scooters from gas to electricity, a move that saved more than 1,300 gallons of gas annually. Each fiscal year since FY 2005, we have saved or avoided costs in excess of $30 million dollars.

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

Absorbing any reduction while maintaining our lease and staffing commitments would be difficult, possibly forcing reductions to our base services and causing us to affect staffing levels. Of the approximately $375 million being requested, nearly $160 million is associated with rental costs for existing administrative space leases with another $100 million funding on-board personnel related 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. The additional funding requested for administrative space leases is for anticipated rent increases at existing locations. Some leases were negotiated over 15 years ago under market conditions different from today. Since then, both staffing and the cost per square foot have increased. As part of renegotiation, reducing square footage levels is considered where feasible and practicable, but leasing fewer square feet at a higher cost per square foot still results in a net increase in cost.

OPERATIONS APPROPRIATION

Information Services (AIO)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**49,278**	**108**	**6**	**108**
Unavoidable Adjustments				
1. Adjustments to Base	311			
2. Non-Pay Inflation	166			
3. One Less Compensatory Day	-63			
Total Unavoidable Adjustments	**414**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	3,528			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0	3		3
Total Uncontrollable Adjustments	**3,528**	**3**	**0**	**3**
Discretionary Increases				
1. Adjustments to Base	6,000			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	4,000	4		2
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**10,000**	**4**	**0**	**2**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	178	1		1
9. NAS Support (2 EOY/ 2 FTE)	-378	-2		-2
10. Degree Completion Program (0 EOY/0 FTE)	-10			
Total Base Transfers	**-210**	**-1**	**0**	**-1**
FY 2012 Request	**63,010**	**114**	**6**	**112**

Detailed Justification for – Information Services (AIO)

What Do I Need To Know Before Reading This Justification?

The FAA has experienced increasingly high risk security attacks to its external websites and internal networks in the past several years. Resources are needed to further protect against both cyber terrorism and malicious activities by hackers and other unauthorized personnel. The number of alerts has grown to over 12,600,000 per day.

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

FY 2012 – Information Services
($000s)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 – FY 2012
Information Systems Security (ISS)	$25,700	$35,714	$10,014
Privacy Program	$2,471	$2,504	$33
Enterprise Wide Services	$21,107	$24,792	$3,685
Total	**$49,278**	**$63,010**	**$13,732**

The FY 2012 budget request of $63,010,000 and 112 FTEs will support the AIO program. This is an increase of $13,732,000 (21.8 percent) and four FTE from the FY 2010 enacted level. The request provides for salaries and benefits as well as non-pay activities including increases in the Working Capital Fund and cyber security increases to guard against threats. The funding request includes three base transfers: $378,000 and two FTE to the Air Traffic Organization, $10,000 to Human Resources Degree Completion Program, and will receive $178,000 and one FTE from the Office of Financial Services. This request also includes $4,000,000 and two FTEs for the DOT/FAA Cyber Security Management Center (CSMC). Additionally, this request includes an uncontrollable adjustment of $3,528,000 for a Working Capital Fund Increase.

Information Systems Security (ISS)

Requested funding provides CSMC services to FAA and DOT. Base funds cover federal staff, contract services, purchase and maintenance costs for specialized hardware and software technology tools, and facility infrastructure costs. In FY 2010 the CSMC had a total of 1,480,207,769 alerts and 1720 incidents. To date, FAA has had 160 Special Threat events. In an effort to defend against these events, the CSMC is planning to undertake a new requirement which supports the National Airspace Systems (NAS) communications backbone. This includes monitoring and analysis support of additional sensors (72) that the CSMC currently monitors. In addition, the CSMC has been requested to provide additional support to other organizations within FAA, including extending monitoring capabilities to cover 10 international sites and covering Intrusion Prevention Systems (IPS) at important FAA sites.

In order to meet requirements, the CSMC requests an increase of $4,000,000 to purchase additional hardware and software, add facility infrastructure upgrades to two sites, and increase staff by four new positions. Four positions will be hired as Cyber Intel Specialists to work as senior systems engineers for the CSMC responsible for FAA's classified network services and associated duties for its network. These staff will be leading members of the DOT/FAA CSMC in support of a 24-hour and 365 days a year facility. Current levels are inadequate to meet increasing demands. Increased staffing levels are critical to adequately address the rising occurrences of incidents. Safety is our priority and we must be aggressive in advancing our detection and prevention capabilities associated with securing our national systems.

FY 2012 Goals:

- 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 FY2012.
- Ensure adequate security controls are in place to prevent cyber terrorist attacks from penetrating FAA networks.
- Train and develop ISS professionals and provide security awareness training.
- Continue to reduce the number of FAA Internet Access Points per the OMB and DOT Trusted Internet Connections initiative and transition plan.
- Ensure 40 percent of PII systems reduce or eliminate unnecessary use of Social Security Numbers and implement enterprise-wide data protection tools.

2. What Is This Program?

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.

The Information Services Program is comprised of the following components:

- Information Systems Security (ISS) including:
    - Cyber Security Management Center (CSMC)
    - ISS Compliance, Certifications, Remediation, and Training
- Privacy Program including:
    - Data Loss Protection
    - Privacy Policy and Guidance
- Enterprise Wide Services including:
    - IT Governance, Capital Planning, Records, Directives & Forms Management, and Business Process Improvement
    - Enterprise Architecture (EA) Policy and Guidance
    - Enterprise Wide IT Applications and Infrastructure Governance and Optimization

<u>Information Systems Security</u>

The goal of ISS is to achieve zero cyber security events that significantly disable or degrade FAA mission critical services. ISS funds all cyber security work protecting FAA networks. The program includes:

<u>Cyber Security Management Center (CSMC):</u> The CSMC is 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 proactive and responsive corrective action capability,
- Providing DOT with information security technical assistance with cyber disaster recovery,
- 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
- Examining, prioritizing, and remediating vulnerabilities as identified in the DOT portal.

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 Federal laws issued by 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 are followed.
- Certification – Conduct Certification and Authorization (C&A) processes to address threats and document actions needed to address vulnerabilities.
- Remediation – Conduct activities to remediate identified IT system vulnerabilities.
- Training – Develop and conduct **s**pecialized ISS personnel training as well as generalized security awareness training for all FAA employees.

Privacy Program

A 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.
- A process to evaluate third party security and privacy controls.
- Privacy Threshold Analyses (PTAs) and Privacy Impact Assessments (PIAs) that assess potential threats to PII and determines 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.

Enterprise Wide 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 systems that 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:

- Ensure critical acquisitions are on schedule.
- Develop and issue appropriate IT policy, regulations, and guidance.
- Evaluate all Earned Value Management Policy changes proposed by the White House, Congress, OMB, DOT, or any other federal agency.
- Monitor, support, and enhance project execution by implementing a compliant American National Standards Institute/Electronic Industries Alliance Standard -748 Earned Value Management Systems for all major IT acquisition programs.
- Monitor, analyze, and report on investment portfolio performance for major acquisition programs.
- Lead the preparation of business cases required by OMB Circular A-11 as part of the Capital Planning and Investment Control (CPIC) processes.
- Review CPIC support documentation for agency capital programs.
- Implement sound business cases for 100% of FAA agency capital programs.
- Provide training and guidance.

Records, Directives & 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 and Guidance: 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 CIO Council (CIOC) and IT Executive Board (ITEB) 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:

- Consolidate redundant IT applications and infrastructures and manage the operations of enterprise-wide IT solutions.
- Develop and implement standardized, performance-based IT acquisition processes.
- Lead agency-wide application and infrastructure strategic initiatives, including oversight of studies for improving enterprise applications and infrastructure.
- Lead and manage agency-wide IT strategic sourcing.

Anticipated accomplishments include:

- Achieve zero cyber security events that significantly disable or degrade FAA service.
- Ensure resolution of all high and moderate risk vulnerabilities.
- Provide security awareness training for all FAA employees and contractors.
- Develop and maintain information architecture to seamlessly share information between agencies participating in the Next Generation Air Transportation System.
- Transition FAA's network Infrastructure to an Internet Protocol version 6 (IPv6) compatible configurations and ensure that the agency's application and systems interface with this infrastructure.
- Continue to reduce the number of FAA Internet Access Points per the OMB and DOT Trusted Internet Connections initiative and transition plan.

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. The enterprise wide services provide cost effective and secure infrastructure and applications solutions.

3. Why Is This Particular Program Necessary?

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. On May 29, 2009 President Obama stated that …"cyberspace is real. And so are the risks that come with it…..In short, America's economic prosperity in the 21st century will depend on cyber security." President Obama launched the *Comprehensive National Cyber security Initiative* in response to that need.

There are also growing numbers of countries that are attacking high profile government agencies within the US. The CSMC has mature relationships with Department of Defense (DOD) and other federal civilian agencies including US CERT, and US Cyber Command. The CSMC 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. The additional CSMC funding requested will allow FAA to keep up with terrorists using increasingly sophisticated technology tools to attack websites and networks, and to analyze and use incoming data effectively.

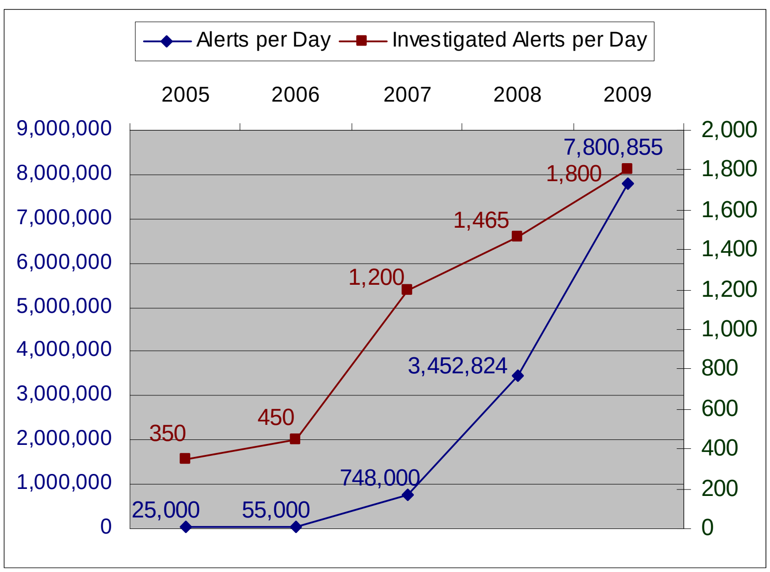
In addition, protecting FAA networks requires a robust hardware and software infrastructure. Without these technologies, our capacity to ensure FAA networks are protected from malicious activity would be greatly reduced. The threats to FAA networks are increasing at a rate that exceeds our current ability to respond effectively. Finding these threats is a labor-intensive process. Additional staff in the cyber intelligence field is needed to increase our ability to detect, analyze, and prevent malicious activity.

4. How Do You Know The Program Works?

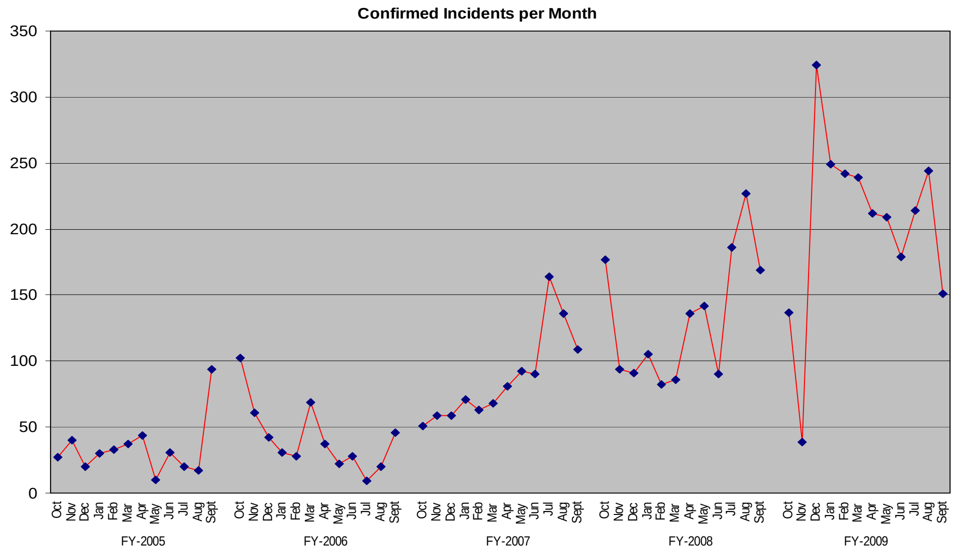
FAA has taken significant steps to close the gap in preventing major incidents. These would include: mapping, logging, sensor placement, development of secure enclaves, focused protection of executive systems, Intrusion Protection Systems, etc.

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. Since 2009 no additional major privacy breaches have been documented.

The Information Security Activity and Events chart shown on the following page indicates the increasing number of alerts.



The chart on below shows the increasing number of incidents resulting from the constant cyber attacks since 2005.



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

The key AIO program outcomes are:

- Reduce FAA privacy data loss and application software security risks; and
- Ensure that IT serves as a strategic enabler for the agency, providing secure and efficient capabilities to store and exchange the agency's critical information.

Security risks have been increasing over the past few years at an alarming rate. For example, the sharp increase in "Special Threat" events over the past several years and the number of alerts shows that FAA is becoming more of 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 increased funding requested.

In FY 2009, FAA experienced a significant privacy breach impacting over 48,000 employees. FY 2012 funding will allow the program to continue to implement the needed privacy policy, regulations, and software application support. The outcome goal is to mitigate risk and prevent any further data breaches. A reduction in funding will seriously reduce FAA's ability to prevent data loss from increasing threats and attacks on our mission critical networks and applications. The Privacy Program would not be implemented as planned. Identity theft for FAA employees would become a significant and growing risk. A reduction would also impact our ability to develop IT 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.

OPERATIONS APPROPRIATION

Office of the Administrator (AOA)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**4,205**	**20**	**4**	**24**
Unavoidable Adjustments				
1. Adjustments to Base	35			
2. Non-Pay Inflation	4			
3. One Less Compensatory Day	-13			
Total Unavoidable Adjustments	**25**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**0**	**0**	**0**	**0**
Discretionary Increases				
1. Adjustments to Base	0			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**0**	**0**	**0**	**0**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-10			
Total Base Transfers	**-10**	**0**	**0**	**0**
FY 2012 Request	**4,220**	**20**	**4**	**24**

Detailed Justification for – Office of the Administrator - AOA

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

FY 2012 – Office of the Administrator
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010- FY 2012
Office of the Administrator (AOA)	$4,205	$4,220	$15
Total	**$4,205**	**$4,220**	**$15**

In FY 2012, the Administrator's office requests $4,220,000 and 24 FTE to meet its mission, an increase of $15,000 (0.36 percent) above the FY 2010 enacted level. This increase is due to inflation. This request also includes a base transfer of $10,000 to the Degree Completion Program. Throughout FY 2012, AOA will continue to lead FAA toward achieving the agency's performance goals and targets.

2. What Is This Program?

The office of the Administrator and Deputy Administrator leads the agency in its mission to provide the safest, most efficient aerospace 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, the 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.

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

The requested funding level includes inflationary adjustments from the FY 2010 actual level. There are no discretionary increases in the FY 2012 budget request.

OPERATIONS APPROPRIATION

Civil Rights (ACR)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**10,977**	**81**	**4**	**85**
Unavoidable Adjustments				
1. Adjustments to Base	94			
2. Non-Pay Inflation	6			
3. One Less Compensatory Day	-38			
Total Unavoidable Adjustments	**62**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**0**	**0**	**0**	**0**
Discretionary Increases				
1. Adjustments to Base	0			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**0**	**0**	**0**	**0**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	-66	-1		-1
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	-95	-1		-1
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-10			
Total Base Transfers	**-171**	**-2**	**0**	**-2**
FY 2012 Request	**10,868**	**79**	**4**	**83**

Detailed Justification for – Office of Civil Rights (ACR)

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

FY 2012 – Office of Civil Rights
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010- FY 2012
Office of Civil Rights	$10,977	$10,868	-$109
Total	**$10,977**	**$10,868**	**-$109**

The request of $10,868,000 and 83 FTE supports the FAA's Office of Civil Rights. This is a decrease of $109,000 (one percent) below and 2 FTE below the FY 2010 enacted level. This request provides for inflation for ACR base programs and three base transfers including one FTE for Safety and Hazardous Materials to the Office of Security and Hazardous Materials, one FTE for Civil Rights Diversity to Aviation Safety and $10,000 for the Degree Completion Program in Human Resources.

The FAA Office of Civil Rights (ACR) provides leadership and direction with regard to civil rights, diversity, and equal opportunity matters. The ACR mission is to provide airport oversight with regard to civil rights laws and regulations under the External Civil Rights Program. ACR consults with airport grant sponsors to develop goal methodologies for contracting and concession projects under the DOT Disadvantaged Business Enterprise (DBE) Program. The latest focus is on conducting reviews to ensure compliance with DBE regulations, as needed, and consultations and training to make airport sponsors aware of their DBE roles and responsibilities. However, the External Civil Rights Program extends beyond the DBE program. It includes airport compliance with Americans with Disabilities Act, Title VI, Limited English Proficiency, Environmental Justice and other civil rights regulations.

Under the Equal Employment Opportunity (EEO) and Diversity Programs, the ACR mission is to prevent discrimination by providing oversight to organizational changes and policies, practices, and procedures for all, as an FAA wide collaborative effort. The Equal Employment Opportunity Commission (EEOC) Management Directive 715 identifies six essential elements for achieving a Model EEO Program. ACR will also:

- Ensure that 35 percent of all EEO pre-complaint cases engage in alternative dispute resolution processes.
- Ensure that sixty percent (60 percent) of pre-complaints (when using alternative dispute resolution) will be closed within 75 days.

2. What Is This Program?

The Office of Civil Rights supports the DOT Strategic Plan's Organizational Excellence goal, 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 Civil Rights Program's key activities include:

- Conducting Disadvantaged Business Enterprise (DBE) compliance reviews and ensures that 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 ensure that 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:

- Consult with at least 220 airport grant recipients on developing DBE goal methodologies for contracting projects and review goal methodologies for contracting projects.
- Facilitate the development of a DBE/Airport Concessions DBE (ACDBE) airport opportunity electronic information exchange system by partnering with aviation and minority advocacy groups.
- Increase Americans with Disabilities Act (ADA) and Rehabilitation Act by conducting six compliance reviews at airports.
- Manage 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?

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.

4. How Do You Know The Program Works?

Over the past several years, ACR has made significant progress in numerous areas including:

- Reduced EEO complaints by more than 30 percent since FY 2008.
- In FY 2010, the complainant to total employment ratio was reduced to 0.52 percent, 0.02% below the government wide ratio.
- More than 1700 mediations have been conducted since 1999 with a 40 percent success rate.
- The participation rate for mediations of informal EEO complaints has progressively increased from 14% in FY 2008 to 25% in FY 2009 to 28% in FY 2010.
- Since the targeted disabilities Flight Plan initiative was put in place, hiring of people with targeted disabilities has increased by 300 percent when compared against FY 2008. Thirty one people with targeted disabilities were hired in FY 2010.
- The ACR EEO Training Institute surpassed managerial and employee awareness EEO training with regard to EEO responsibilities and appropriate behavior during FY 2010 with 463 briefings given to a total of 6,337 managers and employees.
- Participated in 139 outreach events and placed several ads in minority publications in FY 2010 resulting in over 10,000 candidates for specific job areas of interest.

- Consulted with 758 airport grant recipients on developing Part 26 goal methodologies. ACR reviewed 122 goal methodologies, more than doubling the target of consulting with approximately sixty (60) airport sponsors on developing concession programs in FY 2009 under the Disadvantaged Business Enterprise (DBE) Concessions Rule.
- In recognition of FAA's longstanding partnership and commitment to level the playing field for minority and women-owned firms in airport contracting and concession opportunities, ACR was awarded the highest Airport Minority Advisory Council (AMAC) award, being inducted into the AMAC Hall of Fame.

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.

Additionally, over the past several years, ACR has taken a very proactive approach to conflict management. Alternative dispute resolution 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.

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 do an effective job of marketing the use of ADR to employees and managers and to reduce the number of formal complaints in FY 2012, we need a major campaign 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 need to 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 an Economist from the Office of Aviation Policy and Planning conducted a study on Labor Costs for Processing an EEO Complaint. The study concluded that 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.

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 nor 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.

OPERATIONS APPROPRIATION

Government and Industry Affairs (AGI)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**1,596**	**12**	**0**	**12**
Unavoidable Adjustments				
1. Adjustments to Base	14			
2. Non-Pay Inflation	0			
3. One Less Compensatory Day	-6			
Total Unavoidable Adjustments	**8**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**0**	**0**	**0**	**0**
Discretionary Increases				
1. Adjustments to Base	0			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**0**	**0**	**0**	**0**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-1			
Total Base Transfers	**-1**	**0**	**0**	**0**
FY 2012 Request	**1,603**	**12**	**0**	**12**

Detailed Justification for – Government and Industry Affairs (AGI)

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

FY 2012 – Office of Government and Industry Affairs
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010- FY 2012
Office of Government and Industry Affairs	$1,596	$1,603	$7
Total	**$1,596**	**$1,603**	**$7**

The Assistant Administrator for Government and Industry Affairs requests $1,603,000 (an increase of 0.44 percent above the FY 2010 enacted level) and 12 FTEs to meet its mission. AGI is transferring $1,000 for the Degree Completion Program.

The following core activities represent the FY 2012 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 The 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 three and half years through 17 extensions.
- Successful coordination of over 1,000 incoming Congressional Correspondence, as well as FAA's responses, each year.
- Ensure FAA witnesses are well-prepared for congressional hearings, between ten and twenty hearings per year.
- Swift responses to dozens of time-sensitive issues, questions, and requests from Members of Congress, their staffs, and congressional committees each week.
- Successful review, coordination, and clearance of approximately 25 reports sent to Congress annually on a wide range of policy matters. In addition, we currently have approximately 30 reports in one stage or another of drafting, tracking, or clearance.
- Our above efforts have led to a variety of positive outcomes, such as strengthened working relationships with our counterparts, increased awareness of FAA programs and priorities, and ensuring timely notification of critical developments of interest on Capitol Hill.
- Additionally, we consistently receive positive feedback, from across Capitol Hill and internally within the Administration, regarding our proactive engagement, timely responsiveness, and continuous outreach efforts with Members and staff.

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?

The 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.

OPERATIONS APPROPRIATION

Communications (AOC)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**6,892**	**34**	**1**	**34**
Unavoidable Adjustments				
1. Adjustments to Base	56			
2. Non-Pay Inflation	7			
3. One Less Compensatory Day	-21			
Total Unavoidable Adjustments	**42**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0	1		1
Total Uncontrollable Adjustments	**0**	**1**	**0**	**1**
Discretionary Increases				
1. Adjustments to Base	0			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**0**	**0**	**0**	**0**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	-1,010	-1		-1
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-10			
Total Base Transfers	**-1,020**	**-1**	**0**	**-1**
FY 2012 Request	**5,914**	**34**	**1**	**34**

Detailed Justification for -- Office of Communications (AOC)

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

FY 2012 - Office of Communications
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010- FY 2012
Office of Communications	$6,892	$5,914	-$978
Total	**$6,892**	**$5,914**	**-$978**

This request is for $5,914,000 and 34 FTEs to support AOC's outreach to news media, FAA-licensed individuals, the flying public, and FAA's workforce. AOC works with news media 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 FAA, providing employees with daily, weekly, and periodic communication vehicles and news programs. AOC also manages the national branding program and media (broadcast and video) services to the agency at large. The request includes a base transfer of one FTE and $1,010,000 to the Office of Regions and Center Operations (ARC) for the Graphics Program and $10,000 to the Office of Human Resources for the Degree Completion Program.

2. What Is This Program?

The Office of Communications is both the external and internal spokesperson for the FAA. AOC's mission is to disseminate accurate and timely aviation and aviation-related information affecting FAA employees, licensed individuals, and the flying public. 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. 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. AOC advises all agency officials on communication strategy and prepares them for media interviews and other public appearances.

In support of the new DOT IdeaHub program, AOC created an IdeaHub platform, an online community enabling innovation and cross-organizational collaboration. The platform empowers employees to develop, rate, and vet innovative ideas for programs, processes, and technologies. In addition, the program improves morale and introduces cultural change to the FAA by engaging employees and providing an open conduit for ideas.

The goals and expected accomplishments for this program are to:

- Provide a conduit for great idea and fresh perspectives to move upstream
- Use great ideas to help FAA accomplish its mission
- Enable employees to participate and become stakeholders in changing their workplace
- Recognize employees for their contribution to FAA
- Improve employee morale

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 and FAA employees nationwide. Implementing these new programs is critical to AOC's mission to drive communications in support of the FAA and DOT.

Media Relations
AOC works closely with the lines of business and staff offices to provide timely, accurate information on FAA programs and activities to reporters and coordinate requests for interviews with agency officials.

Corporate Communications
AOC coordinates with lines of business and staff offices to provide employees pertinent, accurate, and timely information on agency programs and activities. AOC provides information and resources employees need to do their jobs through the employee website, the employee newsletter and other communication channels. AOC supports the agency's communications programs, provides web management, and media services, including webcasting and policy and oversight of FAA's branding program nationwide.

The IdeaHub initiative stems from President Obama's January 21, 2009 Memorandum on Transparency and Open Government requiring executive departments and agencies take specific actions to implement the principles of transparency, participation, and collaboration. The Open Government Directive, issued by OMB on December 8, 2009, requires agencies to create and institutionalize an Open Government Culture. Senior leaders must create an unprecedented and sustained level of openness and accountability within their agencies. Specifically, leaders are to strive to "incorporate the values of transparency, participation, and collaboration into the ongoing work of their agency," and recommend that "…Integration of various disciplines facilitates organization-wide and lasting change in the way that Government works."

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 tells us that AOC is meeting its goal to provide information that is readily available, timely, accurate, and is understandable by the traveling public, as indicated by its consistent high survey feedback from users. 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.

AOC has also achieved its goal of answering 98 percent of questions through self-service in its Frequently Asked Questions knowledge base on the public website and its goal of 100 percent of questions sent to FAA experts within 15 days.

AOC also has been successful in conducting proactive outreach resulting in media stories that positively highlight FAA initiatives. 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. An internal communications initiative called FocusFAA has more than 60,000 monthly visits, has high readership and enables robust employee interaction.

The IdeaHub program is modeled after other Government programs that currently employ or are developing similar ideation tools and communities within their respective organizations. While more than 120 different agencies participate in the White House-led Ideation Community of Practice, the three most mature programs, recognized in 2009 by *Government Executive,* are identified here:

- **The State Department** launched the Sounding Board to enable Foreign Service Officers to communicate with their colleagues and organizational leadership. The tool was seeded with an agency-wide challenge from Secretary Clinton asking employees for ways to improve their work environment.
- **Centers for Disease Control and Prevention (CDC)** developed Idea Lab to connect people and make "good ideas better" for CDC. Idea Lab is a peer-to-peer network that provides a mechanism for agency-wide idea generation and problem solving by harnessing the collective wisdom of CDC staff around the world.
- **Transportation Security Administration (TSA)** launched IdeaFactory, its internal ideation program, in 2007 for 50,000 employees at more than 450 locations nationwide. On average, 300 ideas are submitted each month, and ideas receive 8 comments and 30 ratings. As of April 1, 2010, over 11,000 ideas, 88,000 comments, and 350,000 ratings were submitted to IdeaFactory by TSA employees. IdeaFactory has approximately 5,000 monthly visitors, and 30 percent of users actively

contribute on the site. Over 31,000 employees have visited IdeaFactory since its inception.

TSA formally evaluated 2,500 ideas for implementation, responded to another 1,000 ideas, and implemented 60 ideas as new programs, initiatives, and policy changes for the workforce. TSA is seen as the leader and key success story in the Federal Government's implementation of ideation programs. Its employee demographic is similar to the FAA's in size, distribution, and accessibility to computers and leads us to believe AOC will have similar success.

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 and more interaction with the FAA. AOC must continue to provide critical operational and safety-related information to employees and the flying public, accurately and in a timely fashion, to effectively accomplish the FAA's mission.
FAA-licensed individuals, the traveling public, and those with an interest in aviation need this information to make informed choices, follow regulations, and conduct research on aviation.

OPERATIONS APPROPRIATION

General Counsel (AGC)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**49,202**	**275**	**9**	**279**
Unavoidable Adjustments				
1. Adjustments to Base	419			
2. Non-Pay Inflation	29			
3. One Less Compensatory Day	-169			
Total Unavoidable Adjustments	**280**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0	2		2
Total Uncontrollable Adjustments	**0**	**2**	**0**	**2**
Discretionary Increases				
1. Adjustments to Base	0			
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**0**	**0**	**0**	**0**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	1,300	4		4
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-10			
Total Base Transfers	**1,290**	**4**	**0**	**4**
FY 2012 Request	**50,772**	**281**	**9**	**285**

Detailed Justification for – Chief Counsel (AGC)

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

FY 2012 – Chief Counsel
($000)

Program/Component	FY 2010 Actual	FY 2012 Request	Change FY 2010- FY 2012
Chief Counsel	$49,202	$50,772	$1,570
Total	**$49,202**	**$50,772**	**$1,570**

The request of $50,772,000 (a 3.19 percent increase over the FY 2010 enacted level) and 285 FTEs support the AGC program. This increase will provide for non-pay inflationary increases and a base transfer of $1.29 million and four FTEs for the Audit and Evaluation Organization (AAE) in addition to a base transfer of $10,000 to the Degree Completion Program. The staffing level includes a technical adjustment of two FTEs.

Funding in FY 2012 will support critical agency outputs related to:
- Rulemaking and regulatory enforcement.
- Acquisition of safety and operation systems and equipment, commercial and fiscal requirements.
- Airports capacity enhancement and grants, environmental streamlining for airport projects.
- Environmental aspects of NextGen development.
- Personnel and labor matters.
- International agreements and harmonization of international safety requirements.
- International technical assistance agreements and safety assessments.
- Alternative dispute resolution/conflict management services.
- Resolution or adjudication of bid protests.
- Freedom of Information Act and Privacy Act compliance, and compliance with Government-wide ethics requirements.

Moreover, AGC represents the agency 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.

Funding in FY 2012 will support the following key outputs and outcomes:

- 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 60 percent of the exemptions submitted.
- Prioritize and 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 50 percent of the drafts within 180 days of the receipt of the last brief.

2. What Is This Program?

AGC provides mission support to all DOT goals. We furnish legal services to the FAA Administrator and all agency organizations worldwide. Our primary purpose and functions are giving legal advice, reviewing agency action for legal sufficiency, and providing representational services. AGC supports each operational function within FAA, chief among them, rulemaking, acquisition, regulatory enforcement, airport and environmental activity, international activity, tort litigation and various government-wide administrative functions. In addition to its primary function of providing legal services, AGC houses the Audit and Evaluation (AAE) function for FAA.

The AAE organization serves as a consolidated focal point for disclosures affecting aviation safety, health and safety of FAA employees, and whistleblower contributions. It also coordinates Department of Transportation (DOT) Office of Inspector General and General Accountability Office (GAO) evaluations and investigations on aviation safety and matters directly affecting the health and safety of FAA employees.

In addition to providing legal support services, 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.

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, 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 these safety matters before the NTSB, the FAA Decision-maker and the Federal courts.
- Advising 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 accomplishments include:

- Maintaining scheduled progress for Environmental Impact Statements at Philadelphia and Southern Nevada and maintaining scheduled progress for environmental review to redesign the airspace and air traffic systems for Boston, San Francisco, Atlanta, Washington/Baltimore, and Western Corridor and providing legal advice to support ongoing implementation and representational legal services to defend the New York/New Jersey/Philadelphia Metropolitan Airspace Redesign.
- 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 fist 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. Our largest contribution can be found in our timely and efficient support of safety and mobility:

- 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% time and contract document are cleared through the legal office within 10 days.

AGC's principal legal practice areas are integrally linked to the success of FAA's mission. AGC plays a significant role by providing critical legal advice so that program milestones are maintained and ensuring legal sufficiency of program office actions regarding the legal and environmental implications of runway expansions, terminal improvements and redesign of the national airspace. 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 in the international and economic competitiveness goal area by developing the agency position on international law issues and supporting FAA international aviation efforts. Finally, in support of the overall goal of achieving organizational excellence, 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.

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 our specific performance measures.

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 flight pan initiative require, 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.

Reductions will force AGC to consider the following scenarios:

- Impair the agency ability to vigorously defend tort and personnel cases, thereby significantly increasing the government's exposure to loss.
- Reduce 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.
- Delay agency initiatives related to maintaining scheduled progress of environmental reviews for airport development projects and airspace redesign efforts.
- Cause a bottleneck in AGC that will lead to prevent safety and efficiency improvements for FAA programs that provide service to the public.

OPERATIONS APPROPRIATION

Policy, International Affairs and Environment (APL)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**35,600**	**164**	**2**	**161**
Unavoidable Adjustments				
1. Adjustments to Base	340			
2. Non-Pay Inflation	50			
3. One Less Compensatory Day	-100			
Total Unavoidable Adjustments	**290**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	310			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**310**	**0**	**0**	**0**
Discretionary Increases				
1. Adjustments to Base	3,019	3		2
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	0			
Total Discretionary Increases	**3,019**	**3**	**0**	**2**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	-177	-1		-1
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	0			
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-10			
Total Base Transfers	**-187**	**-1**	**0**	**-1**
FY 2012 Request	**39,032**	**166**	**2**	**162**

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 2012 – Office of Policy, International Affairs, and Environment
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010- FY 2012
Office of Policy, International Affairs, and Environment	$35,600	$39,032	$3,432
Total	**$35,600**	**$39,032**	**$3,432**

The FY2012 budget request of $39,032,000 and 162 FTEs allows FAA to identify, develop and implement the domestic and international policy goals of the agency. This is an increase of $3,432,000 and one net FTE over the FY 2010 enacted level. This funding reflects the estimated non-pay inflation increase for 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 includes a base transfer of $177,000 and one FTE to AHR for labor relations/national employee safety and $10,000 to the Degree Completion Program.

This request also includes an uncontrollable adjustment of $310,000 to cover FAA's share of the Capital Security Cost Sharing Program (CSCSP) managed by the Department of State Overseas Building Office. The Capital Security Cost Sharing program is a multiyear effort to upgrade existing or build new U.S. Foreign Service posts to meet heightened physical security requirements. This request provides funding to accommodate the move of the FAA International Field Office in London, United Kingdom to be part of the Chief of Mission space.

Funding in FY 2012 will support the following key outputs and outcomes:

<u>Policy and Plans</u>

- 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 for the Office of Management and Budget (OMB) and the Congressional Budget Office (CBO).
- Develop and manage a continuous, end-to-end strategic planning and budget process for the agency to include transparent reporting of performance outcomes via multiple web-based initiatives.

<u>International Affairs</u>

- Execute a plan targeting priority National Airspace System (NAS) contiguous Flight Information Regions to improve procedural interoperability, automation compatibility, and digital data communications.

- Identify and provide technical assistance and training to 75 civil aviation authorities throughout the world.
- Support government and industry partnerships to facilitate the transfer of aeronautical products, services, and technologies to China, India, Brazil and Mid-Americas and Caribbean.
- Work with key stakeholders to formulate and finalize the FY2012 – FY2016 FAA International Priorities
- Expand the use of NextGen concepts and systems worldwide

Environment and Energy

- Reduce the number of people exposed to significant aircraft noise in the U.S. by 4 percent.
- Improve aviation fuel efficiency, with resulting air quality and carbon dioxide (CO_2) benefits, by 2 percent.
- Complete technical work to develop the first CO_2 standard for aircraft, working through ICAO
- Achieve U.S. environmental and energy objectives at ICAO.
- Meet FAA performance goals to achieve national energy and conservation mandates.

2. What is the Program?

APL supports the DOT goals of Economic Competitiveness, 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. Incumbent on the Economic Competitiveness and 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. 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.

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

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.

The organization consists of the following offices:

Aviation Policy and Plans develops programs to facilitate, develop, coordinate, and implement crosscutting national and international aerospace system policies, goals, and priorities:
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 has national and international responsibilities for aviation environmental and energy policy, research, standards, analytical models, technical support, and programs.

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.
- Maintaining international leadership by expanding our global presence to ensure global harmonization of aviation standards and practices through representation in key international bodies and provision of training and technical assistance around the globe.
- 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 alternative aviation fuels
    - Implement FAA's Greening Program to comply with national energy and conservation mandates
    - Integrate environmental considerations into NextGen through Environmental Management Systems and National Environmental Policy Act compliance
- Supporting the Administrator on crosscutting policy issues and staffing the Management Advisory council and Air Traffic Services Committee, or other similar bodies as directed by Congress.

Anticipated FY 2012 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.
- 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 for OMB and CBO.

<u>International Affairs</u>

- Expand and coordinate all aspects of the FAA global outreach for NextGen and communicate NextGen priorities to the international community to ensure harmonization of future air transportation systems. 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 at least five 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 at least seven international aviation development projects to assist civil aviation authorities improve safety and efficiency.

Environment and Energy

- Issue NextGen environment and energy policy with goals to reduce significant aviation noise and air quality impacts, notwithstanding aviation growth, and to achieve carbon neutral growth by 2020 and reductions of aviation greenhouse gas emissions long term.
- Accelerate development of clean and quiet aircraft technologies and advance sustainable renewable aviation fuels, including qualifying a biofuel/JetA blend as an approved aviation fuel, under the Continuous Lower Energy, Emissions, and Noise technologies program.
- Achieve international agreement for the global aviation sector to reduce greenhouse gas emissions, and make progress within the ICAO on a new CO_2 standard for aircraft and efficiency improvements to air traffic management systems.
- Lead FAA's development of a sustainability performance plan to reduce greenhouse gas emissions, increase energy efficiency, conserve resources, and implement sustainable operating practices to achieve national mandates and environmental stewardship.

Beneficiaries

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, the 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 everyday. APL 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 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.

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 engine 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 with aircraft CO2 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, which represents 190 of the world's civil aviation authorities. 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 over 100 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. The
Whether we are referring to regulatory oversight, the development of air commerce, the 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's 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 all six DOT goal areas – Safety, State of Good Repair, Economic Competitiveness, 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 2010. These include:

- Noise Exposure: Reduce the number of people exposed to significant noise.
- Aviation Fuel Efficiency: Improve aviation fuel efficiency per revenue plane-mile
- International Aviation Development Projects: Arrange external funding commitments
- NextGen Technologies: Promote seamless operations around the globe in cooperation with bilateral, regional, and multilateral aviation partners.
- Developing Aviation Leaders: Work with countries or regional organizations to develop aviation leaders to strengthen the global aviation infrastructure.
- Customer Satisfaction: Achieve an average score for the FAA surveys on the American Customer Satisfaction Index at or above the FY 2008 average Federal Regulatory Agency Score

In addition, in 2008, the U.S. aviation system received a score of 91 out of 100 in a safety audit conducted by ICAO. The U.S. score was well above the global average of 56 and reflects U.S. compliance with over 9,500 international safety standards. APL led U.S. preparations for the audit, which also included the National Transportation Safety Board, the U.S. Coast Guard and the Pipeline and Hazardous Materials Safety Administration.

Listed below are more indicators of our success:

- Completed the Annual Aviation Commercial and General Aviation Forecast and ensuing 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 alternative jet fuel specification, working through the Commercial Aviation Alternative Fuels Initiative, and received the 2010 DOT Sustainability Achievement Award for Alternative Fuels/Fuels Conservation
- Led the event "Greening U.S. Aviation: The Roadmap to Reducing Greenhouse Gases," with a panel of experts on aviation greenhouse emissions, new aircraft and engine technologies, alternative fuels and operational improvements under NextGen at the 2009 United Nations Climate Change Conference in Copenhagen, Denmark
- Delivered cost-benefit analyses on FAA safety and operational rulemakings enabling the agency to meet its scheduled delivery dates to OST.
- Supported NextGen implementation by enhancing data gathering capabilities and developing NextGen-unique performance metrics and measurement.
- Implemented 5 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 enhance China's ability to maintain its excellent safety record as it expands its aviation system in the future.
- Arranged 8 external funding commitments for International Aviation Development Projects, which was above the FY 2009 goal of seven for countries in Africa, China, India, Indonesia, Caribbean

- Worked with countries and regional organizations in developing Aviation Leaders that will strengthen global aviation infrastructure. For FY 2010, FAA exceeded its goal to work with at least three countries by working with ten countries.
- Expanded the use of NextGen performance-based systems in India.
- Created a performance-based budget that links resource requirements to the DOT and Strategic Plans.

5. Why do we want/need to fund the program at the requested level?

To achieve the performance goals outlined in the FY 2012 as well as the long-term goals into FY 2015, we will depend on a strategy balanced between incremental increases in personnel and 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:

- There will be a delay to technical work to improve aircraft noise assessment and mitigation to keep pace with aviation growth. By not advancing the FAA's work in reducing the impact from aircraft noise, it will impede the development of airports, new air traffic procedures in the terminal environment and airspace redesign.
- We would be unable to backfill positions and consideration would be given to reducing the FAA global footprint. FAA's presence, policy and technical expertise are essential to maintaining the U.S. leadership role in aviation. International outreach efforts would be reduced as funding available for travel would be minimized, impacting U.S. representation and leadership nationally and around the globe.
- NextGen implementation dates would be delayed. Work on certain critical safety rules would have to be discontinued with focus on only the most critical going forward due to staffing shortfalls.

OPERATIONS APPROPRIATION

Security and Hazardous Material (ASH)
($ in Thousands)

Item Title	Dollars	FTP	OTFTP	FTE
FY 2010 Actual	**87,591**	**497**	**0**	**484**
Unavoidable Adjustments				
1. Adjustments to Base	707			
2. Non-Pay Inflation	103			
3. One Less Compensatory Day	-284			
Total Unavoidable Adjustments	**526**	**0**	**0**	**0**
Uncontrollable Adjustments				
1. Adjustments to Base	0			
2. NATCA Collective Bargaining Agreement	0			
3. NAS Handoff Requirement	0			
4. GSA Rent/DHS Security	0			
5. AVS/ASH Leases	0			
6. Working Capital Increase	0			
7. Increased payment to Bureau of Transportation Statistics	0			
8. Capital Security Cost Sharing Program (CSCSP)	0			
9. Workforce Attrition	0			
10. Technical Adjustments for Staffing	0			
Total Uncontrollable Adjustments	**0**	**0**	**0**	**0**
Discretionary Increases				
1. Adjustments to Base	8,022	110		54
2. AVS NextGen Technology/Advancement	0			
3. AFS Inspector Staffing	0			
4. AIR Inspector Staffing	0			
5. Develop. and Impl. of Safety Requirements for Commercial Human Space Flight	0			
6. Space Incentives	0			
7. Oracle 12i Delphi Conversion	0			
8. Cyber Security Management Center (CSMC)	0			
9. Emergency Operations, Communications, Intelligence Watch and Investigations	5,600	26		13
Total Discretionary Increases	**13,622**	**136**	**0**	**67**
Cost Efficiencies				
1. Adjustments to Base	0			
2. Flight Services Contract Savings	0			
3. Real Property Savings	0			
4. Administrative Efficiencies	0			
Total Cost Efficiencies	**0**	**0**	**0**	**0**
Base Transfers				
1. NextGen and Acquisitions Hiring Support (3 EOY/ 3 FTE)	0			
2. Labor Relations / National Employee Safety (1 EOY/ 1 FTE)	0			
3. Safety and Hazardous Materials (1 EOY/ 1 FTE)	66	1		1
4. Mailing and Printing (1 EOY/ 1 FTE)	0			
5. Civil Rights / Diversity (1 EOY/ 1 FTE)	0			
6. Graphics Program (1 EOY / 1 FTE)	0			
7. Audit and Evaluation (AAE) (4 EOY / 4 FTE)	0			
8. IT Support (1 EOY/ 1 FTE)	0			
9. NAS Support (2 EOY/ 2 FTE)	0			
10. Degree Completion Program (0 EOY/0 FTE)	-10			
Total Base Transfers	**56**	**1**	**0**	**1**
FY 2012 Request	**101,795**	**634**	**0**	**552**

Detailed Justification for – Security and Hazardous Materials (ASH)

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

FY 2012 – Security and Hazardous Materials
($000)

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010- FY 2012
Security and Hazardous Materials	$87,591	$101,795	$14,204
Total	**$87,591**	**$101,795**	**$ 14,204**

The FY 2012 request of $101,795,000 (a 16.2 percent increase over the FY 2010 enacted level) and 552 FTEs will support the ASH program. Also included is a base transfer of $66,000 and one FTE to ASH for Safety and Hazardous Materials and $10,000 to AHR for the Degree Completion Program. The request reflects an adjustment of $8,022,000 and 54 FTEs to account for funding not realized in prior year budgets.

This funding level reflects a $5.6 million and 13 FTE discretionary increase to:

- Integrate Hazardous Materials Safety Program into risk-based oversight inspections.
- Increase capabilities of Washington Operations Center Complex Division (WOCC) to provide support to agency efforts in response to crises and emergency events.
- Implement the secure room accreditation capabilities at the Service Area Center Offices and the Air Route Traffic Control Center.

Funding in the FY 2012 request will allow us to meet these milestones:

- Upgrade and redesign communications and infrastructure to effectively meet the demands levied upon the organization by continued security threats.
- Upgrade functions of physical security, personnel security, computer/digital forensics, ID-media and information systems that support and affect the entire FAA.
- Support the implementation of the Facility Security Management Program and the Personnel Security Program that protect critical FAA infrastructure and personnel that support the National Airspace System (NAS).
- Enhance emergency operations network capability to meet increased user needs and to ensure continued situational awareness of daily and emergency events. The planned capabilities include fully integrating the WOCC and Regional Operations Centers (ROC) with their emergency notification system.
- Plan, 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 WOCC and the Air Traffic Security Coordinators that manage the Domestic Events Network. Continue the development of a Counterintelligence program for FAA Lines of Business and decision-makers.
- Enhance and provide regulatory oversight of shippers, air carriers and repair stations in accordance with the Hazardous Materials Regulations, 14CFR, and with ICAO's International 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.

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.
- Make notification 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 over 500 FAA facility inspections and assessments.

2. What Is This Program?

The Office of Security & Hazardous Materials develops and implements policy to protect FAA employees, contractors, facilities, and assets, provide crisis management support, support the national security responsibilities of the FAA and protect 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 criminal activity by FAA employees, 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.
- Coordinate national surveillance of carriers, shippers, and aviation repair stations to assess compliance and enforce regulations through coordination with other transportation modes and other agencies.
- In partnership with the Pipeline and Hazardous Materials Safety Administration, assist with the lithium battery and air-specific packaging rules and assess options for the safe transport of flammable aerosols, and harmonize the Hazardous Materials Regulations with international requirements.

DOT, FAA, the aviation industry and the general flying public are the beneficiaries of ASH as well as the partners to these programs, as shown in the description above.

3. Why Is This Particular Program Necessary?

We develop and implement policy to protect FAA employees, contractors, facilities, and assets, provide crisis management support, 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 its functions as one of the key components of our country's transportation infrastructure. These are some of our yearly measurable benefits to our customers and beneficiaries:

- Conduct 6,000+ suitability and background checks
- Perform approximately 3,000 HAZMAT activities
- Issue more than 50,000 Personal Identity Identification cards

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, training and equipment.

4. How Do You Know The Program Works?

It has been made abundantly clear in the last several years that there is an absence of security and safety measures in the aftermath of incidents and disasters. However, 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 most recently during Hurricane Katrina, the earthquake in Haiti, and during other incidents. 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?

We have experienced expanding requirements to protect the NAS, the public, and our FAA employees from increasing numbers of attempted terrorist attacks and natural disasters, as well as maintaining ASH operations at the FAA standard in the constantly growing volume of the air transportation industry. In order to successfully execute our mission and support DOT's Strategic Plan, ASH requires the requested funding and safety and support staff to keep pace with increasing requirements and costs to get our mission accomplished.

Any reduction to our request will have a significant and negative impact on our ability to meet our critical safety-security mission requirements. 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 the reductions to the request include Emergency Operations and Communications, Investigations, Compliance and Enforcement of Hazardous Materials Inspections and Regulations, Facility Security, Communications Security, Personnel Security, and ongoing improvements in the Identification Media Program - 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 FAA workforce.

Receiving less than the amount requested would impact operational travel, mission safety-critical operational/technical training for the Hazardous Material Compliance and Enforcement Program, support for the National Security Professional Development program and key ASH positions. 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-evaluation of maintaining all 12 nationwide satellite talk groups which must remain active to support conference calls between ROCs during times of national crisis.
- Prevent 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.
- Limit FAA's visibility and influence to Pandemic Influenza support through interdepartmental exercises, preventing the Agency from addressing aviation related matters with DHS, Health & Human Services and other related stakeholders without aviation expertise.
- Diminish the level of support from contract personnel who respond to equipment failures and outages at the WOCC and other facilities, as well as 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.

Explanation of Funding Changes for Staff Offices

	Dollars ($000)	FTE
Staff Offices (Net Change from FY 2010 Enacted)	**$65,236**	**71**
Overview: For FY 2012, the Assistant Administrators for the 11 staff offices request $866,663,000 and 2,881 FTEs to meet their respective missions. The FY 2012 request corresponds to an increase of $65,236,000 and an increase of 71 FTEs over the FY 2010 Enacted level. The FY 2012 request level reflects unavoidable adjustments and non-pay inflation; programmatic increases and ten FAA base transfers.		
Unavoidable Adjustments		
Adjustments to Base This adjustment provides for unavoidable cost increases not funded in prior year budgets.	5,536	-15
Non-Pay Inflation This increase is needed to provide for inflationary cost increases consistent with OMB guidance that uses the FY 2012 GDP price index (year over year) of 0.5 percent.	2,174	
One Less Compensatory Day This adjustment factors in one less compensable day in FY 2012.	-1,452	
Uncontrollable Adjustments		
Adjustments to Base This adjustment provides for uncontrollable cost increases not funded in prior year budgets.	-5,000	
GSA Rent/DHS Security An increase of $9.9 million is required to accommodate increased leasing costs at three FAA facilities: Northwest Mountain Regional Office, Miramar FL AVS Office, and New England Regional Office. The Northwest Mountain (ANM) Regional Office (RO) Headquarters facility's Occupancy Agreement expired at the end of FY 2010. FAA is	9,900	

	Dollars ($000)	FTE
in the process of identifying a new location for the Regional Office (RO) as part of the proposed service center relocations. A new facility in ANM will not be ready to occupy at the time the current lease expires and the lessor intends to double the current rent while the Agency remains in the facility. A leased facility in Miramar FL houses consolidated Flight Standards staff from several Florida facilities including the North Florida Flight Standards District Office (FSDO), the AirTran Certificate Management Office (CMO), and the South Florida Certificate Management Office (CMO). The annual rent for the facility is approximately $2,750,000. An additional $1 million in costs is associated with the New England regional HQ building. The previous lease expired and after reviewing other potential locations, opted to remain at the current location. Under the terms of the new agreement, the agency will occupy fewer square feet than it did previously but at a higher cost per square foot.		
AVS/ASH Leases The FY 2007 President's Budget base transferred $25.9 million from AVS and ASH to ARC to fund those organization's administrative space leases. As Congress continues to appropriate additional funding for Flight Standards hiring, some of the existing leased facilities can no longer effectively accommodate additional staff and must relocate into larger space. For FY 2012, additional funding is being requested for a space lease in Atlanta that consolidated the Atlanta Flight Standard District Office (FSDO) [previously located in the Regional Headquarters] and other Flight Standards organizations into a single, stand-alone facility.	2,000	
Capital Security Cost Sharing Program (CSCSP) CSCSP provides funds to manage United States Government real property overseas, maintain Government-owned and long-term leased properties at approximately 265 posts, and to lease office and functional facilities and residential units, not only for the Department of State, but also for all United States Government employees overseas. This request provides for the increase in FAA's contribution to the CSCSP fund for our overseas employees that reside in the facilities maintained by this fund.	310	
Technical Staffing Adjustments	0	11

	Dollars ($000)	FTE
During FY 2010/FY2011 execution, four staff offices received approval for eleven positions to address some key areas of benefit for the agency. The Assistant Administrator for Financial Services received five positions for Information Systems and Assets Management. The Assistant Administrator for Information Services received three positions for IT optimization leadership, Electronically Sourced Information leadership, and investment analysis support. The Assistant Administrator for Communications received one position to initiate the IdeaHub program. The Assistant Administrator for Chief Counsel received two positions to support the Office of Audit and Evaluation. Base programs fund these positions.		
Working Capital Fund Increase The FAA requests funding to support cost increases to the Department of Transportation's Working Capital Fund (WCF) for the following items: $304,00 for an additional FTE and program support to oversee reimbursable agreements; $63,000 to support the transition of e-Gov Initiatives from reimbursable agreements to WCF oversight; $797,000 for the Office of the Chief Information Officer (OCIO) New Initiatives to include Security Operation Center Expansion; $312,000 for OCIO Cyber Security Transfer to support key program enhancements including infrastructure upgrades, provide contractual resources to address Federal security requirements, and to close critical gaps; and $2,400,000 for Records Management which will help DOT meet its responsibilities as directed by Section 207(e) of the e-Gov Act of 2002, the Federal Records Act, and the Federal Rules of Civil Procedure by focusing on modernizing current records management operations.	3,833	
Discretionary Increases		
Adjustments to Base This adjustment provides for discretionary cost increases not funded in prior year budgets.	32,041	56
Oracle 12i Delphi Conversion 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 implementing an OMB mandated Common Government Accounting Code (CGAC) and business process transformation activities. The upgrade of the core accounting system must operate on a currently supported platform of Oracle software. This request provides for contractual services and other resource	5,000	

	Dollars ($000)	FTE
requirements to implement all activities associated with the Oracle 12i Delphi conversion.		
Cyber Security Management Center (CSMC) The CSMC is established as the DOT's focal point for all information security incidents and provides a centralized operation responsible for monitoring and tracking information security incidents, conducting sensor data analysis, establishing trend analysis documentation, providing proactive and responsive corrective action capability, and providing the DOT with a wide information security technical assistance with cyber disaster recovery and other Information Security functions. In support of the Air Traffic Organization (ATO), the CSMC has been requested to extend their monitoring capabilities to cover 10 international sites. Funding is requested for two FTEs, additional hardware and software, and facility infrastructure upgrades to two sites.	4,000	2
Emergency Operations, Communications, Intelligence Watch, and Investigations This request provides funding for 13 FTEs, contract support and other related costs to more adequately resource security and hazardous material efforts. Resources are needed to address surge capability during protracted emergency events and upgrading the Washington Operations Center complex and IT infrastructure to address the current inadequate spatial configuration and aging technology that degrade effective information dissemination and crisis management. Additional resources are needed for intelligence and investigative responsibilities that include identifying and analyzing/investigating potential threats and misconduct; and to provide actionable information to FAA and DOT leadership, LOBs/SOs, and interagency defense, intelligence, and law enforcement agencies, supporting both FAA's and other agencies' operational and/or regulatory actions.	5,600	13
Base Transfers		
Labor Relations/ National Employee Safety: The Office of Aviation Policy, Planning and Environment will transfer one EOY/FTE and $177,000 to the Office of Human Resource Management to support the employee safety program, providing program management support, contract management support and coordination of issues where employee safety and environmental protection overlap. The workload of the program has increased significantly over the past years, as AHR has led the Occupational Safety, Health and Environmental Compliance Committee	0	0

	Dollars ($000)	**FTE**
(OSHECCOM) to identify and address issues that affect employee safety and health FAA-wide. This office works closely with all Lines of Business and Staff Offices in support of the Flight Plan goal to reduce workplace injuries. This results in no net change to Staff Offices.		
Safety and Hazardous Materials: The Office of Civil Rights will transfer one EOY/FTE and $66,000 to the Office of Safety and Hazardous Materials. This results in no net change to Staff Offices.	0	0
Mailing and Printing In an effort to achieve operational efficiencies, the Assistant Administrator for Financial Services/ CFO will transfer one FTE and $7,162,000 to the Assistant Administrator for Regions and Center Operations for the operation of mailing and printing services. This results in no net change to Staff Offices.	0	0
Civil Rights/ Diversity: The Civil Rights office will transfer one FTE and $95,000 to the Aviation Safety office.	-95	-1
Graphics Program In an effort to achieve operational efficiencies, the office of Communications will transfer one FTE and $1,010,000 to the Regions and Center Operations for the operation of the Graphics Program. This results in no net change to Staff Offices.	0	0
Audit and Evaluation The Air Traffic Organization and Aviation Safety Office will transfer four FTEs and $1,300,000 to the Office of the Chief Counsel to fully resource the Office of Audit and Evaluation. The office was established in FY 2010. Functions previously performed in ATO and AVS now reside in this newly-created AGC division.	1,300	4
IT Support The Financial Services/Chief Financial Officer will transfer one FTE and $178,000 to the Information Services/Chief Information Officer to	0	0

	Dollars ($000)	FTE
consolidate select IT-related services. This results in no net change to Staff Offices.		
NAS Support The Information Services/Chief Information Officer will transfer two FTEs and $378,000 to the Air Traffic Organization to support NAS-related IT systems. This results in no net change to Staff Offices.	-378,000	-2
Degree Completion Program FAA organizations will transfer a total of $310,000 to the Human Resource Office to administer the degree completion program. Of this amount $1900,000 is from the Air Traffic Organization and $10,000 is from the Commercial Space office, resulting in a net increase of $200,000 to Staff Offices.	200,000	0

Resource Summary

Staff Office Total

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	350,835	372,559	4,367	8,382	385,307
Other Objects					
Contracts	245,324	292,295	7,230	23,259	322,787
Travel/Transportation	36,357	19,017	55	-	19,069
Other Services[2]	163,885	117,555	6,945	15,000	139,500
Total	445,566	428,868	14,229	38,259	481,357
Total	**796,401**	**801,427**	**18,596**	**46,641**	**866,663**
Staffing					
EOY (FTP)	2,742	2,728	13	145	2,886
OTFTP	87	87	-	-	87
Total FTEs (Includes FTP and OTFTP)	2,625	2,795	(3)	74	2,866

Resource Summary

ABA

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	22,592	23,844	817	-	24,661
Other Objects					
Contracts	93,420	93,057	(7,113)	5,000	90,944
Travel/Transportation	333	307	2	-	308
Other Services[2]	(2,918)	(3,527)	(18)	-	(3,545)
Total	90,835	89,837	(7,129)	5,000	87,708
Total	**113,427**	**113,681**	**(6,312)**	**5,000**	**112,369**
Staffing					
EOY (FTP)	162	162	(2)	5	165
OTFTP	-	-	-	-	-
Total FTEs (Includes FTP and OTFTP)	145	162	(2)	5	165

[1] FY 2010 derived from actual obligations.

[2] Rents, Communications, Utilities, Printing & Reproduction Services, Supplies & Materials, Equipment, Land & Structures, and Insurance Claims & Indemnities.

Resource Summary

AHR

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	70,144	72,652	810	-	73,462
Other Objects					
Contracts	25,846	25,465	875	-	26,340
Travel/Transportation	1,782	1,324	7	-	1,331
Other Services[2]	2,485	986	5	-	991
Total	30,112	27,776	887	-	28,662
Total	**100,256**	**100,428**	**1,697**	**-**	**102,125**
Staffing					
EOY (FTP)	609	595	4	-	599
OTFTP	32	32	-	-	32
Total FTEs (Includes FTP and OTFTP)	595	624	4	-	628

Resource Summary

ARC

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	92,838	102,202	770	-	102,972
Other Objects					
Contracts	80,551	121,097	10,295	-	131,393
Travel/Transportation	8,825	7,448	12	-	7,460
Other Services[2]	159,403	111,230	6,900	15,000	133,130
Total	248,778	239,775	17,207	15,000	271,983
Total	**341,617**	**341,977**	**17,977**	**15,000**	**374,955**
Staffing					
EOY (FTP)	780	780	2	-	782
OTFTP	29	29	-	-	29
Total FTEs (Includes FTP and OTFTP)	760	822	(13)	-	809

[1] FY 2010 derived from actual obligations.
[2] Rents, Communications, Utilities, Printing & Reproduction Services, Supplies & Materials, Equipment, Land & Structures, and Insurance Claims & Indemnities.

Resource Summary

AIO

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	16,563	18,661	414	340	19,415
Other Objects					
Contracts	30,472	29,217	3,311	9,660	42,188
Travel/Transportation	1,265	1,054	5	-	1,059
Other Services[2]	510	346	2	-	348
Total	32,247	30,617	3,318	9,660	43,595
Total	**48,810**	**49,278**	**3,732**	**10,000**	**63,010**
Staffing					
EOY (FTP)	108	108	2	4	114
OTFTP	6	6	-	-	6
Total FTEs (Includes FTP and OTFTP)	102	108	2	2	112

Resource Summary

AOA

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	2,649	3,074	18	-	3,092
Other Objects					
Contracts	1,438	1,038	(3)	-	1,035
Travel/Transportation	71	90	0	-	90
Other Services[2]	24	3	0	-	3
Total	1,533	1,131	(3)	-	1,128
Total	**4,182**	**4,205**	**15**	**-**	**4,220**
Staffing					
EOY (FTP)	20	20	-	-	20
OTFTP	4	4	-	-	4
Total FTEs (Includes FTP and OTFTP)	20	24	-	-	24

[1] FY 2010 derived from actual obligations.
[2] Rents, Communications, Utilities, Printing & Reproduction Services, Supplies & Materials, Equipment, Land & Structures, and Insurance Claims & Indemnities.

Resource Summary

ACR

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	8,979	9,324	(105)	-	9,219
Other Objects					
Contracts	961	500	(10)	-	490
Travel/Transportation	724	710	4	-	713
Other Services[2]	300	444	2	-	446
Total	1,985	1,654	(4)	-	1,650
Total	**10,964**	**10,977**	**(109)**	**-**	**10,868**
Staffing					
EOY (FTP)	81	81	(2)	-	79
OTFTP	4	4	-	-	4
Total FTEs (Includes FTP and OTFTP)	77	85	(2)	-	83

Resource Summary

AGI

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	1,410	1,449	8	-	1,457
Other Objects					
Contracts	51	7	-	-	7
Travel/Transportation	33	47	0	-	47
Other Services[2]	41	93	(1)	-	92
Total	125	146	(1)	-	145
Total	**1,534**	**1,596**	**7**	**-**	**1,603**
Staffing					
EOY (FTP)	12	12	-	-	12
OTFTP	-	-	-	-	-
Total FTEs (Includes FTP and OTFTP)	11	12	-	-	12

[1] FY 2010 derived from actual obligations.

[2] Rents, Communications, Utilities, Printing & Reproduction Services, Supplies & Materials, Equipment, Land & Structures, and Insurance Claims & Indemnities.

Resource Summary

AOC

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	5,568	5,653	(52)	-	5,600
Other Objects					
Contracts	1,083	985	(926)	-	59
Travel/Transportation	112	92	0	-	92
Other Services[2]	106	162	-	-	162
Total	1,301	1,239	(925)	-	314
Total	**6,870**	**6,892**	**(977)**	**-**	**5,914**
Staffing					
EOY (FTP)	34	34	-	-	34
OTFTP	1	1	-	-	1
Total FTEs (Includes FTP and OTFTP)	33	34	-	-	34

Resource Summary

AGC

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	38,978	44,564	740	-	45,304
Other Objects					
Contracts	7,181	3,200	823	-	4,024
Travel/Transportation	958	614	3	-	616
Other Services[2]	1,799	824	4	-	828
Total	9,937	4,638	830	-	5,468
Total	**48,915**	**49,202**	**1,570**	**-**	**50,772**
Staffing					
EOY (FTP)	275	275	6	-	281
OTFTP	9	9	-	-	9
Total FTEs (Includes FTP and OTFTP)	260	279	6	-	285

[1] FY 2010 derived from actual obligations.

[2] Rents, Communications, Utilities, Printing & Reproduction Services, Supplies & Materials, Equipment, Land & Structures, and Insurance Claims & Indemnities.

Resource Summary

APL

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	25,128	24,380	565	270	25,215
Other Objects					
Contracts	1,652	4,192	(187)	2,749	6,755
Travel/Transportation	7,944	4,558	8	-	4,564
Other Services[2]	579	2,470	28	-	2,498
Total	10,175	11,220	(152)	2,749	13,817
Total	**35,303**	**35,600**	**413**	**3,019**	**39,032**
Staffing					
EOY (FTP)	164	164	2	-	166
OTFTP	2	2	-	-	2
Total FTEs (Includes FTP and OTFTP)	143	161	1	-	162

Resource Summary

ASH

	FY 2010 Actuals[1]	FY 2011 Annualized	Unavoidable Changes	Discretionary Changes	FY 2012 Request
Funding ($000)					
PC&B	65,986	66,755	382	7,772	74,909
Other Objects					
Contracts	2,670	13,536	164	5,850	19,551
Travel/Transportation	14,309	2,775	14	-	2,788
Other Services[2]	1,557	4,525	23	-	4,547
Total	18,536	20,836	200	5,850	26,887
Total	**84,522**	**87,591**	**582**	**13,622**	**101,795**
Staffing					
EOY (FTP)	497	497	1	136	634
OTFTP	-	-	-	-	-
Total FTEs (Includes FTP and OTFTP)	479	484	1	67	552

[1] FY 2010 derived from actual obligations.

[2] Rents, Communications, Utilities, Printing & Reproduction Services, Supplies & Materials, Equipment, Land & Structures, and Insurance Claims & Indemnities.

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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, $2,870,000,000, of which $2,390,000,000 shall remain available until September 30, 2014, and of which $480,000,000 shall remain available until September 30, 2012: *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 2013 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 2013 through 2017, 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.

Note.--A full-year 2011 appropriation for this account was not enacted at the time the budget was prepared; therefore, this account is operating under a continuing resolution (P.L. 111-242, as amended). The amounts included for 2011 reflect the annualized level provided by the continuing resolution.

Program and Financing
(in millions of dollars)

Identification code: 69-8107-0-7-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
	Direct program:			
0001	Engineering, development, test and evaluation	445	447	498
0002	Procurement and modernization of (ATC) facilities and equipment	1,518	1,623	1,575
0003	Procurement and modernization of non-ATC facilities and equipment	156	127	128
0004	Mission support	239	183	215
0005	Personnel and related expenses	467	470	480
0100	Subtotal, direct program	2,825	2,850	2,896
0801	Reimbursable program	53	140	140
0900	Total new obligations	2,878	2,990	3,036
	Budgetary resources available for obligation:			
1000	Unobligated balance brought forward, Oct 1	1,203	1,379	1,467
1021	Recoveries of prior year unpaid obligations	73	. . . . .	. . . . .
1050	Unobligated balance	1,276	1,379	1,467
	New budget authority (gross), detail:			
	Discretionary:			
1102	Appropriation (trust fund)	2,936	2,936	2,870
1133	Unobligated balance of appropriations temporarily reduced	-8	. . . . .	. . . . .
1160	Appropriation, discretionary (total)	2,928	2,936	2,870
1700	Spending authority from offsetting collections: collected	76	142	140
1701	Change in uncollected payment, Federal sources	-1	. . . . .	. . . . .
1750	Spending auth from offsetting collections, disc (total)	75	142	140
1900	Budget authority (total)	3,003	3,078	3,010
1930	Total budgetary resources available	4,279	4,457	4,477
	Memorandum (non –add) entries:			
1940	Unobligated balance expiring	-22	. . . . .	. . . . .
1941	Unexpired Unobligated balance, end of year	1,379	1,467	1,441
1951	Special and non-revolving trust funds: Unobligated balance expiring	22	. . . . .	. . . . .
1952	Expired Unobligated balance, start of year	130	125	125
1953	Expired Unobligated balance, end of year	103	125	125
1954	Unobligated balance canceling	53	. . . . .	. . . . .
	Change in obligated balances:			
3000	Unpaid obligations, brought forward, Oct 1 (gross)	1,945	2,012	1,983
3010	Uncollected pymts, Fed sources, brought forward, Oct 1	-115	-88	-88
3020	Obligated balance, start of year (net)	1,830	1,924	1,895
3030	Obligations incurred, unexpired accounts	2,878	2,990	3,036
3031	Obligations incurred, expired accounts	15	. . . . .	. . . . .
3040	Outlays (gross)	-2,697	-3,019	-3,132
3050	Change in uncollected pymts, Fed sources, unexpired	1	. . . . .	. . . . .
3051	Change in uncollected pymts, Fed sources, expired	26		
3080	Recoveries of prior year unpaid obligations, unexpired	-73		
3081	Recoveries of prior year unpaid obligations, expired	-56		
3090	Unpaid obligations, end of year (gross)	2,012	1,983	1,887
3091	Uncollected pymts, Fed sources, end of year	-88	-88	-88
3100	Obligated balance, end of year (net)	1,924	1,895	1,799
	Budget Authority and outlays, net:			
4000	Budget authority, gross	3,003	3,078	3,010

4010	Outlays from new discretionary authority	1,042	1,345	1,326
4011	Outlays from discretionary balances	1,638	1,662	1,794
4020	Outlays (gross)	2,680	3,007	3,120
	Offsets:			
	Against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-11	-48	-48
4033	Non-Federal sources	-76	-94	-92
4040	Offsets against gross budget authority and outlays (total)	-87	-142	-140
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pymts, Fed sources, unexpired	1	. . . . .	. . . . .
4052	Offsetting collections credited to expired accounts	11	. . . . .	. . . . .
4060	Additional offsets against gross budget authority only (total)	12	. . . . .	. . . . .
4070	Budget authority, net (discretionary)	2,928	2,936	2,870
4080	Outlay, net (discretionary)	2,593	2,865	2,980
	Mandatory:			
	Outlays, gross:			
4101	Outlays from mandatory balances	17	12	12
4170	Outlay, net (mandatory)	17	12	12
4180	Budget authority, net (total)	2,928	2,936	2,870
4190	Outlay, net (total)	2,610	2,877	2,992

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. As the organization primarily responsible for air traffic infrastructure, the Air Traffic Organization receives and manages 95 percent of the funding in this account. The funding request for 2012 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 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Direct obligations:			
	Personnel compensation:			
1111	Full-time permanent	317	319	325
1113	Other than full-time permanent	3	3	3
1115	Other personnel compensation	11	11	11
1119	Total personnel compensation	331	333	339
1121	Civilian personnel benefits	85	85	87
1210	Travel and transportation of persons	38	38	39
1220	Transportation of things	2	2	2
1232	Rental payments to others	. . . . .	. . . . .	1
1233	Communications, utilities, and miscellaneous charges	68	68	70
1240	Printing and reproduction	. . . . .	. . . . .	1
1252	Other services from non-federal sources	1,938	1,957	1,988
1260	Supplies and materials	31	31	32
1310	Equipment	190	192	195
1320	Land and structures	132	133	134
1410	Grants, subsidies, and contributions	10	11	8
1990	Subtotal, obligations, Direct obligations	2,825	2,850	2,896
	Reimbursable obligations:			
	Personnel compensation:			

2111	Personnel compensation: Full-time permanent	5	5	5
2121	Civilian personnel benefits	2	1	1
2210	Travel and transportation of persons	2	2	2
2252	Other services from non-federal sources	20	69	69
2260	Supplies and materials	4	19	19
2310	Equipment	17	39	39
2320	Land and structures	3	5	5
2990	Subtotal, obligations, Reimbursable obligations	53	140	140
9999	Total new obligations	2,878	2,990	3,036

Employment Summary

Identification code: 69-8107-0-7-402	FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
1001 Direct civilian full-time equivalent employment	2,899	3,062	3,082
2001 Reimbursable civilian full-time equivalent employment	46	55	55

FACILITIES AND EQUIPMENT, INFRASTRUCTURE INVESTMENT

Program and Financing
(in millions of dollars)

Identification code: 69-1308-4		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
	Direct program:			
0001	Engineering, development, test and evaluation	.....	.....	82
0002	Procurement and modernization of air traffic	.....	.....	65
0003	Procurement and modernization of non-ATC facilities and equipment	.....	.....	1
0004	Mission support	.....	.....	2
0900	Total new obligations	.....	.....	150
	Budgetary resources available for obligation:			
	Unobligated balance:			
1050	Unobligated balance carried forward, end of year	.....	.....	.....
	New budget authority (gross), detail:			
	Discretionary:			
1200	Appropriation, mandatory (total)	.....	.....	250
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	.....	.....	100
	Change in obligated balances:			
3030	Obligation incurred, unexpired accounts:	.....	.....	150
	Budget authority and outlays (Mandatory):			
4090	Budget authority, gross	.....	.....	250
	Budget authority, net (Mandatory):			
4180	Budget authority, net	.....	.....	250
4190	Outlays, net (total)	.....	.....	100

To spur job growth and allow States to initiate sound multi-year investments, the Budget includes a $50 billion boost above current law spending for roads, railways and runways. The Budget requests a one-time appropriation of $250 million in mandatory General Fund resources to advance FAA's next generation air traffic control (NextGen) and make near-term improvements in FAA's air traffic control infrastructure. $200 million will be used to accelerate applied research, advance development, and implement engineering solutions for NextGen technologies, applications, and procedures; and $50 million will be used to upgrade FAA capital infrastructure such as power systems and air traffic control centers and towers.

Object Classification
(in millions of dollars)

Identification code: 69-1308-4		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Direct obligations:			
1310	Equipment	.....	.....	89
1320	Land and sructures	.....	.....	61
9999	Total new obligations	.....	.....	150

EXHIBIT III-1

FACILITIES and EQUIPMENT
SUMMARY BY PROGRAM ACTIVITY
Appropriations, Obligations Limitations, and Exempt Obligations
($000)

	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Engineering, Development, Test and Evaluation	520,742	497,850	137,300	635,150
Air Traffic Control Facilities and Equipment	1,581,244	1,459,850	108,100	1,567,950
Non-Air Traffic Control Facilities and Equipment	131,917	180,400	2,000	182,400
Facilities and Equipment Mission Support	232,300	251,900	2,600	254,500
Personnel and Related Expenses	470,000	480,000	0	480,000
TOTAL	**2,936,203**	**2,870,000**	**250,000**	**3,120,000**
FTEs				
Direct Funded	2,899	3,082	0	3,082
Reimbursable	46	55	0	55

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.

As the organization primarily responsible for air traffic infrastructure, the performance based Air Traffic Organization (ATO) receives and manages 95 percent of the funding in this account. The remaining five percent of the funding is for Aviation Safety (AVS), Information Services (AIO), and Regions and Centers (ARC).

*Includes funding provided by the President's $50 billion Infrastructure Initiative of 2012. This act requests one-time General Fund Mandatoryl funding of $250 million to Facilities and Equipment.

FY 2012 Submit

Activity 1, Engineering, Development, Testing and Evaluation

		Discretionary	Mandatory	Total	Page
1A01	Advanced Technology Development and Prototyping	$31,900,000	$1,500,000	$33,400,000	13
1A02	NAS Improvement of System Support Laboratory	$1,000,000	$0	$1,000,000	25
1A03	William J. Hughes Technical Center Facilities	$15,000,000	$0	$15,000,000	27
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$7,500,000	$4,900,000	$12,400,000	29
1A05	NextGen Network Enabled Weather	$27,350,000	$0	$27,350,000	33
1A06	Data Communications in support of Next Generation Air Transportation System	$143,000,000	$7,200,000	$150,200,000	36
1A07	Next Generation Air Transportation System – Demonstrations and Infrastructure Development	$16,900,000	$8,100,000	$25,000,000	40
1A08	Next Generation Air Transportation System – System Development	$90,000,000	$19,000,000	$109,000,000	45
1A09	Next Generation Air Transportation System – Trajectory Based Operations	$9,300,000	$13,700,000	$23,000,000	54
1A10	Next Generation Air Transportation System – Reduce Weather Impact	$14,600,000	$18,400,000	$33,000,000	59
1A11	Next Generation Air Transportation System – High Density Arrivals/Departures	$14,300,000	$13,700,000	$28,000,000	63
1A12	Next Generation Air Transportation System – Collaborative ATM	$28,000,000	$25,000,000	$53,000,000	68
1A13	Next Generation Air Transportation System – Flexible Terminals and Airports	$36,300,000	$21,800,000	$58,100,000	76
1A14	Next Generation Air Transportation System – Safety, Security and Environment	$5,000,000	$3,000,000	$8,000,000	85
1A15	Next Generation Air Transportation System – System Network Facilities	$9,000,000	$1,000,000	$10,000,000	89
1A16	Next Generation Air Transportation System – Future Facilities	$19,500,000	$0	$19,500,000	93
1A17	Joint Planning and Development Office (JPDO)	$3,000,000	$0	$3,000,000	97
1A18	NextGen Performance Based Navigation (PBN) Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)	$26,200,000	$0	$26,00,000	99

Total, Activity 1 .... $635,150,000

Activity 2, Procurement and Modernization of Air Traffic Control Facilities and Equipment

a. En Route Programs

		Discretionary	Mandatory	Total	Page
2A01	En Route Modernization (ERAM)	$120,000,000	$0	$120,000,000	104
2A02	En Route Modernization (ERAM) – D-Position Upgrade and System Enhancements	$0	$64,500,000	$64,500,000	106
2A03	En Route Communications Gateway (ECG)	$2,000,000	$4,000,000	$6,000,000	109
2A04	Next Generation Weather Radar (NEXRAD)	$2,800,000	$0	$2,800,000	112
2A05	Air Traffic Control Command Center (ATCSCC) – Relocation	$3,600,000	$0	$3,600,000	115
2A06	ARTCC Building Improvements/Plant Improvements	$46,000,000	$6,000,000	$52,000,000	117
2A07	Air Traffic Management (ATM)	$7,500,000	$0	$7,500,000	120
2A08	Air/Ground Communications Infrastructure	$4,800,000	$0	$4,800,000	122
2A09	Air Traffic Control En Route Radar Facilities Improvements	$5,800,000	$0	$5,800,000	124
2A10	Voice Switch and Control System (VSCS)	$1,000,000	$0	$1,000,000	126
2A11	Oceanic Automation System	$6,000,000	$2,000,000	$8,000,000	128
2A12	Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$45,150,000	$0	$45,150,000	130
2A13	System-Wide Information Management (SWIM)	$66,350,000	$0	$66,350,000	133
2A14	ADS-B NAS Wide Implementation	$285,100,000	$0	$285,100,000	136
2A15	Windshear Detection Services	$1,000,000	$0	$1,000,000	139
2A16	Weather and Radar Processor (WARP)	$2,500,000	$0	$2,500,000	141
2A17	Collaborative Air Traffic Management Technologies	$41,500,000	$0	$41,500,000	144
2A18	Colorado ADS-B WAM Cost Share	$3,800,000	$2,000,000	$5,800,000	146
2A19	Automated Terminal Information System (ATIS)	$1,000,000	$0	$1,000,000	149
2A20	Tactical Flow Time Based Flow Management (TBFM)	$38,700,000	$0	$38,700,000	151

b. Terminal Programs

		Discretionary	Mandatory	Total	Page
2B01	Airport Surface Detection Equipment – Model X (ASDE-X)	$2,200,000	$0	$2,200,000	154
2B02	Terminal Doppler Weather Radar (TDWR) – Provide	$7,700,000	$0	$7,700,000	157
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$25,000,000	$0	$25,000,000	159
2B04	Terminal Automation Modernization/Replacement Program (TAMR Phase 3)	$98,750,000	$0	$98,750,000	162
2B05	Terminal Automation Program	$2,500,000	$0	$2,500,000	165
2B06	Terminal Air Traffic Control Facilities – Replace	$51,600,000	$0	$51,600,000	167
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve	$56,900,000	$5,000,000	$61,900,000	169
2B08	Terminal Voice Switch Replacement (TVSR)	$10,000,000	$0	$10,000,000	171
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$26,000,000	$0	$26,000,000	173
2B10	Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$6,000,000	$2,000,000	$8,000,000	175
2B11	Terminal Digital Radar (ASR-11) Technology Refresh	$3,900,000	$0	$3,900,000	178
2B12	Runway Status Lights (RWSL)	$29,800,000	$0	$29,800,000	181
2B13	National Airspace System Voice System (NVS)	$19,800,000	$0	$19,800,000	183
2B14	Integrated Display System (IDS)	$8,800,000	$0	$8,800,000	185
2B15	Remote Monitoring and Maintenance System (RMMS) Technology Refreshment	$4,200,000	$0	$4,200,000	187
2B16	Mode S Service Life Extension Program (SLEP)	$4,000,000	$4,000,000	$8,000,000	189
2B17	ASR-8 Service Life Extension Program	$2,700,000	$0	$2,700,000	192

c. Flight Service Programs

		Discretionary	Mandatory	Total	Page
2C01	Automated Surface Observing System (ASOS)	$2,500,000	$0	$2,500,000	194
2C02	Flight Service Station (FSS) Modernization	$4,500,000	$0	$4,500,000	196
2C03	Weather Camera Program	$4,800,000	$0	$4,800,000	198

d. Landing and Navigational Aids Program

		Discretionary	Mandatory	Total	Page
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$5,000,000	$0	$5,000,000	200
2D02	Instrument Landing System (ILS) – Establish/Expand	$5,000,000	$0	$5,000,000	202
2D03	Wide Area Augmentation System (WAAS) for GPS	$125,000,000	$0	$125,500,000	204
2D04	Runway Visual Range (RVR)	$5,000,000	$0	$5,000,000	209
2D05	Approach Lighting System Improvement Program (ALSIP)	$5,000,000	$0	$5,000,000	211
2D06	Distance Measuring Equipment (DME)	$5,000,000	$0	$5,000,000	213
2D07	Visual Navaids – Establish/Expand	$3,400,000	$0	$3,400,000	215
2D08	Instrument Flight Procedures Automation (IFPA)	$2,200,000	$0	$2,200,000	217
2D09	Navigation and Landing Aids – Service Life Extension Program (SLEP)	$6,000,000	$0	$6,000,000	219
2D10	VASI Replacement – Replace with Precision Approach Indicator	$7,000,000	$0	$7,000,000	221
2D11	Global Positioning System (GPS) Civil Requirements	$50,300,000	$0	$50,300,000	223
2D12	Runway Safety Areas – Navigational Mitigation	$25,000,000	$0	$25,000,000	225
2D13	NAVAID Control, Interlock, and Monitoring Equipment (NCIME)	$0	$1,000,000	$1,000,000	228

e. Other ATC Facilities Programs

		Discretionary	Mandatory	Total	Page
2E01	Fuel Storage Tank Replacement and Monitoring	$6,400,000	$0	$6,400,000	230
2E02	Unstaffed Infrastructure Sustainment	$18,000,000	$4,600,000	$22,600,000	232
2E03	Aircraft Related Equipment Program	$11,700,000	$0	$11,700,000	235
2E04	Airport Cable Loop Systems – Sustained Support	$5,000,000	$0	$5,000,000	238
2E05	Alaskan Satellite Telecommunications Infrastructure (ASTI)	$16,000,000	$3,000,000	$19,000,000	240
2E06	Facilities Decommissioning	$5,000,000	$0	$5,000,000	243
2E07	Electrical Power System – Sustain/Support	$85,600,000	$10,000,000	$95,600,000	245
2E08	Aircraft Fleet Modernization	$9,000,000	$0	$9,000,000	249
2E09	FAA Employee Housing and Life Safety Shelter System Service	$2,500,000	$0	$2,500,000	251

Total, Activity 2.. ...$1,567,950,000

Activity 3, Procurement and Modernization of Non- Air Traffic Control Facilities and Equipment

	a. Support Programs	Discretionary	Mandatory	Total	Page
3A01	Hazardous Materials Management	$20,000,000	$0	$20,000,000	255
3A02	Aviation Safety Analysis System (ASAS)	$30,100,000	$0	$30,100,000	257
3A03	Logistics Support System and Facilities (LSSF)	$10,000,000	$0	$10,000,000	261
3A04	National Air Space Recovery Communications (RCOM)	$12,000,000	$0	$12,000,000	263
3A05	Facility Security Risk Management	$18,000,000	$0	$18,000,000	266
3A06	Information Security	$17,000,000	$2,000,000	$19,000,000	268
3A07	System Approach for Safety Oversight (SASO)	$23,600,000	$0	$23,600,000	274
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$17,200,000	$0	$17,200,000	276
3A09	Data Center Optimization	$1,000,000	$0	$1,000,000	281
3A10	Aerospace Medical Equipment Needs (AMEN)	$12,000,000	$0	$12,000,000	284

	b. Training, Equipment, and Facilities	Discretionary	Mandatory	Total	Page
3B01	Aeronautical Center Infrastructure Modernization	$18,000,000	$0	$18,000,000	288
3B02	Distance Learning	$1,500,000	$0	$1,500,000	291
	Total, Activity 3				

Total, Activity 3.. $182,400,000

Activity 4, Facilities and Equipment Mission Support

	a. System Support and Support Services	Discretionary	Mandatory	Total	Page
4A01	System Engineering and Development Support	$32,900,000	$0	$32,900,000	295
4A02	Program Support Leases	$41,700,000	$0	$41,700,000	297
4A03	Logistics Support Services (LSS)	$11,700,000	$0	$11,700,000	299
4A04	Mike Monroney Aeronautical Center Leases	$17,000,000	$0	$17,000,000	301
4A05	Transition Engineering Support	$13,000,000	$0	$13,000,000	303
4A06	Technical Support Services Contract (TSSC)	$22,000,000	$0	$22,000,000	305
4A07	Resource Tracking Program (RTP)	$4,000,000	$0	$4,000,000	308
4A08	Center for Advanced Aviation System Development (CAASD)	$80,800,000	$0	$80,800,000	310
4A09	Aeronautical Information Management Program	$26,300,000	$2,600,000	$28,900,000	315
4A10	Permanent Change of Station (PCS) Moves	$2,500,000	$0	$2,500,000	319

Total, Activity 4.. $254,500,000

Activity 5, Personnel Compensation, Benefits, and Travel

		Discretionary	Mandatory	Total	
5A01	Personnel and Related Expenses	$480,000,000	$0	$480,000,000	321
	Total, All Activities	**2,870,000,000**	**250,000,000**	**$3,120,000,000**	

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 $635,150,000 for FY 2012, a reduction of $114,405,000 (-18 percent) below our FY 2010 budget request. Of the $635,150,000 requested for FY 2012, $573,350,000 is requested to begin one new initiative and continue multiple basic and applied research efforts in support of future Next Generation Air Transportation System (NextGen) technologies and concepts. The remaining $61,800,000 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 – Significantly reduce communications-related operational errors and improve the safety of air travel
- NextGen Future Facilities – Complete the 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 Goal:

- 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; and
- 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.

Detailed Justification for - 1A01 Advanced Technology Development and Prototyping

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

FY 2012 – Advanced Technology Development and Prototyping
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Advanced Technology Development and Prototyping	$42,800	$31,900	$1,500	$33,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Runway Incursion Reduction Program	---	$5,000.0
2. System Capacity, Planning and Improvements	---	6,000.0
3. Operations Concept Validation	---	4,000.0
4. NAS Weather Requirements	---	1,000.0
5. Airspace Management Program	---	3,000.0
6. ATO Strategy and Evaluation	---	3,000.0
7. Dynamic Capital Planning	---	2,500.0
8. Wind Profiling and Weather Research Juneau	---	700.0
9. Traffic Collision Avoidance System (TCAS)	---	2,500.0
10. Operational Modeling Analysis and Data	---	3,500.0
11. In Service Engineering	---	700.0
Total	Various	$31,900.0

Activity Tasks – Mandatory		
Flight Service Automation Modernization (FSAM)	---	$1,500.0

For FY 2012, a total of $33,400,000 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.

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. National Airspace System (NAS) Weather Requirements

The National Airspace System (NAS) Weather Requirements program develops aviation weather mission analysis, users' needs analysis, and NAS and domain level functional/performance requirements; allocates requirements to the National Weather Service and FAA components; and harmonizes U.S. aviation weather requirements and standards globally.

This work is done to address the high cost of weather to today's NAS where weather is responsible for 70 percent of delays over 15 minutes and contributes to 24 percent of accidents and 34 percent of fatalities. Up to 2/3 of weather delays are avoidable, but despite a continuous flow of improvements available through aviation weather science and implementation solutions aimed at providing better weather information, the significant impact of weather on aviation remains.

The NAS Weather Requirements program supports the goals of:

- Safety, Reduced Congestion, and Global Connectivity in the Department of Transportation Strategic Plan.
- NAS Capacity, NAS Safety, and Global Harmonization goals of the FAA Flight Plan, and
- NAS and Domain Level Weather Requirements Data Base for NextGen under a Core Activity in the 2012 Business Plan entitled "12S.108C1 - Core Activity: National Airspace System Requirements Development.

The NAS Weather Requirements program is composed of five components:

1. Core weather requirements development and allocation,
2. Global standardization of NAS weather requirements,
3. Integration of weather information into capabilities needed by ATC Decision Support
4. Fast track development of concept and requirements documentation for targeted NowGen operational needs, and
5. Core safety assessment capability under the Safety Management System (SMS) for required new weather capabilities.

1. The core weather requirements development component gathers and assesses users' needs for weather information by FAA ATC, pilots, Flight Operations Centers (FOCs), and airport operators and converts those users' needs into NAS and domain level functional and performance requirements for weather information. The program data bases the NAS weather requirements and allocates them to providers including the National Weather Service (NWS), elements of FAA, and/or commercial providers. Work includes completing requirements allocation to map requirement to organizations and systems; performing a user need analysis for convective forecasting, turbulence, ceiling and visibility and in-flight icing; performing a gap analysis between current and NextGen timeframes; developing plans for how weather requirements will be validated; updating the Preliminary Portfolio Requirements document with NNEW and NWP requirements; and developing governance rules for the process to approve and allocate weather requirements.

2. The global standardization component arises out of FAA's official role as the U.S. Meteorological (MET) Authority to the International Civil Aviation Organization (ICAO). The role of the MET Authority to promote adoption of U.S. meteorological information requirements, standards and practices for global use through International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPS). This work is accomplished through about 12 ICAO planning, study, and operations groups. Work will consist of mitigating U.S. differences to ICAO Annex 3 Meteorological Service for International Air Navigation after Amendments are approved; developing US positions on issues arising from the ICAO Volcanic Ash Task Force; developing various working papers for the World Area Forecast Systems Operations Group; developing a user needs analysis and functional requirements for Space Weather; and work to amend ICAO Annex 3 to incorporate the NextGen concept of the 4-D Weather Data Cube.

3. The NAS Weather Requirements program is to effectively integrate weather information into operational decision. The weather information requirements of operational decision support processes and tools (e.g. CATM) are assessed and incorporated into overall NAS Weather Requirements data base. This program is responsible for base-lining the integration requirements while NextGen funded programs will assess the NextGen requirements for integration.

4. The NAS Weather Requirements program funds deep-dive concept and requirements development and documentation of targeted NowGen operational needs. These are operational needs that can be addressed in the near term, prior to the NextGen solution, to meet urgent needs, and that can transitioned smoothly into NextGen solutions at a later time. Examples include (1) improved airborne observations of weather (icing, turbulence, winds, temperatures, and water vapor) for immediate use by controllers, FOC's, ATC, and pilots and (2) provision of near-real-time wind information needed to reduce the impact of adverse winds aloft (compression problem) on arrivals and departures at major hubs such as NYC. This program will fund the necessary ConUse and requirements development/allocation of weather information to support these NowGen needs.

5. The NAS Weather Requirements program is maintenance of a core safety assessment capability under the Safety Management System (SMS) for required new weather information products and capabilities. As changes are proposed as FAA updates weather systems and incorporates new weather product, safety risk assessments are conducted to ensure that the changes do not introduce unacceptable risk into the NAS.

e. 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 communications 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.

f. Air Traffic Organization (ATO) Strategy and Evaluation

The FAA's Office of NextGen 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 that do capacity studies:

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 NextGen Systems Analysis, the model will be used by the Office of Performance Analysis and Strategy for runway capacity studies, ATO Finance 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 to 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.

For FY 2012 we will continue developing and maintaining the software for the two computer models. The new Airport Capacity Model will be completed prior to FY 2012. 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 the new System-Wide NAS Model.

Specifically, the following work is to be performed on the System-Wide NAS Model with FY 2012 funds:

- Continue development of Graphical User Interface (GUI)
- Update output processor
- Continue development (and provide initial delivery) of Monte Carlo simulation capability
- Begin software re-architecting to allow parallel computation
- Begin software implementation of new en route airspace capacity algorithm
- Begin software implementation of new airport capacity algorithm
- Integrate software modules
- Verify, validate, and test new software releases

- Maintain software
- Provide user support and training
- Update software documentation.

g. 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.

h. Wind Profiling and Weather Research Juneau

The JAWS provides terrain induced wind and turbulence data that addresses safety of flight and decreases the probability of experiencing unnecessary weather related delays in and out of the Juneau International Airport (JNU), Alaska. Although JAWS data is provided to the aviation community as advisory, it is operationally essential for pilots to know the wind conditions because of the restrictive geographical features that affect approach and departure paths. The JAWS measures and transmits wind information to the Juneau Automated Flight Service Station (AFSS) for use in preparing general aviation pre-flight and in-flight pilot weather briefings; Alaska Airlines for use in complying with their FAA Flight Standards directed Operations Specification; the National Weather Service for weather forecasting; and to other Alaska aviation weather users via the Internet.

In 2008 favorable results were realized in the performance of turbulence alerting, and alternatives were analyzed to determine the best business case for the JAWS. The JAWS investment decision, in December 2008, approved implementing the hardened prototype as the end-state JAWS. The end-state system will be operated and maintained by the FAA.

The National Center for Atmospheric Research (NCAR) developed the prototype JAWS and has been operating, maintaining, improving and upgrading the prototype since 1998. The JAWS prototype does not conform to FAA operations and maintenance standards, and the current architecture of the prototype JAWS is not supportable beyond 2009. Operating and maintaining the JAWS requires hardware replacement, a computer technology update, information security compliance, and transfer of the technology from NCAR to the FAA. Transitioning the operations and maintenance of the JAWS to the FAA involves software development, code, compilers, operating system improvements, obtaining system and training documentation, and receiving access to data on JAWS operating experience and other NCAR, intellectual property. NCAR provides operation and maintenance history and technical support during the transition.

For FY 2012, $700,000 is requested for JAWS to complete the transition from the JAWS Hybrid to the JAWS End State. The JAWS contributes to the FAA Flight Plan Objective 1: Reduce commercial air carrier fatalities, Increased Safety to achieve the lowest possible accident rate and constantly improve safety. JAWS contributes to achieving the DOT Safety Strategic Goal by providing critical wind information to enable commercial required navigation performance (RNP) operations in Juneau, AK, and it disseminates timely turbulence information to the aviation community to reduce cabin injuries caused by turbulence. The JAWS also supports landing and departure capabilities for aircraft during hazardous wind conditions

i. 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) that tell 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 that occurred in Japan. The committee examined these events and others to determine the cause and contributing factors. The committee determined that 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, and it 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, and
- Situational awareness or separation tools were not available in the cockpit.

j. Operational Modeling Analysis and Data

The Operational Modeling Analysis and Data program provides support and oversight for developing and using operational models of air traffic activity. 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 funding the development of new models and modification or upgrading of existing models and by providing standardized input data that these models require. This program will also provide guidance and assistance in the use of models to answer operational needs.

k. 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.

Flight Service Automation Modernization (FSAM)

FSAM is an effort to develop alternatives for the automation platforms for all FSS facilities. This effort is aimed at developing the Next Generation Air Transportation System (NextGen) enhancements; an integrated pilot web portal or interoperability with other Flight Service systems with appropriate and configuration management, and safety/risk management. It is also exploring other service delivery models.

This effort will be a step towards NextGen integration by offering operational efficiencies and safety benefits in the near-term. The new functions will be linked to the NextGen Reduce Weather Impact (RWI) Solution Set and will support the FAA Flight Plan goal of reducing the general aviation (GA) accident rates.

This effort will examine how the automation of services currently performed by humans will improve operational efficiencies and further safety improvements through weather updates, monitoring flight plan progress, expediting Search and Rescue (SAR), and improving situational awareness for both pilots and Air Traffic Control Specialists.

Investment analysis activities will be conducted in FY 12 including the following:

- Development and approval of a Concept of Use
- Development of Preliminary Program Requirements
- Development of a Preliminary Functional Analysis
- Development of a Shortfall Analysis
- Development of an Operational Safety Analysis
- Development of a Preliminary Alternatives Analysis, and

Initial Development of an Investment Analysis Plan and Rough Order of Magnitude (ROM) estimates for the three alternatives

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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 JRC 2A.

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. NAS Weather Requirements

This program is necessary because (1) the needs for weather information in the operation of the NAS are not being adequately met today, (2) those needs will grow exponentially with the growth in traffic planned for in NextGen, and (3) weather science itself is changing rapidly. These three factors point to the need to continually reassess NAS aviation weather requirements, and this program is the only capability in FAA that addresses weather requirements at the NAS and domain levels. These high level requirements are an essential foundation of system level requirements needed to guide NWS production, FAA weather systems development, and U.S. leadership in global harmonization of aviation weather requirements with ICAO.

e. Airspace Management Program (AMP)

Airspace Redesign is the FAA initiative to ensure that 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 the new flows associated with new runways in Chicago (ORD) and in Las Vegas.

f. ATO Strategy and Evaluation:

This program provides analytical tools to assist with decision-making throughout the 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 us to estimate these metrics for future scenarios involving different traffic forecasts and NAS characteristics. Without such tools we cannot perform the cost-benefit analyses required of us to justify capital investments for all the 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 decide 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 we easily achieve with the Modernized NASPAC. System-Wide Modeler is a proprietary product of the MITRE Corp., and also requires extensive computer infrastructure. At the beginning of this effort MITRE refused to transfer the model to the Government.

If this program is not funded in FY 2012 we will not be able to complete development of the system-wide model. Several key components will not be finished, namely the Monte Carlo capability. Some support for NextGen portfolio analysis will also not be available, as these funds are supporting users engaged in this activity.

One of the 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 us to make better investment decisions

In FY 2012 we will continue developing and maintaining the software for the two computer models. The new Airport Capacity Model will be completed prior to FY 2012. 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 the new System-Wide NAS Model.

If this program is not funded in FY 2012 we will not be able to complete development of the system-wide model. Several key components will not be finished, namely the Monte Carlo capability. Some support for

NextGen portfolio analysis will also not be available, as these funds are supporting users engaged in this activity.

g. Dynamic Capital Planning

The current Planning tools 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 the FAA Financial systems are not standardized in the same language and formats. Also it produces several different reports and the terminology is not standardized.

h. Wind Profiling and Weather Research Juneau (JAWS)

The JAWS system provides both safety (anecdotal) and efficiency (capacity) benefits. Pilots receive the wind information in the Juneau area. Additionally, the wind information is used by Alaska Airlines to comply with an FAA directed Operations Specification (Ops Spec). When the winds are such that they exceed the Ops Spec parameters, commercial related operations in and out of Juneau are stopped, ensuring safety for the flying public. As soon as the wind sensors show a decrease below the Ops Spec restriction parameters, the Juneau flight operations are allowed to resume. In addition to these commercial aviation safety and efficiency benefits, the JAWS wind measurement system enhances the safety of general aviation operations. The Juneau AFSS provides the JAWS data as part of their weather briefings, as appropriate, and pilots are able to access the data via the internet, as well. However, the safety benefits are only discussed qualitatively due to the limited number of historical wind related accidents in Juneau, from which to base the estimated value.

i. 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).

Flight Service Automation Modernization (FSAM)

Expiration of the Current Contract: The Flight Service Program Office must develop options for flight services. The base period of the current fixed price CONUS contract expires in 2010, with two optional extensions, until 2013 and 2015.

Stakeholder Support: The Aircraft Owners and Pilots Association (AOPA), the National Air Transport Association (NATA) and other user groups have reviewed and endorsed the operational upgrades proposed for FSAM.

Increased Safety: The FAA Flight Plan Goal to reduce General Aviation (GA) accidents remains unmet. Most GA accidents have no ATC involvement and many GA pilots do not file flight plans for fear that they will forget to close the flight plan. There is no alert if a VFR flight 'disappears' from En Route Screens. The GA accident rate will only change when more pilots get better information. The new services provide incentive for GA to equip with ADS-B. Safety upgrades include delivery of new weather information, flight plan monitoring to expedite SAR response time and reduce search areas, and flight plan closure reminders. FSAM will make a positive impact on GA accident rates by increasing situational awareness by pushing critical weather updates to the pilot and by monitoring VFR flight progress in order to expedite SAR.

Automation upgrades and efficiencies: To put Flight Service on the path to the FAA's Next Generation Air Traffic System (NextGen), FSAM will include the use of Automatic Dependent Surveillance-Broadcast (ADS-B), NextGen Network Enabled Weather (NNEW) and System Wide Information Management (SWIM).

Operational Efficiencies: The current contract has provided the FAA considerable cost savings and avoidances. FASM is aiming to realize even more savings and cost avoidance for the government by examining alternatives that automate many functions currently performed by humans And allowing pilots to self-brief on the integrated pilot web portal and then use the chat feature to receive an expert interpretation on matters not fully understood, e.g., thunderstorm activity. This will reduce the Preflight briefing times and Inflight talk time.

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. NAS Weather Requirements

The principal users of NAS weather information are people and decision support systems in the various components of air traffic services, FOC's, pilots, and airport operators. Their needs for weather information are identified from analysis of (1) what decisions they make for which weather information is needed (users needs analysis) and (2) what and how good that 2B05 information must be (functional and performance requirements). Requirements are allocated to research in cases where the information is not available or directly to providers where capabilities are already developed. This program funds core capability for these allocation functions with substantial supplemental funding from NextGen programs for future capabilities.

We know that the program works to establish NAS weather requirements in the manner described above. We also know from extensive commercial and government system engineering history and practices that requirements set in this manner are essential to development of complete and efficient systems and procedures.

e. 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 ensure project efficiency and success to the NAS.

f. 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 and 2010 NextGen Implementation Plans. We anticipate the model will be used to support a similar effort for the FY 2012 budget request. The model is also currently being used to perform the business case analysis for the DataComm program. 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.

g. 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.

h. Wind Profiling and Weather Research Juneau (JAWS)

This project provides both safety and capacity benefits: Three significant incidents involving transport aircraft that occurred during turning departures between 1993 and 1995 led to the implementation of wind restrictions and the need for JAWS. These wind restrictions along with additional routes have mitigated the safety risk significantly. In addition, general aviation users rely on JAWS for wind information and receive this information from the Juneau Automated Flight Service Station (AFSS), internet, and National Weather Service forecast.

i. 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.

Flight Service Automation Modernization (FSAM)

Basic flight service automation requirements and functions are well established. FSAM is using this foundation while adding important safety enhancements for a smarter and more efficient system.

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

$33,400,000 is required to continue all activities within the Advanced Technology Development and Prototyping (ATDP) budget line item.

A reduction to ATDP will have to be developed carefully so that significant damage is not done to important milestones on which considerable importance is attached. 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. We urge that any cuts necessary be provided in a general sense so that they can be managed so that the least impact would occur in the ATDP program.

Detailed Justification for - 1A02 NAS Improvement of System Support Laboratory

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

**FY 2012 – NAS Improvement of System Support Laboratory
($000)**

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
NAS Improvement of System Support Laboratory	$1,000	$1,000	$0	$1,000

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 2012, $1,000,000 is requested for continued improvements to the Laboratory systems and laboratory infrastructure in order to support critical National Airspace System (NAS) and NextGen programs.

FY 2010 funding was appropriated for system support laboratory improvements, such as uninterrupted power system upgrades for the NAS Laboratories, electrical panel board replacements, 20-year laboratory facilities master plan, and fire stops and safety improvements.

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 that supports the implementation, testing, and integration of new NAS systems prior to their delivery to the various FAA field sites. A single, centralized support laboratory helps FAA 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 provide 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 the FAA's centralized NAS laboratory facilities so that 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 12E.294 Core Business Target: System Support Laboratory Sustained Support, Laboratory Infrastructure Initiative, Business Goal 12E.294A2 for implementing laboratory improvements outlined in the 20-Year Laboratory Facility Master Plan and completion of the Design and Phase 1 of this plan. A reduction will limit work completed in Phase I and a further percent reduction will likely push Phase 1 into fiscal year FY 2013, missing our Core Business Target for FY 2012.

Detailed Justification for - 1A03 William J. Hughes Technical Center Facilities

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

FY 2012 – William J. Hughes Technical Center Facilities
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
William J. Hughes Technical Center Facilities	$12,000	$15,000	$0	$15,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Hardware Sustainment	---	$1,045.9
2. Software Licenses and Support	---	460.1
3. Engineering. Maintenance, and Support Services	---	11,775.0
4. Parts, Supplies, and Equipment	---	1,419.0
5. Pilot Training	---	300.0
Total	1	$15,000.0

For FY 2012, $15,000,000 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; 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 provide 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 thus 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?

$15,000,000 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 including a reduction in support staff providing services on the third shift.

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 2012 – William J. Hughes Technical Center Infrastructure Sustainment ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
William J. Hughes Technical Center Infrastructure Sustainment	$5,500	$7,500	$4,900	$12,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Bldg. 300 Roof and Skylight Replacement Phase 2	---	$7,500.0
Activity Tasks – Mandatory		
2. Structural Deficiency Remediation	---	300.0
3. Technical Support Space Utilization Strategy	---	1,400.0
4. Substation 2 Replacement in building 300	---	2,000.0
5. building 287 Roof Replacement and Mechanical Upgrade	---	1,200.0
Total	1	$4,900.0

For FY 2012, $7,500,000 of discretionary funding is requested for continued sustainment of FAA's infrastructure at the William J Hughes Technical Center and $4,900,000 of mandatory funding is requested for Structural Deficiency Remediation, Technical Support Space Utilization Strategy, Substation 2 Replacement in building 300 and Building 287 Roof Replacement and Mechanical Upgrade.

The Building 300 Roof and Skylight Replacement project involves the replacement of approximately 192,000 square feet of roofing, 19,000 square feet of skylights and over 500 linear feet of on grade flashing. The current roofing system was installed in 1991 and consists of loose laid and stone ballasted black EPDM (rubber) roofing over board insulation. The roofing system is beyond its 15 year useful life and is exhibiting numerous areas of failure, including leaks, separation of seams, displacement of ballast, areas of ponding and clogging of roof drains. The roof skylights, despite having been recoated several times, are a constant source of leakage. In addition, lack of properly detailed counter-flashing has also resulted in leakage over administrative and support areas located below grade within the building.

For FY 2012 the Building 300 project will replace the building's roofing system with a new fully adhered Polyvinylchloride (PVC) membrane roofing and insulation system carrying a 20 year total system warranty. The existing black rubber roofing, ballast and insulation will be removed and the materials recycled wherever possible. The new white PVC roofing is an Energy Star rated, environmentally friendly "cool" roof system which is expected to reduce energy costs as well as reduce maintenance expenses associated with constant repair of the existing roof system, since as many as 10 leaks have occurred after a single, heavy rainstorm and identifying the source of a leak can require the removal of approximately 10,000 square feet of roofing area. It will also replace skylights with new insulated, aluminum framed thermally broken, sloped modular translucent fiberglass panels with attached insulated glass clerestory windows which will increase natural light, increase energy efficiency and are warranted against leakage, yellowing and panel degradation. In addition, the counter-flashing for the below grade roofing areas will be replaced with new, extended stainless steel counter-flashing.

The Structural Deficiency Remediation project will correct all Building 275 deficiencies associated with (1) the roof structure; (2) the existing refractory ceiling; (3) the existing non-refractory ceiling; and (4) all supporting structural members. Building 275, the Full Scale Fire Test Facility, was built in the late 1970's.

Its mission is to fire test sections of full scale airplane fuselages in a test facility 72 ft. x 184 ft. x 50 ft. high. The roof of the building is constructed using large steel trusses made from rolled sections. The 64 foot by 72 foot refractory ceiling consists of panels that are suspended from the roof framing using steel rods and heavy steel wire. Each refractory ceiling panel has 6 rows of embedded plaster type anchors (36 anchors per panel). Acidic smoke from burn testing is encountered in the area between the roof and refractory ceiling. Furthermore, although the building roof was recently replaced (in late 2008), there had been prior reports of water leakage in the non-refractory areas of the ceiling. A few of the non-refractory (lay-in) ceiling panels were damaged by water and have fallen.

This Structural Remediation project enables the Fire Research and Safety Program to efficiently carry out its mission without incidents or delays; and eliminates a potential life safety problem as the failure of support rods and/or refractory panels in Building 275 could lead to substantial damage and possible injury. This will also implement the first year's structural recommendations for Building 275 included in a consultant's 20 year master plan prepared for the Center in FY 2008

The Technical Support Space Utilization Strategy funds are required for the procurement of Architect/Engineer Services. These services include the preparation of design documents, which will commence in late FY-2012 with completion expected to be in early FY 2013. Deliverables will include plans, specifications, cost estimates, design analyses, and supporting documentation to enable construction of the infrastructure necessary to provide and environment suitable for 24x7x365 reliability and availability. The existing Technical Center's aging infrastructure with single points of failure and insufficient monitoring capability will be upgraded to support critical NAS/FAA systems.

The establishment of an infrastructure necessary for providing and sustaining a suitable environment for the Tech Center's 24x7x365 operations enables the mission critical systems hosted at the Tech Center, such as Traffic Flow Management Production Center (TPC), FAA Telecommunications Infrastructure (FTI) and the Enterprise Data Centers supporting FAA IT operations to provide increased capacity with enhanced reliability. Additionally, systems such as Reduced Vertical Separation Minimum (RSVM), Wide Area Augmentation System (WAAS), and Automatic Dependent Surveillance Broadcast (ADS-B) to also perform in a proper environment and hence provide enhanced safety and reliability to the greater NAS/FAA system.

Upgrading the electrical infrastructure within Building 300 is crucial to the establishment of a suitable 24x7x365 environment. A key portion of this initiative is the replacement of the six electrical substations located within the building. The current substation conditions and overall arrangement have been identified as serious system deficiencies by the FAA's Power Services Group (AJW-22). A contract is currently in construction to replace three of these substations (Nos. 1, 3 and 6). A design to replace the remaining three substations is almost complete. Due to the complexity of the electrical equipment as well as the costs associated with establishing a Supervisory Control and Data Acquisition (SCADA) System for the Center's complex electrical infrastructure current funding is only available to replace Substations 4 and 5. This project will fund the replacement of Substation 2. This project will also ensure compliance with the FAA's electrical sub-metering requirements.

The Building 287 roofing system consists of approximately 5,000 square feet of roofing. The current roofing system was installed in 1993 and has essentially failed. Numerous roof leaks have enabled water to run into electrical panel boxes, the building's elevator shaft, various offices as well as stairwells. Despite repeated maintenance efforts the leaks have resulted in rotted interior wooden doors, saturated drywall and forced the inhabitants to build barriers on the floor to contain the flow of water.

The entire roofing system will be replaced including all of the mechanical equipment located on the roof. The existing lightning protection system will also be upgraded to comply with current National Fire Protection Association and Underwriter Laboratories standards. All of these deficiencies had been identified in a private engineering firm's 20 year master plan for 34 buildings, completed in July of 2008.

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 Building 300 roof and skylights are at the end of their useful lives, has an expiring warranty, and have been maintenance nightmares. A private engineering firm's 20 year master plan for 34 buildings, completed in July of 2008, identified structural deficiencies in a facility utilized by the Fire Research and Safety Program.

The Technical Support Space Utilization Strategy program will identify, evaluate, and develop facilities improvement projects based on customer requirements for current and future NAS support facilities, research, development, test and evaluation (RDT&E) facilities, Information Technology (IT) data centers, and administrative support space at the WJHTC. The purpose of this program is to implement a strategy based on a comprehensive space management assessment that consolidates FAA customer requirements and identifies opportunities for modernization, modifications, and/or expansion of the facilities infrastructure at the WJHTC.

Electrical testing during a 2005 planned power shutdown revealed that the six substations located in Building 300 were in marginal condition. These substations are beyond their useful lives per the American National Standards Institute. One of the transformers in substation No. 6 caught fire in October of 2009, causing the evacuation of approximately 1200 people from Building 300.

DOT Strategic Goal - Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

The 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 figures). 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 2012 expenditure of approximately 4.1 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 $4.81 per square foot.

The Technical Center facility must provide 24x7x365 availability/reliability support (i.e. power, cooling) for NAS/FAA operational systems 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.

In addition to these operational systems, the Technical Center facility must enable 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).

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).

The proposed Technical Support Space Utilization Strategy to provide 24X7X365 availability/reliability support is based on proven and well established concepts utilized on a national and international basis by Government and corporate installations operating in a mission critical environment. Basic guidance for work of this nature has been developed by organizations such as the Uptime Institute. Further guidance is available from sources such as Standard 942, Revision 5, published by the Telecommunications Institute of America (TIA). The basic methodology governing engineering design and analysis related to this effort is encompassed within the best business practices and adopts industry standards such as those referenced in the previous paragraph.

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

$11,000,000 is required to complete the Building 300 Roof and Skylight Replacement – Phase 2; for Structural Deficiency Remediation; Substation 2 Replacement in Building 300, and for Building 287 Roof Replacement and Mechanical Upgrade. Impacts have already been encountered in the elimination of an electrical subsystem upgrade project in Building 300 and the restructuring of the Building 300 Roof and Skylight Replacement project, which have now been subdivided into two phases due to previous budgetary constraints. Reductions would delay completion of these projects.

$1,400,000 is required to complete a comprehensive investment analysis, so the FAA can implement a space management strategy that will:

- Improve management of FAA's real property assets and optimizing maintenance costs
- Update the Technical Center infrastructure and facilities to better support NextGen activities, operational systems and programs
- Reduce leased space
- Implement cost efficiency as well as agency-wide initiatives to reduce costs and improve productivity

A reduction would eliminate the possibility of completing the Structural Deficiency Remediation project.

Detailed Justification for - 1A05 Next Generation Network Enabled Weather (NNEW)

What Do I Need To Know Before Reading This Justification?

- In order to realize early NextGen functionality the NNEW Program will be delivering a limited operational capability in 2013. This will provide an essential contribution to the full operational capability for Segment 1 in 2015. Segment 2 will improve weather dissemination capability and provide improved infrastructure to better handle future NextGen requirements.
- NNEW currently has a lower funding requirement for FY 2012 when compared with the Capital Investment Plan (CIP). This is due to Initial Operating Capability for NNEW Segment 1 moving to 2015. In turn, acquisition costs originally planned for 2012 have been pushed to later years.

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

FY 2012 – Next Generation Network Enabled Weather (NNEW)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Network Enabled Weather (NNEW)	$20,000	$27,350	$0	$27,350

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
2013 Limited Operational Capability		
1. Baseline Software for Reference Implementation	---	$3,500.0
2. Baseline IT Security Network Enabled Environment	---	800.0
3. Fund Acquisition Activities	---	4,750.0
Segment 1		
4. Investment Analysis	---	1,250.0
5. Refine Software for Reference Implementation	---	3,500.0
6. Refine Security Development Network Enabled Environment	---	1,700.0
7. Acquire Hardware, Software, and Communications	---	1,500.0
Segment 2		
8. Initiate CRD Activities	---	750.0
9. Initiate Planning/Development Efforts for Segment 2 Concepts	---	8,000.0
10. NextGen System Engineering	---	1,350.0
11. Independent Operational Test and Evaluation	---	250.0
Total	Various	$27,350.0

For FY 2012, $27,350,000 is requested to provide for a 2013 limited operational capability as an initial contribution to Segment 1 development; to refine software development for the reference implementations; refine security development in the network enabled environment, to acquire hardware, software and communications in Segment 1; to initiate Segment 2 concept requirement definition activities, and to initiate planning and development efforts to examine Segment 2 concepts. Additionally, funding is requested for Program Management and NextGen Systems Engineering, and Independent Operational Test & Evaluation (OT&E).

2. What Is This Program?

The NextGen Network Enabled Weather (NNEW) program will establish the capability to disseminate aviation weather information in a network enabled, multiagency environment. 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.

NNEW will develop the FAA's portion of the 4-Dimensional (4-D) Weather Data Cube. Access to aviation weather information is required by both human users and automated systems. NNEW will enable standardized access to weather data sets by all NextGen users. By making aviation weather information available in a network enabled manner, legacy and new systems as well as human users will be able to acquire the weather information appropriate to their missions without acquiring additional telecommunications lines to existing individual or multiple weather systems. Should the weather requirements of an existing system change, acquiring the new or different weather information can be accomplished without new telecommunications.

The 4-D Wx Data Cube consists of (1) weather data published in various databases within FAA, National Oceanic and Atmospheric Administration (NOAA), and Department of Defense (DoD), as well as commercial weather data providers that may participate; (2) registries/repositories needed to locate and retrieve published data; (3) the capability to translate among various standards that will be employed to provide data in user required units and coordinate systems; and (4) the capability to support retrieval requests for data volumes (such as along a flight trajectory). A subset of the data published to the 4-D Wx Data Cube will be designated the Single Authoritative Source (SAS). The SAS identifies the preferred data source that should be used to support collaborative air traffic management decisions and ensures that decisions are based on consistent data. This is commonly referred to as the Common Operating Picture because using the SAS will cause air traffic management and a pilot to use the same sources of weather information for making decisions.

NNEW is responsible for establishing the information management capabilities necessary for the operations of the network-enabled 4-D Weather Data Cube. There will be testing and demonstration efforts to resolve key technical questions and reduce implementation risk of a network-enabled weather environment to the FAA and external system users. This will include assurance that NNEW is fully compatible and consistent with the evolved System-Wide Information Management (SWIM) infrastructure. This will also serve to define open standards and requirements necessary for overall NextGen weather dissemination compatibility.

FY 2012 Key Milestones and Deliverables:

- Finalize data/exchange standardization
- Final NNEW evaluation and demonstrations
- Finalize definition Initial Operating Capability (IOC) Content
- Finalize Metadata Guidelines for IOC
- Complete Version 4 of WCS/WFS Reference Implementation
- Obtain Initial Investment Decision for NNEW Segment 1
- Finalize documentation for the RFP for NNEW Segment 1
- Conduct evaluations to resolve key technical questions and reduce implementation risk while demonstrating and assessing the operational benefits of a network-enabled weather environment to the FAA, other agencies, and aviation system users

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Delays in the National Airspace System (NAS) are primarily attributable to weather. Over the last five-year period, over 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, the NNEW Program utilizes open international data standards for digital weather data so that this data can more easily be integrated into Air Traffic Management (ATM) systems.

4. How Do You Know The Program Works?

The NNEW program has entered the Concept and Requirements Definition and this includes the establishment of measurement criteria in support of flight plan objectives. The program is scheduled to establish a baseline at Final Investment Decision (FID), planned for FY 2013. During this timeframe, a 2013 limited operational capability is planned as an initial contribution to NNEW Segment 1 development. It will establish a baseline from which to measure performance as the NNEW improvements are implemented through the NextGen weather IOC timeframe. 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.

As a risk reduction activity the NNEW program is using open international standards to format and exchange digital weather data. Additionally the program is building a prototype for conducting test and evaluations of the developed capabilities to determine how effectively the new capabilities perform. Additionally, NNEW is leading the world with EUROCONTROL in developing the Weather Exchange Model (WXXM) which is the emerging worldwide standard for the exchange of weather data. NNEW provides access to the 4-D Wx Data Cube 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?

NNEW is part of an interagency effort to provide quick, easy, and cost effective access to weather information. The interagency partners, led by National Oceanic and Atmospheric Administration (NOAA), and including the FAA, have program responsibilities and tasks to ensure their collaborative efforts are integrated into a single solution.

$27,350,000 is required to provide for a 2013 limited operational capability as an initial contribution to NNEW Segment 1 development; to refine software development for the reference implementations; refine security development in the network enabled environment, to acquire hardware, software and communications in Segment 1; to initiate concept requirement definition activities, and planning and development efforts for Segment 2. Additionally, funding is requested for Program Management and NextGen Systems Engineering, and Independent Operational Test & Evaluation (OT&E).

A reduction would impact the program's ability to achieve the 2013 limited operational capability as an initial contribution to NNEW Segment 1 development.

Detailed Justification for - 1A06 Data Communications in support of Next Generation Air Transportation System

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

FY 2012 – Data Communications in Support of Next Generation Air Transportation System ($000)

Activity/Component	FY 2010 Enacted	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Data Communications in support of Next Generation Air Transportation System	$46,700	$143,000	$7,200	$150,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Final Investment Decision (FID) Management Planning	---	$2,683.0
2. Systems Engineering	---	13,260.1
3. Operational Integration	---	35,873.9
4. DataComm Air Ground Network Service	---	26,264.8
5. Business Case Analysis	---	4,037.4
6. Business Management	---	2,970.3
7. En Route	---	52,445.5
8. Tower DCL and Revision	---	5,465.0
Total	Various	$143,000.0

Activity Tasks – Mandatory		
9. Automation Engineering	---	7,200.0
Total	Various	$7,200.0

For FY 2012, $143,000,000 is requested for DataComm 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. In addition, DataComm will enhance automation for ATC message generation and exchange.

For FY 2012, $7,200,000 of mandatory funding is requested for automation engineering activities in the En Route environment.

2. What Is This Program?

The DataComm 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. DataComm 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

The DataComm program is divided into three segments. Segment 1 will deliver the initial set of DataComm services integrated with automation support tools, which provides NAS benefits and lays the foundation for a data-driven NAS. Segment 2 will enable more advanced NextGen operations, which would not be possible using the existing voice systems.

Near-term DataComm program efforts focus on:

- Continuation of avionics validation, prototyping and certification
- DataComm Integrated Services (DCIS) contract award
- Final Investment Decision Segment 1b for en route automation enhancements
- Award En route data communications automation integration efforts
- Software development for en route Computer-Human Interface (CHI) upgrades
- Trials and Validations
- Human-in-the-Loop simulations
- Business Case and Program Requirements Finalization
- Industry Outreach Efforts
- Tower Data Link Services (TDLS) hardware and software enhancements to enable data communications over Aeronautical Telecommunications Network (ATN)
- William J. Hughes Technical Center (WJHTC) Integration and Test Planning, Laboratory Development, and test equipment procurement
- Spectrum repacking and band clearing

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The operations and services enabled by DataComm 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 of the three DataComm segments 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. Segment 3 will enable the full transformation to NextGen.

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, DataComm will significantly reduce communications related operational errors and improve the safety of air travel.

DataComm 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 ATM service per aircraft operation) will decrease. DataComm 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, DataComm does not completely replace voice communications, rather it augments these services. Several studies suggest that with 70 percent of aircraft data-link 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. DataComm 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, DataComm will be used in conjunction with the current traffic control strategies as well as planned strategies such as traffic flow management (TFM) reroutes. DataComm 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. DataComm benefits will be realized in en route, TRACON, 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 in Operational Evolution Partnership (OEP) airport towers, will see the most dramatic benefits.

New services enabled by DataComm 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. DataComm, 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.

NAS capacity will be improved by data communications and the operations it enables. Initially, DataComm will be used with the current traffic control strategies to reduce controller workload by automating repetitive exchanges. As controllers become more productive, sector capacity will grow without the need to assign additional resources. DataComm benefits will be realized in En Route, TRACON, tower and ground operations, as controllers' workloads are reduced, enabling them to spend more time moving traffic efficiently. The busiest positions, whether in en route feeder sectors in metro corridors, terminal approach sectors or airport ground control at OEP airports, will see the most dramatic benefits.

4. How Do You Know The Program Works?

The DataComm program is currently in the Final Investment Analysis phase. Final Investment Decision (FID) will occur in fiscal year 2012.

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

$150,200,000 is required for FIA management and planning technical support; En Route Automation Modernization (ERAM) system engineering and specifications development; Protocol Gateway; Tower Data Link Services (TDLS) automation specifications development; systems engineering; standards development; avionics validation, prototype and demonstration support; integration, test planning and laboratory development; operational capability and integration support, and human factors for NextGen Concept of Operations (CONOPS). DataComm will bridge the gap between current voice-only ATC, and the data-intensive NextGen. To ensure the NAS has the capacity to grow, DataComm will implement services that maximize controller productivity, reduce operational errors associated with voice communications, and enable new air traffic services and reduce delays. DataComm 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 accelerate the transition to DataComm 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 this initiative will substantially accelerate the benefits derived from en route data communications services in the future. Current estimate of significant NAS benefit is $18 billion over a 24 year life cycle for Segment 1 and Segment 2, which includes:

- User: $16.5 billion in Airline Direct Operating Cost (e.g., fuel) and Passenger Value of Time
- FAA: $1.3 billion in operations costs and related equipment

Detailed Justification for - **1A07 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 2012 – Demonstrations and Infrastructure Development (DEMO)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FAA Mandatory	FY 2012 Total
Demonstrations and Infrastructure Development	$34,602	$16,900	$8,100	$25,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. International Air Traffic Interoperability	---	$4,500.0
2. Airborne Access to SWIM	---	4,200.0
3. Airborne Execution of Flow Strategies	---	4,200.0
4. GBAS Demonstration Project	---	2,500.0
5. Future Planning	---	1,500.0
Total	Various	$16,900.0

Activity Tasks - Mandatory	Quantity	($000)
1. International Air Traffic Interoperability	---	$500.0
2. RNAV-RNP Terminal Area Demo Report	---	3,100.0
3. Airborne Access to SWIM	---	800.0
4. Airborne Execution of Flow Strategies	---	800.0
5. GBAS Demonstration Project	---	1,000.0
6. Future Planning	---	1,900.0
Total	Various	$8,100.0

For FY 2012, $16,900,000 of discretionary funding will provide for the following:

Demo International Air Traffic Interoperability

- 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 to conduct Oceanic Optimization demonstrations in the Atlantic and Pacific
- Continue to conduct Flight Data Object (FDO) information exchange demonstration in the Pacific (e.g., SWIM, FDO, etc)

Demo Airborne Access to SWIM

- Demonstration Plan
- Test Bed Requirements
- Safety Analysis

Airborne Execution of Flow Strategies

- Develop program plan for linking ground-based ANSP flow strategies with flight operator planning
- Conduct analysis of relationship, including potential impact, to both other flow strategies (for example, airborne metering and interval management) and leveraging of planned, advanced flight information availability (through, for example, flight object or SWIM capabilities)

Ground Based Augmentation System (GBAS) Demonstration Project

- Planning and coordination
  - Develop Concept of Operations (CONOPS) for rapid recovery operations.
  - Coordinate with stakeholders
- Instrument flight procedures
  - Design, develop, and deploy comprehensive, public-use Area Navigation-Required Navigation Performance (RNAV/RNP) AR flight segments at Guam International Airport.
  - Integrate RNP procedures with complementary RNAV arrivals.
  - Consult with the Performance Based Navigation (PBN)user community.
  - Maintain and support flight procedures for the duration of the phase
- Staged deployment at the trial site
- Data collection and analysis to characterize the effects on GBAS accuracy in the equatorial ionosphereic environment.
- Develop recommendations for further improvements to the deployed operations to meet the objectives of the CONOPS

Future Planning

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.

For FY 2012, $8,100,000 of mandatory funding will provide for the following:

Demo International Air Traffic Interoperability

- Continue to conduct Gate-to-Gate demonstration over the Atlantic

RNAV/RNP Terminal Area Demonstration

- Integrate RNP procedures with complementary RNAV arrivals
- Consult with the PBN user community
- Design, develop and deploy comprehensive, public -use RNAV and RNP AR flight segments at trial airports
- Develop CONOPS and Coordinate with stakeholders
- Develop recommendations for further improvements to the deployed operations to meet the objectives of the CONOPS
- Maintain and support flight procedures for the duration of the phase
- Measurement of pre-and post-implementation fuel consumption, CO2 emission, noise, and other relevant metrics

Demo Airborne Access to SWIM

- Memorandum of Agreements

Airborne Execution of Flow Strategies

- Develop engineering assessment of potential alternatives

Ground Based Augmentation System (GBAS) Demonstration Project

- Benefits measurement
  - Measurement of pre- and post-implementation fuel consumption, CO2 emission, noise, and other relevant metrics.
  - Establish benefits case for rapid recovery GBAS system

Future Planning

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.

Area Navigation-Required Navigation Performance (RNAV-RNP) Terminal Area Demonstration

This project is intended to demonstrate the safe and effective integration of public RNP operations in a mixed-equipage traffic environment using Traffic Management Advisor (TMA), an existing software tool, to sequence traffic in a way that can produce immediate and measurable reductions in CO_2 emission, fuel burn, and noise. RNP procedures implemented under this proposal will be designed for public use by any authorized operator.

Airborne Access to System Wide Information Management (SWIM)

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 will begin field demonstration of Airborne Execution of Flow Strategies to support development of final procedures and information exchange. Also, this project will demonstrate the use of electronic negotiation to coordinate and execute reroutes of airborne 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. Negotiation may include the ability for the user to substitute flights to meet their business needs. Once the reroute(s) is finalized, demonstrate the capability to transfer the reroute to the flight deck and the downstream controller's workstation. If possible, the reroute will be uploaded to the flight deck via data communications. Other possible procedures include transmission through ATC voice communications or data transmission relayed through the AOC.

Ground Based Augmentation System (GBAS) Demonstration Project

This project is intended to demonstrate use of GBAS to support rapid recovery of Cat I instrument approach capability, the safe and effective integration of public RNP operations in a mixed-equipage traffic environment, the measurable reductions in CO2 emissions, fuel burn, and noise with the implementation of GBAS enable approaches to all runways at the project airport. Additionally, the project will characterize the impact of the equatorial ionospheric environment on GBAS operations. RNP procedures implemented under this proposal will be designed for public use by any authorized operator.

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. Unmanned Aircraft Systems 4D Trajectory Based

- Integration of Automated Dependent Surveillance Broadcast (ADS-B) Point of Service delivery for UAS
- Integration of Four Dimensional Trajectory Flight Management System into the UAS architecture
- Conduct integrated operational expanded demonstration with ADS-B, 4DT FMS and NAS Voice Switch prototype (VOIP)

b. High Density Airport (HAD) Capacity and Efficiency Improvement

- Conduct flight deck human in the loop simulation
- Conduct Air Traffic Control human in the loop simulations
- Complete the 3D Path Arrival Management technical transfer package
- Complete the Tailored Arrivals technical transfer package

c. International Air Traffic Interoperability

- Conduct Gate to Gate demonstration over the Atlantic
- Conduct Oceanic Optimization demonstrations in the Atlantic and Pacific
- Conduct Flight Data Object (FDO) information exchange demonstration in the Pacific (e.g., SWIM, FDO, etc)

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

For FY 2012, $25,000,000 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 - 1A08 Next Generation Transportation System (NextGen) – System Development (SYSDEV)

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

FY 2012 -- Next Generation Transportation System (NextGen) – System Development (SYSDEV) ($000)

Activity/Component	FY 2010 Enacted	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System (NextGen) – System Development (SYSDEV)	$66,100	$90,000	$19,000	$109,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Human Factors (Efficiency/Air Ground Integration)	---	$8,600.0
2. New ATM Requirements	---	28,000.0
3. Operations Concept Validation Modeling	---	8,600.0
4. Staffed NextGen Towers (SNT)	---	5,200.0
5. Environment and Energy – EMS and Noise Reduction	---	12,900.0
6. Wake Turbulence-Re-categorization	---	2,600.0
7. System Safety Management Transformation	---	15,500.0
8. Operational Assessments	---	8,600.0
Total	Various	$90,000.0

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Human Factors (Efficiency/Air Ground Integration)	---	$1,400.0
2. New ATM Requirements	---	9,000.0
3. Operations Concept Validation Modeling	---	1,400.0
4. Staffed NextGen Towers (SNT)	---	800.0
5. Environment and Energy – EMS and Noise Reduction	---	2,100.0
6. Wake Turbulence-Re-categorization	---	400.0
7. System Safety Management Transformation	---	2,500.0
8. Operational Assessments	---	1,400.0
Total	Various	$19,000.0

For FY 2012, $90,000,000 of discretionary funding will provide for the following:

Human Factors (Efficiency/Air Ground Integration)

- Continue Human Factors program to support System Development and Enterprise Architecture during Service Analysis

New Air Traffic Management (ATM) Requirements

- Develop an integrated approach between separation assurance and collision avoidance, with special attention to the safety case
  - Develop and execute implementation plan for NextGen Traffic Alert and Collision Avoidance System (TCAS)
  - Develop standards and guidance for advanced safety assurance methods and simulation
- Common Trajectory Requirements and Implementation Strategy
  - Continue analysis to allocate functions to systems, ground and airborne
  - Lab demonstration and fast time modeling of common trajectory

- Continue risk assessment
- RNAV/RNP via Data Communications
  - Delivery across data communications
  - On the fly development, evaluation and delivery
- New Radar Requirements (Surveillance and Weather)
  - Surveillance & Weather Radar Replacement (SWRR) - Analyze Phase 1 technology maturity and deliver recommendation
  - SWRR - Phase 2 concept demonstrator procurement preparation and contract award
  - SWRR - provide for best practices

Operations Concept Validation Modeling

- Initial set of detailed operational scenarios for the far-term
- Concept Benefits Modeling (230% increase modeled by the end of 2013)
- Simulation and Analysis of Integrated Time Based Flow Management (TBFM)

Sys Dev Staffed NextGen Towers (SNT)

- Business Case Analysis Report
- Implementation Strategy and Planning
- Basis of Estimate
- Risk Metrics for final investment analysis
- Updated Enterprise Architecture products and amendments
- Completion of system safety documentation

Environment and Energy – Environmental Management System (EMS) and Noise Reduction

- Implement enterprise level EMS framework
- Integrate environmental information into key decision processes
- Initiate targeted EMS Communications and outreach initiatives
- Conduct second phase of pilot studies based on outcomes from the first phase
- Initiate NextGen EMS implementation efforts at priority stakeholder organizations with significant near-term environmental issues
- Assess the impacts on NAS wide operations (including environmental performance) of aircraft standards for noise and emissions.
- Significant exploration and demonstration of environmental control algorithms for surface and terminal operational procedures
- Analyze environmental impacts of CLEEN technologies on the NAS and assess approaches to optimize aircraft system environmental performance
- Analyze environmental impacts of alternative fuels on the NAS and assess approaches to optimize aircraft system environmental performance
- Investigate impact on NAS wide operations of market based options, including Cap and Trade and carbon charges, to limit aircraft greenhouse gas emissions

Wake Turbulence Re-categorization

- Engineering and analysis necessary to determine system implementation feasibility of the Leader/Follower wake turbulence mitigation separation processes and procedures that being developed by the project
- Continued data collection of aircraft wake turbulence to achieve statistical confidence in the leader/follower separations being proposed
- Determine best methods for incorporating key weather and aircraft performance parameters into determination of safe and capacity efficient separation processes and procedures

System Safety Management Transformation

- Annual system-level safety assessment capability is productized, and validated.
- Transition to steady state operations for analysis of known risks, safety enhancements, and benchmarks.

Operational Assessments

- Continue Aviation Environmental Design Tool (AEDT) and Aviation Portfolio Management Tool (APMT) enhancements for NextGen local to NAS-wide environmental analysis
- Refine analysis and assessment of NAS-wide NextGen environmental mitigation and cost-beneficial options for decision support
- Continue exploration of options to integrate environmental assessment capability with NextGen NAS models
- Enhance Operational Performance Model to support NextGen Operational Assessments

For FY 2012, $19,000,000 of mandatory funding will provide for the following:

Human Factors (Efficiency/Air Ground Integration)

- Continue Human Factors program to support System Development and Enterprise Architecture during Service Analysis

New Air Traffic Management (ATM) Requirements

- New Radar Requirements (Surveillance and Weather)
  - Complete CRDR artifacts for wind-shear detection services work package 1 (NAS EA DP WxA)
- Development of industry standards/requirements and to evaluate the benefits associated with the current phase
- Availability of ADS-B data matching or exceeding coverage from the five current Long Range Radars along the proposed RNAV routes
- Development of ADS-B only RNAV routes along the East Coast and the Caribbean

Operations Concept Validation Modeling

- Initial version of NextGen end-to-end concept for the far-term (2025) for internal review.

Sys Dev Staffed NextGen Towers (SNT)

- Maintain SNT equipment at Dallas/Ft. Worth (DFW) (field test site)

Environment and Energy – Environmental Management System (EMS) and Noise Reduction

- Perform analysis for EMS Environmental Impacts and Metrics
- Finalize NextGen EMS implementation in initial FAA organizations
- Analyze NEPA compliance within the EMS framework
- Coordinate NextGen data management with NextGen planners and developers
- Significant exploration and demonstration of environmental control algorithms for en route operational procedures to reduce aircraft fuel burn, emissions and noise
- Investigate potential operational changes required to optimize aircraft operations for greenhouse gas reductions

Wake Turbulence Re-categorization

- Develop framework structure for dynamic wake mitigation processes and procedures

System Safety Management Transformation

- Continue to evolve ASIAS ability to automatically monitor for unknown risk based on complex text mining capabilities and seamless data sources.
- The FAA-wide SMS capability is matured with ASIAS and SSA providing operational and data support for interoperability among SMS programs within the FAA, and with stakeholders.

Operational Assessments

- Enhance Safety Model to support NextGen Operational Assessments
- Apply models to assess NAS wide impacts of Task Force recommendations
- Perform NAS-wide environmental assessment of the current aviation system

2. What Is This Program?

The Joint Planning and Development Office's (JPDO) 2004 Integrated Plan identified three key performance targets to achieve the desired capability by 2025. These are: (1) satisfy future growth in demand up to three times current levels; (2) reduce domestic curb-to-curb transit time by 30 percent; and (3) minimize the impact of weather and other disruptions to achieve 95 percent on time performance. Achievement of these targets by 2025 will be a challenge. In addition, an increase in demand of three times the current levels could cause an equivalent increase in the number of accidents, aircraft noise and the volume of emissions, as well as the Air Traffic Control (ATC) workload. This line item provides the research and development required to resolve these potential problems:

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 2012, new ATM requirements will focus on four areas: TCAS, Airborne SWIM, Weather/surveillance radar, and Trajectory modeling.

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, 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.

The FAA plans to deploy Automated Dependent Surveillance-Broadcast (ADS-B) critical services (ATC separation services) in the New York terminal areas and on the surface at LaGuardia, Kennedy, and Newark airports in FY 2011. To support operational validation, this activity will support accelerating the equipage of New York-based JetBlue Airways to validate the Best Equipped/Best Served concept in the New York metro area and along the East Coast. JetBlue will equip aircraft with DO-260B-compliant ACSS ADS-B "In" & ADS-B "Out" avionics, certify the system, and demonstrate the operational benefits in revenue service.

c. Operations Concept Validation Modeling

The Operations Concept Validation Program addresses the development and validation of 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.

Furthermore, 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 will provide an end-to-end NAS Operational Concept and a complete set of scenarios 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. These products will be developed first for the Midterm (2018) and subsequently for the NAS in 2025.

d. Staffed NextGen Towers (SNT)

With demand in air transportation expected to grow significantly in the NextGen timeframe from today's traffic levels, there is a need for new, innovative ways to provide tower services. In response to this challenge, the Joint Planning and Development Office (JPDO) outlined a future air traffic system in which tower services are provided from remote locations without requiring the air traffic provider to have direct visual observation of the airport environment. This concept is referred to as a Staffed NextGen Tower (SNT). SNT plans to address airport capacity problems by increasing the capacity of high-density hub airports in low visibility and night conditions and by improving services at the satellite airports. Through a companion vision for Automated NextGen Towers (ANT), it also plans to increase the capacity of the presently non-towered airports.

SNT is planned for medium and high density airports as these airports are likely to have most aircraft equipped with avionics that will support SNT operations. ANT is planned for non-towered and low density airports. The development of both the SNT and ANT automated tower capability are planned as part of this project. The SNT and ANT concepts will require substantial concept engineering funding as advanced decision support tools will be needed for such events as conformance monitoring using aircraft movement tracking; advanced Data Communications to ensure safe operations at non-towered airports; and use of aircraft derived data (ADD) for identification of off-nominal events.

This project is in the concept engineering phases providing the necessary requirements, specifications and supporting documentation leading to an investment decision on an FAA system that should increase throughput and safety; provide for cost-effective expansion of services to a larger number of airports; and reduce tower construction costs. Requirements, operational procedures, and cost benefit information will be generated and documentation refined in preparation for the initial investment decision.

e. Environment and Energy – Environmental Management System (EMS) and Noise Reduction

Robust aviation growth could cause commensurate increases in aircraft noise, fuel burn, and emissions. Environmental impacts could restrict capacity growth and prevent full realization of NextGen. NextGen environmental goals are to reduce the system wide aviation environmental impacts in absolute terms notwithstanding the growth of aviation. The solution is to reduce the increased environmental impacts of aviation through new operational procedures, technologies, alternative fuels, policies, environmental standards and market based options to allow the desired increase in capacity. The environmental and energy development efforts under this program will lead to assessment of solutions to reduce emissions, fuel burn, and noise towards achieving NextGen environmental goals. The effort specifically focuses on explorations, simple demonstrations as well as methods to integrate these environmental impact mitigation and energy efficiency options with the NextGen infrastructure in a cost-beneficial and verifiable manner.

There are two environmental projects that support this program: Environmental Management System (EMS) and Environment and Energy.

The EMS will manage, mitigate and verify progress towards achieving the environmental goals in an iterative manner based on planning, implementing, measuring the effects of, and adjusting solutions that are based on well developed and demonstrated environmental impacts metrics. The EMS approach will allow optimization of advance options for noise, fuel burn, and emissions reduction to enable the air traffic system to handle growth in demand.

Environment and Energy - Advanced Noise and Emission Reductions: This program will employ proven capabilities as well as NAS-wide implementation of mitigation solutions through advanced aircraft (both engine and airframe) technologies, alternative aviation fuels and improved environmental and energy efficient operational procedures. These are the keys to reduce significant environmental impacts while improving the energy efficiency of the system

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. Recently, work was done to accommodate the A380 class of aircraft and work continues to address introduction of other large aircraft into the NAS. This program builds on that joint work and is accomplishing a more general review to include regional jets, Unmanned Aerial Vehicles (UAVs), micro jets, etc.

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 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 three areas: Systems Analysis, Environmental Analysis, and Safety Assessments.

In the Systems Analysis area, an initial concept of use has been developed and the stakeholder RTCA Trajectory Operations sub-work group has been formed under the RTCA ATMAC (Air Traffic Management Advisory Committee) Requirement and Planning Work Group. This group is to deliver a Concept of Use for Trajectory-Based Operations by April 2010. This Concept of Use will form the starting point from which ATM requirements for trajectory modeling will be derived.

The Environmental Analysis program enables NextGen by providing comprehensive NextGen local to NAS-wide environmental assessment of the aviation system, analyzing the benefits of environmental impacts mitigation options and providing the guidance on environmentally effective and optimally cost-beneficial solutions to reduce the environmental constraints that might otherwise hinder capacity increases.

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.

This Safety Assessments 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 impact 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

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
- Developed Human Error Database Structure and Results of Preliminary Human Hazard Analysis
- Integrated NextGen Workstation – Initial midterm NextGen En route, TRACON and Tower Workstation Requirements

b. New ATM Requirements
- Define Baseline Requirements for Future TCAS Systems
- Define required level of TCAS Independence for Future Systems
- Develop Final Airborne SWIM Concept of Use
- Initial trajectory information and exchange requirements

c. Operations Concept Validation/Modeling
- Refined NextGen Midterm Concept of Operations for the NAS to provide the overall midterm operational framework for NextGen

d. Staffed NextGen Tower (Staffed and Autonomous)
- Complete standards and alternatives development in support of an initial investment decision and OMB Exhibit 300 preparation
- Maintain SNT equipment at DFW (field test site)

e. Environment and Energy EMS and Noise Reduction
- Assess the NAS-wide benefits of CLEEN aircraft technologies and alternative fuels
- Identify opportunities for environmental gains for Taxi/Ramp, Terminal and En route area operations
- Demonstration of environmental control algorithms used in Taxi/Ramp, Terminal, and En route procedures

f. Wake Turbulence Re-categorization
- Provide recommendation package to International Civil Aviation Organization (ICAO) on new wake separation standards (Phase 1)

g. System Safety Management Transformation
- Expand ASIAS to achieve statistically significant coverage of NAS operations

h. Operational Assessments
- Systems Analysis - Deliver NextGen Performance Assessment Annual Report
- Develop a framework and models to support environmental assessment of the NAS-wide system
- Develop a framework and models to support economic assessment of the NAS-wide system.

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

$109,000,000 is required to allow for continued execution of work within the System Development solution set. The FY 2012 work will satisfy future growth in demand up to three times current levels, 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 of three times the current levels could cause an equivalent increase in the number of accidents, aircraft noise and the volume of 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 - 1A09 Next Generation Transportation System – Trajectory Based Operations

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

FY 2012 -- Next Generation Transportation System – Trajectory Based Operations (TBO) ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Trajectory Based Operations (TBO)	$63,500	$9,300	$13,700	$23,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Modern Procedures (D - Side and R - Side)	---	$4,300.0
2. Oceanic Tactical Trajectory Management	---	5,000.0
Total	Various	$9,300.0

Activity Tasks - Mandatory		
1. Modern Procedures (D - Side and R - Side)	---	$10,200.0
3. Conflict Resolution Advisories	---	2,500.0
4. NextGen Distance Measuring Equipment	---	1,000.0
Total	Various	$13,700.0

For FY 2012, $9,300,000 of discretionary funding will provide for the following:

Separation Management- Modern Procedures

- Continue evolving EnRoute NextGen Mid-Term Baseline capabilities. Areas of capability research and analysis includes:
  - 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 trail planning on the radar console

Trajectory Management- Oceanic Tactical Trajectory Management

- Automatic Dependent Surveillance-Contract (ADS-C) Climb Descent Procedures (CDP):
  - Functional Requirements
  - Implementation Funding Request Package
  - Funding Approval/Decision Point

- Pre-Departure & Web-Enabled Collaborative Trajectory Planning (CTP):
  - Preliminary Requirements (Pre-Departure)
  - Lab Demonstration (Pre-Departure)
  - Integrate with Oceanic Conflict Advisory Trials (OCAT) (Web-Enabled CTP)
  - Plan for Future Enhancements (Web-Enabled CTP)

- In-Flight Operations:
  - Finalize Benefits Cost Report for Automation for Trajectory Optimization (Vertical, speed, lateral)
  - Initiate Operational Trial for Trajectory Feedback (OCAT)
  - Data collection & Analysis Report for Trajectory Feedback (OCAT)

- Operational Capabilities for Strategic Trajectory Coordination:

- Scenarios and concepts of use
- Trajectory Likelihood Calculation Description
- Initial Benefits Analysis
- Preliminary Operational Requirements

For FY 2012, $13,700,000 of mandatory funding will provide for the following:

Separation Management- Modern Procedures

- Continue evolving EnRoute NextGen Mid-Term Baseline capabilities. Areas of capability research and analysis includes:
  - Automation support for clearances that include vectors
  - Introduce wake vortex separation indicator.

Trajectory Management- Conflict Advisories

- Continue software development for operational use.
- Software development activities include an engineering analysis and prototype development.
- Safety and human factor analyses
- A technology transfer of previous collected work on conflict advisories from MITRE/CAASD
- The completion of a cost/benefit analysis of the technology
- Trajectory based operations separation management ConOps and functional and nonfunctional requirements for automation will be continuously refined

Capacity Management - NextGen Distance Measuring Equipment (DME)

Procure and install five DME systems.

2. What Is This Program?

TBO is a shift from clearance-based 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.

b. Oceanic Tactical Trajectory Management

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. FY 2012 will be used to address the three initial Oceanic TBO initiatives: Automatic Dependent Surveillance (ADS) Climb and Descent Procedures (CDP), Pre-Departure and Web-Enabled CTP, and In-Flight Operations.

Based on the results of the FY 2011 work, FY 2012 will be used to expand these initiatives to other geographical areas, perform operational trials, further refine longer-term objectives, include new initiatives to investigate separation assurance systems using Automatic Dependent Surveillance (ADS) technology, and begin concept development activities for Oceanic Airspace Management, Trajectory Managed, Autonomous, and Mixed Classic Airspace.

c. Conflict Resolution Advisories

This activity includes the analysis, prototyping, pre-implementation activities and software development activities to implement conflict resolution advisories. Conflict resolution advisories will first be implemented using voice and data in a mixed equipage environment, and ultimately will be transmitted solely via data in certain airspace. The implications for changing controller roles and responsibilities will be explored and the requirements for automation, decision support systems and data communications will be identified.

High performance aircraft will directly connect via air-ground data communications to the flight management system, facilitating electronic data communications between the ATC automation and the flight deck automation. As a first step and in mixed performance airspace, the controller will still be responsible for aircraft separation by responding to problems predicted by the ATC automation. Instead of monitoring the sector airspace display to predict potential problems and mentally calculating problem resolutions, the automation will not only predict the problems but determine the best solution. The controller will transmit the solution via voice initially, and then via data link. This level of automation support helps manage controller workload as a means of safely dealing with the predicted increases in traffic volume. This activity will prototype earlier and easier resolutions capabilities (such as pre-probed altitude and speed amendments) that can be transferred verbally by controllers and evaluate the impact these have on the Computer Human Interface (CHI) design and system performance and conduct research into more complex issues for future implementation such as vector advisories as well as the role of the human versus automation in voice clearance, mixed voice and data communications environments, and data communications only.

d. NextGen Distance Measuring Equipment (DME)

This DME program will provide near term support for a trajectory based and performance based operational requirements and will be functionally capable of providing the signal in space to fill the coverage gaps and meet the redundancy requirements for new GPS/RNAV/RNP procedures. This DME will have availability greater than 99.95 percent, a mean time to repair of less than one-half hour, a mean time between failures of 14,231 hours, and a mean time between outages of 15,193 hours. It will be configurable for low, intermediate, and high power with single or dual equipment and will be commissioned accordingly.

The functionality of this DME, while providing a higher transponder capacity, better reliability/maintainability, and the most current solid state technology, is exactly the same as the DMEs currently in the NAS. The most important function of the DME is the reply delay requirement used by the airborne interrogator to obtain slant range. This function has been consistent since the 1950's and will continue to be consistent in this DME.

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 exchange and monitored and that 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 Variable Separation Concept of Operations
- Final Investment Decision for ERAM Post Release 3 (PER3)

b. Oceanic Tactical Trajectory Management
- Deliver Concept of Operations (CONOPS) for In-Flight Operations Re-Profile Alert capability
- Conduct ADS-C Climb & Descent Procedure (CDP) Ops Trial

c. Conflict Resolution Advisories
- Develop and deliver initial CONOPS for Conflict Resolution Advisories
- Develop and deliver safety assessment plan for Conflict Resolution Advisories

d. NextGen DME
- First site delivery is scheduled for August 2012
- Procure and install DME systems to fill coverage gaps in support of en route RNAV/RNP

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

$23,000,000 is required allowing FAA to continue work within the TBO solution set. The FY 2012 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 - **1A10 Next Generation Air Transportation System (NextGen) – Reduce Weather Impact (RWI)**

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

FY 2012 -- Next Generation Transportation System (NextGen) – Reduce Weather Impact (RWI) ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System (NextGen) – Reduce Weather Impact (RWI)	$35,600	$14,600	$18,400	$33,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Weather Forecast Improvements	---	14,600.0
Total	Various	$14,600.0

Activity Tasks - Mandatory		
1. Weather Observation Improvements	---	$3,000.0
2. Weather Forecast Improvements	---	15,400.0
Total	Various	$18,400.0

For FY 2012, $14,600,000 of discretionary funding will provide for the following:

RWI Weather Forecast Improvements

- Complete NextGen Weather Processor (NWP) document package for Initial Investment Decision
- Develop NWP document package towards Final Investment Decision
- Convective Weather 0-8 hour Forecast GFI package ready for NWP acquisition
- Radar Mosaic GFI package ready for NWP acquisition
- Convective Weather Avoidance Model (CWAM) GFI package ready for NWP acquisition
- Complete NWP Request for Offer (RFO) Package
- Update NWP Project Management Best Practices Documentation
- Analyze 2011 CoSPA operational evaluation and deliver report
- Maintain CoSPA prototype operations at selected ATC facilities to support TFM
- Update NAS EA Weather Roadmap
- Enhance manual QMS to include operational aviation weather products
- Evaluate metrics methodology to monetize avoidable and unavoidable weather impacts
- Validate NextGen Radar Mosaic (I.e., MRMS) quality editing schemes for NAS compliance (DSR, ERAM)
- Finalize requirements for selected set of ATM-Wx translation technologies
- Concept Maturity Assessment Plan, initial ConOps for turbulence product (GTG3/GTGN), and access to EDR data
- Provide for RWI best practices

For FY 2012, $18,400,000 of Mandatory funding will provide for the following:

RWI Weather Observation Improvements:

- Translate sensor gap analysis results into refined NextGen weather observation requirements.
- Demonstrate Collector 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 adaptive sensing system engineering activities
  - Conduct technology studies focused on consolidating and improving the existing sensor capability

RWI Weather Forecast Improvements:

- Complete development of Convective Weather Avoidance Model (CWAM) in support of mid-term DSTs.
- Develop selected set of AMT-Wx translation technologies
- System Engineering support for Segment Bravo
- Conduct CoSPA lab based low-fidelity evaluation for mid-term capability
- Develop functional requirements for automated QMS
- Develop a metrics application to assess improvements in convection observations, analyses and forecasts
- Deliver update release – enhanced metrics capability for Weather Analysis and Visualization Environment (WAVE) tool and the WITI-based Dynamic Airspace Rerouting Tool (DART)
- Demonstrate MRMS mosaic with TDWR and Canadian weather radar data on DSR, ERAM
- Concept Maturity Assessment Plan and initial ConOps for Forecast Icing Product (FIP)
- Conduct maturity assessment and safety management process for turbulence product (GTG3/GTGN)
- Concept Maturity Assessment Plan and initial ConOps for C&V Forecast (CVF)

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 NextGen Network-Enabled Weather (NNEW) transformational program that will interface 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 activities include assessing the current sensor network capabilities and identifying gaps. Technical studies will then be conducted to identify economical methods to consolidate existing legacy capabilities, provide improved capability, and make sensor outputs more universally available. When fielded, this will result in a homogenous network of 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. This includes: 1) integrating weather information tailored for DSTs and systems into NextGen operations; 2) implementing improved forecasts through research transition (RT) 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 which 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 examine 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 sensor technology currently fielded is based on 70s-80s technology and has been in the field since that period. While the current observation network performs adequately, there are many significant gaps that exist between current observation performance and the requirements established for the NextGen environment. Many of these gaps can be filled by a combination of modern sensor technologies and net-centric infrastructure to link all sensors to the NextGen NAS environment. Extensive research has shown that more observations are needed both in time and space in order to produce forecasts accurate enough to ensure aircraft safety and still support increased capacity in the NextGen environment. Additionally 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, and safety.

Current weather forecast infrastructure and abilities are inadequate to meet real-time needs of DSTs, operational decision-makers and NextGen. Existing 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 air traffic management (ATM) DSTs such as icing and turbulence indices that impact 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 standalone weather displays at facilities in the NAS that provide conflicting information.

4. How Do You Know The Program Works?

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.

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

$33,000,000 is required to continue work within the RWI solution set. As stated above, RWI provides improved weather observations, 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 2012 work supports 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; supports investment decision activities for a consolidated surface observation network that includes weather radar; 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. The FY 2012 work also includes the risk reduction activity associated with the generation of the GFI Package as well as the preparation of the Request for Offer (RFO) Package.

A reduction will impact the initial operating capability of NWP targeted for 2015, investment analysis decision in 2014 for the initial consolidated surface observing network, and the development and evaluation of weather translation techniques which can be used by ATM decision support tools and users in the mid-term.

Detailed Justification for - 1A11 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 2012 – Next Generation Transportation System – Arrivals / Departures at High Density (HD) Airports ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Arrivals / Departures at High Density (HD)Airports	$51,800	$14,300	$13,700	$28,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Surface Tactical Flow	---	$10,000.0
2. Surface Conformance Monitoring	---	2,000.0
3. Time-Based Flow Management (TBFM) Work Package III *(Formerly Integrated Enterprise Solution)*	---	2,300.0
Total	Various	$14,300.0

Activity Tasks - Mandatory		
1. Surface Tactical Flow	---	$3,800.0
2. Surface Conformance Monitoring	---	3,800.0
3. Surface Traffic Data Sharing	---	1,100.0
4. Integrated Arrival and Departure Operations	---	5,000.0
Total	Various	$13,700.0

For FY 2012, $14,300,000 of discretionary funding will provide for the following:

a. Surface Tactical Flow
- Continue support to Tower Flight Data Manager (TFDM) program AMS effort
- Continue technical transfer of mature surface capabilities to TFDM
- Continue STBO field evaluations at Memphis and Orlando for the Deice Tool, 2D Taxi Route Generation, and Collaborative Departure Scheduling
- Continue HITL simulations of Collaborative Departure Scheduling and Time-Based Taxi Route Generation tools

b. Surface Conformance Monitoring
- Conduct 1 HITL simulation of Time-Based Surface Conformance Monitoring (2D), update ConUse, Requirements, ATC Procedures
- Conduct 1 field evaluation of Surface Conformance Monitoring (2D) at Orlando, update ConUse, Requirements, ATC Procedures

c. Time-Based Flow Management (TBFM) Work Package III
- Continue to develop and refine concept for the Integrated Enterprise Solution
- Develop documentation to support NASEA DP 44 IID for IES

For FY 2012, $13,700,000 of mandatory funding will provide for the following:

a. Surface Tactical Flow
- Conduct field evaluation of Time-Based Taxi Route Generation tool
- Complete Mid- to Far-Term STBO Requirements Development for Data Communications, Surveillance, Navigation, Weather, and NAS Data Systems

b. Surface Conformance Monitoring
- Conduct 2nd HITL simulation of Time-Based Surface Conformance Monitoring (2D), update ConUse, Requirements, ATC Procedures
- Conduct 2nd field evaluation of Surface Conformance Monitoring (2D) at Orlando, update ConUse, Requirements, ATC Procedures

c. Surface Traffic Data Sharing
- Complete deployment of an Initial Surface Traffic Data Sharing capability.

d. Integrated Arrival & Departure Operations
- Continue airspace design and analysis, transition strategy plans, and procedures development for initial selected locations.
- Initial Automation System Requirements Definition.
- Support to related program IA Activities.
- Automation system requirements definition and studies to analyze design and integration feasibility.

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 the development efforts of the NASA Surface Management System (SMS) 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, TCM concepts can be applied to staffed and automated virtual ATC towers.

The demonstrations and validation activities will:

- Demonstrate and validate procedures for Taxi Conformance Monitoring 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. Trajectory Management – Surface Traffic Data Sharing

Surface Traffic Data Sharing will establish a longer term Service-Oriented Approach to procuring, sharing, and storing select surface data for use by both the Air Navigation Service Provider (ANSP) and external stakeholders, such as NAS users, airport authorities, or other governmental organizations (e.g. DHS). This more robust capability will replace an initial infrastructure established in 2010. The data sharing of aircraft movement data between the ANSP and NAS stakeholders at selected airports will enable improved collaborative decision making, enhanced efficiency, and increased common situational awareness. Additionally, this capability will enable the sharing of surface data with ANSP Decision Support Tools (DST), enabling improvements in DST performance, surface capacity management, and collaborative decision making.

d. Time-Based Flow Management (TBFM) Work Package III

The Time-Based Flow Management Work Package (TBFM) III effort will build upon the previous two segments (see below) to develop new NextGen capabilities and integrate these capabilities into an enterprise-oriented solution. Traffic Management Advisor (TMA), which TBFM builds upon, is a vital part of the NAS and enhances air traffic operations by reducing delays and increasing efficiency of air traffic operations. It 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 twenty Air Route Traffic Control Centers (ARTCC) and adapted for most of the major airports served by those ARTCCs.

The Time Based Flow Management Program is divided into three (3) segments:

- Segment I: Initial TMA platform of capabilities. This segment was completed in April 2009.
- Segment II: Current TBFM Program. This is a continuation of TMA that will fulfill operational user needs and NextGen goals. The TBFM program will incorporate NextGen concepts such as extended metering, weather integration, and metering with RNAV/RNP, while expanding the TMA core capabilities to additional locations in the NAS.
- Segment III: Also known as TBFM Work Package III, this effort will develop and implement additional NextGen capabilities and integrate the TBFM capabilities into an enterprise-wide solution.

e. Capacity Management – Integrated Arrival and Departure Operations

The program improves operational efficiencies in major metropolitan areas by expanding the lateral and vertical boundaries of arrival and departure airspace, and the use of terminal separation standards to this airspace, such as 3-mile separation minima. This change also includes the use of dynamic airspace reconfiguration to accommodate bi-directional arrival/departure routes and improving traffic flow management throughout this expanded airspace area. These operational changes will enable creation of additional area navigation arrival and departure routes that take advantage of improvements in aircraft navigation system accuracy, so airspace around an airport can be used more efficiently. The program also calls for integrating arrival and departure airspace systems into one control service area under the control of one facility. This concept is a step toward the NextGen concept for Super Density Operations.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

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, reduce route spacing and separation requirements, 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. Thus, 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 STO capabilities to the FAA implementing organization.
- First 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 & Orlando

b. Surface Conformance Monitoring
- First Surface Conformance (2D) HITL Simulation.
- Second Surface Conformance (2D) HITL Simulations – using hold short and give way instructions

c. Surface Traffic Data Sharing
- Complete deployment of Initial Surface Traffic Data Sharing capability.

d. Time-Based Flow Management (TBFM) Work Package III
- TBFM Work Package III Final Investment Decision
- Development and deployment of time-based flow management capabilities.

e. Integrated Arrival and Departure Operations
- Development of Concept of Use for Conflict Probe in Integrated Arrival/Departure Control Service environment
- Terminal Flight Data Processing evaluation report
- Automation system requirements definition and studies to analyze design and integration feasibility.

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

$28,000,000 is required to continue work within the Arrivals/Departures at High Density (HD) Airports solution set. The FY 2012 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. With a reduction in funding, 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 will not be realized.

Detailed Justification for - 1A12 Next Generation Transportation System – Collaborative ATM

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

FY 2012 – Next Generation Transportation System – Collaborative ATM ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Collaborative ATM (CATM)	$44,641	$28,000	$25,000	$53,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Strategic Flow Management Integration	---	$4,000.0
2. Strategic Flow Management Enhancement	---	3,000.0
3. Common Status and Structure Data	---	5,000.0
4. Advanced Methods	---	2,000.0
5. Flight Object	---	7,000.0
6. Integrated NAS Design and Procedure Planning	---	5,000.0
7. Dynamic Airspace	---	2,000.0
Total	Various	$28,000.0

Activity Tasks - Mandatory	Quantity	($000)
1. Strategic Flow Management Integration	---	$4,000.0
2. Strategic Flow Management Enhancement	---	3,000.0
3. Common Status and Structure Data	---	3,000.0
4. Advanced Methods	---	3,000.0
5. Flight Object	---	3,000.0
6. Integrated NAS Design and Procedure Planning	---	4,000.0
7. Dynamic Airspace		2,000.0
8. Collaborative Information Management	---	2,000.0
Total	Various	$25,000.0

For FY 2012, $28,000,000 of discretionary funding will provide for the following:

a. Flow Control Management – Strategic Flow Management Integration (Integration Execution of Flow Strategies into Controller Tools)
- Conduct studies and analyses as required.

b. Flow Control Management – Strategic Flow Management Enhancement (Enhancing the Strategic Flow Program)
- Conduct requirements analysis, concept development planning leading to a CRD decision for CATMT NextGen capabilities, Decision Point 354 (CATMT Work Package 4 Concept and Requirements Definition Readiness Decision) scheduled for CY 2012

c. Flight and State Data Management – Common Status and Structural Data (Separation, Tactical, Strategic Trajectory Management)
- Collect WAAS Airport Survey from the authoritative source of information.
- Demonstrate ability to receive Special Activity Airspace schedules digitally from the Department of Defense.

d. Flight and State Data Management – Advanced Methods
- Demonstrate the improvements identified in the FY 2011 in a simulation environment
- Analyze and report improvements as a result of demonstration
- Identify opportunities for enhancement

Probabilistic TFM Area Flow Program
- Analyze results of initial demonstration of data-link scenario
- Unified Flight Planning Filing
- Conduct second demonstration that addresses the refined concept
- Advanced Planning
- Identify additional attributes for incorporation into 3D Hypercube demonstration capability

e. Flight and State Data Management – Flight Object
- Building on the End-to-End IFDO system integration activities of FY11, continue demonstration activities, work towards performing End-to-End operational evaluation, and submit IFDO standards petition. The development activities will include the following:
  - Submit IFDO standard petition via continued coordination with international stakeholders
  - Continue coordinating with TBO Oceanic/TA/Surface, ATOP, ERAM, and SWIM

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning

g. Capacity Management – Dynamic Airspace

- Analyses of DataComm requirements
- Analyses of voice switch requirements

h. Collaborative Information Management
- Research, analyze, and develop UAS net-enabled applications
- Research, analyze, and develop ADS-B net-enabled applications

For FY 2012, $25,000,000 of mandatory funding will provide for the following:

a. **Flow Control Management – Strategic Flow Management Integration (Integration Execution of Flow Strategies into Controller Tools)**
- Conduct studies and analyses as required.

b. **Flow Control Management – Strategic Flow Management Enhancement (Enhancing the Strategic Flow Program)**
- Conduct requirements analysis, concept development planning leading to a CRD decision for CATMT NextGen capabilities, Decision Point 354 (CATMT Work Package 4 Concept and Requirements Definition Readiness Decision) scheduled for CY 2012

c. **Flight and State Data Management – Common Status and Structural Data (Separation, Tactical, Strategic Trajectory Management)**
- Demonstrate prototype AIM Data Warehouse
- Integrate AIM Mapping Services in AIM One Stop Shop

d. Flight and State Data Management – Advanced Methods
Integration of Weather into ATM
- Solicit and incorporate comments on standard exchange formats from FAA and international organizations

Probabilistic TFM Area Flow Program
- Prepare draft ConUse of the data-link usage and other integration opportunity with NextGen enabled capabilities
- Initial demonstration of the data-link scenario in the simulation environment

Unified Flight Planning Filing

- Refine the concept of advanced flight planning and filing method based on the initial demonstration
- Prepare draft ConUse and draft ConOps documents

Advanced Planning

- Conduct initial demonstration of 3D Hypercube by implementing the data objects identified in FY11 work
- Analyze initial demonstration and identify the area that should be improved

e. Flight and State Data Management – Flight Object

Continue development of system alternatives and allocation

- Continue fast time modeling/simulation of Flight Object
- Continue Information modeling of Flight Object
- Enhance Flight Object exchange model

Building on the End-to-End IFDO system integration activities of FY11, continue demonstration activities, work towards performing End-to-End operational evaluation, and submit IFDO standards petition. The development activities will include the following:

- Continue IFDO End-to-End system demonstration
- Start to perform End-to-End IFDO Operational Evaluation

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning - add description of work

g. Capacity Management – Dynamic Airspace

- Developed Preliminary requirements
- Safety Management System
- Refined airspace configurations and boundaries adjustment
- Analyses of SWIM requirements

h. Collaborative Information Management

- Develop ConOps / Concept of Use for the net-enabled applications
- Develop Web service Description document for the net-enabled applications.
- Conduct feasibility, technical, and operational issues study of net-enabled applications. Develop Demonstration Plan. Develop Demonstration Procedures.
- Conduct demonstration to show NEO benefits to the stakeholders.

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 the En Route Automation Modernization (ERAM) modifications needed to receive/process the Traffic Management Initiatives (TMI) in the ERAM baseline timeframe (releases 2 and 3). 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 Data program will address information and capability gaps within aeronautical information to achieve the NextGen shared situational awareness and trajectory based operations vision. Program activities will focus on five NextGen operational improvements:

- On-Demand NAS Information: Provide real time access to NAS status.
- Assignment of Airspace for Special Use in High Altitude: Better airspace management. Synchronization of airspace status
- Continuous Flight Day Evaluation: Provide performance metrics real time
- Provide full flight plan constraint evaluation with feedback: Provide new flight planning capabilities that consider NAS constraints
- Trajectory Flight Data Management: Real time trajectory management accounting for all aspects of NAS including real time status and constraints

d. Flight and State Data Management – Advanced Methods

NextGen will benefit from a number of infrastructure enhancements, procedural changes, and system improvements that will enhance capacity and alleviate congestion. These include improvements in the flight deck and avionics, vehicle performance, communications, navigation, and air traffic control and management service provider capabilities. In the area of advanced methods for Traffic Flow Management (TFM), tools will be developed in this program; such as common indexing of NAS resources. These tools will help solve the problem of how to guide flights in capacity-constrained scenarios.

e. Flight and State Data Management – Flight Object

An information sharing mechanism, such as the Flight Object, needs to be developed in order to enable information sharing among various users and stakeholders in the NAS this allows for better coordination, situational awareness, and collaborative decision-making. Flight Object supports trajectory based operation objectives to improve capacity, efficiency, safety, and cost. Flight Object will provide standard information to be shared across flight domains and user systems, and is envisioned to support more integrated and coordinated flow planning to ensure collaboration throughout the flight. Key parts of the Flight Object are:

- The information contained in the filed flight plan.
- The converted (expanded) route with applied restrictions, routes, etc.
- Flight plan trajectory (the 4D path the flight intends to follow) includes crossing key aeronautical elements, such as restrictions, and volumes of airspace
- Aircraft actual trajectory (the 4D path the flight has been observed to follow thus far along with maneuvers it might take to get back to flying according to the original, filed intent)
- Mode-S address or beacon code allocated to the flight
- Pairing information (to a track)
- Control information (current Flight Information Region (FIR) controlling, current local sector controlling, stages of handoff/ transfer of control, point-out information.
- Interim altitude assignments, holds, intent information, etc.

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning

The Integrated National Airspace Design and Procedure Planning will enable the FAA to develop the infrastructure and framework to assess and develop an integrated airspace and procedure implementation plan based on "Best-Equipped, Best-Served." "Best Equipped Best Served" or "Better Capability, Better Service" (JPDO paper) refers to the concept that better service can accrue to operators and to the NAS as more NextGen capability, enabled by technology, policies and procedures, is introduced. The Integrated National Airspace and Procedure Implementation Plan will align with NextGen mid-term capabilities and FAA strategic plan. The initiative focuses on maximizing benefits and facilitating the development of the business case for industry investment with the goal for the operators to be able to have better access to the NAS by virtue of having the ability to fly in more sophisticated (not necessarily more complex) and efficient ways through the system. This activity will include development of a framework for implementation of national airspace and procedures. It will also include targeted enhancements of existing infrastructure to assess the overall impact to NAS operations. Trade analyses will be applied to assess alternatives (implementation schedules) for the implementation plan. Activities include:

- Defining possible "What and Where" for BEBS operations
- Develop concepts for best-equipped, best-served
- Establishing a User Forum to iterate specific concepts and cost/benefits to better understand willingness to equip, and current state of equipage
- Establishing a rapid prototyping environment for course filter analysis of the concepts, and new fast time M&S tools to evaluate operations, operational benefits and costs
- Moving the most promising concepts and capabilities to a field site or high fidelity demonstration facility for analysis (the Test Bed that simulates a Metroplex area without disrupting current operations)
- Developing and refining functional and operational requirements for implementation

g. Capacity Management – Dynamic Airspace

Flexible Dynamic Airspace will reconfigure airspace for demand/capacity predictions to make as much airspace capacity available as possible, where and when it is required, which is fundamentally different from today's system where the airspace is a rigidly structured network of navigation aids, sectors, and special use airspace. The goal of Flexible/Dynamic airspace configuration research is to better serve users' needs by tailoring the availability and capacity of the airspace by creating a dynamic airspace configuration function that will provide the service provider a new degree of freedom to accommodate the airspace requests of users.

h. Collaborative Information Management

The majority of Aviation Command and Control (C2) systems relies on complex communications to relay information within a terminal area, but do not always lend themselves to transporting this information to remote users. The emphasis of networked enabled operations (NEO) Spiral 3 (SP3) is to examine existing and emerging FAA standards that can be applied to distribute vital information to remote users. In this FAA evolving era of Information Age Transformation, major advancements in sensors and communications are being driven by innovative and novel Web-based technical approaches, through Service Oriented Architecture (SOA) design principles. The FAA business and alternative analysis resulted to be delivered by NEO Project SP3 is to highlight those FAA standards that will provide situational awareness and common shared information shared services (data displays) through the use of SOA approaches to start showing NextGen Strategy by 2015.

NEO SP3 will demonstrate how information sharing and collaboration across multi-agency domains can be accomplished by leveraging existing technology and investments for NextGen transformation. The program will apply lessons learned from NEO SP1 and 2 emerging capability demonstrations that are traceable to the NextGen Baseline Operational Improvement (OI) Roadmap. These transformational concepts are the next building blocks for the NextGen concept. SP3 demonstrations will explore net-centric capabilities and collect additional data to enhance the NEO business case and validate JPDO developed models/simulation for NextGen.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

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

- Develop validation plan and schedule for CONOPS
- Develop CONOPS for Airborne Reroute
- Start the development and implementation of the pre-departure reroute in the NAS

b. Strategic Flow Enhancement

Develop the Traffic Flow Management (TFM) Roadmap. (RTCA Task Force 5 Recommendation)

- Complete the TFM Concept of Operations
- Conduct demonstrations and complete report for evaluations of the business logic for balancing capacity and demand predictions

c. Common Status & Structure Data

- Concept of Operations and Enterprise Architecture for National Special Activity Airspace (SAA)
- Conduct a demonstration of the capability to provide a standardized, consistent, and managed digital SAA definition for external stakeholders and users
- Conduct a demonstration of the decision support tool application for performing flight planning and providing situational awareness, focusing on Standard Operating Procedure / Letters of Agreement (SOP/LOA)

d. Advanced Methods

- Conduct initial Demonstration of 3D hypercube by implementing the data objects identified in FY 2011 work
- High level requirements for integration of weather into the ATM

e. Flight Object

- Planning Plan for the International Flight Object Demonstration
- Develop report for flight and flow information exchange model.
- Complete first draft of the Flight Object requirements document

f. Integrated NAS Design and Procedure Planning

- Establish a portfolio analysis approach for investigating BEBS
- Develop plans for engaging the community best-equipped best-served.
- Create a structure for evaluating specific BEBS operations, including issues related to cost/benefit, related airport operations, integrated airspace and procedures design, concepts and procedures assessments, and development of functional requirements

g. Dynamic Airspace

- Initial ARMS concept of operations document

h. Collaborative Information Management

- Initiate concept of operations or ConUse for applying NetCentric concepts to Unmanned Aircraft Systems: Initiate the development of a ConOps describing Network Enabled Operations (NEO) operations in UAS environment. Issues such as sense and avoid, loss of communications, and loss of link will be discussed, along with emerging NextGen and emerging technologies, capabilities that would help address those issues
- Initiate safety and hazard analysis: Conduct safety and hazard analysis, focusing on demonstration activities to ensure appropriate level of safety (e.g., SRMD or SRMDM) is approved prior to flight demonstrations

- Initiate demonstration strategies and program roadmap: Start the development of 5-year strategies and roadmap to plan for technology insertion and transition into the NAS, especially to program of records
- NEO demonstration: conduct demonstration to illustrate NEO capabilities operating in UAS environment

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

$53,000,000 is required to continue execution of work within the CATM solution set. The FY 2012 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 not be realized.

Detailed Justification for - **1A13 Next Generation Transportation System – Flexible Terminals and Airports**

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

FY 2012 – Next Generation Transportation System – Flexible Terminals and Airports ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Flexible Terminals and Airports	$64,300	$36,300	$21,800	$58,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Wake Turbulence (Departures)	---	$1,300.0
2. Wake Turbulence Mitigation for Arrivals	---	2,000.0
3. Surface/Tower/Terminal System Engineering	---	15,000.0
4. Future Communication Infrastructure	---	2,000.0
5. Approaches, Ground Based Augmentation System	---	5,000.0
6. Closely Spaced Parallel Runway Operations	---	3,000.0
7. Approaches, NextGen Navigation Initiatives	---	1,500.0
8. Approaches, Optimized Navigation Technology	---	1,500.0
9. Trajectory Mgmt - Arrivals	---	3,000.0
10. Reduced Runways Visual Range	---	2,000.0
Total	Various	$36,300.0

Activity Tasks - Mandatory	Quantity	($000)
1. Wake Turbulence (Departures)	---	$1,400.0
2. Wake Turbulence Mitigation for Arrivals	---	1,400.0
3. Surface/Tower/Terminal System Engineering	---	7,000.0
4. Approaches, Ground Based Augmentation System	---	5,000.0
5. Closely Spaced Parallel Runway Operations	---	3,000.0
6. Trajectory Mgmt - Arrivals	---	2,000.0
7. Reduced Runways Visual Range (RVR)	---	2,000.0
Total	Various	$21,800.0

For FY 2012, $36,300,000 of discretionary funding will provide for the following:

1. Wake Turbulence Mitigation for Departures (WTMD) ($1,300,000)

- Accomplish any WTMD rework required based on the ongoing WTMD operational evaluation at IAH.
- Provide WTMD training for SFO personnel.
- Maintain and provide corrective maintenance to the IAH, SFO, and William J. Hughes Technical Center (WJHTC) WTMD systems.
- Complete regional service center engineering and installation of WTMD components in SFO's ATCT.
- Install data links necessary for WTMD operation at SFO.
- Setup data collection equipment, processes and procedures for the SFO operational evaluations.
- Assist SFO in developing modifications to their departure procedures to incorporate the WTMD.

2. Wake Turbulence Mitigation for Arrivals (WTMA) ($2,000,000)
- Completion of more extensive HITL evaluation of the WTMA process and procedures and associated prototype ATC decision support tool software
- Completion of documentation necessary to decide to move forward to develop the WTMA capability as an enhancement to the ATC automation platforms
- Begin planning for the single runway application (WTMSR) of the WTMA developed technology

3. Surface/Tower/Terminal Systems Engineering (TFDM) ($15,000,000)
- Based on the IID decision, initiate RFP Documentation.
- Receive final investment decision to initiate procurement.
- Validate detailed TFDM requirements via prototype demonstrations/evaluation in the field, in support of TFDM acquisition

4. Future Communications Infrastructure ($2,000,000)
- Develop and validate aeronautical mobile airport communications system (AeroMACS) Standard and Recommended Practices (SARPS) at the International Civil Aviation Organization (ICAO) level to support global harmonization and interoperability of the system.
- Develop and validate a method for segregation and reliable delivery of ATS and AOC services on AeroMACS,
- Develop secure and reliable methods for Private Key Management and synchronization across all AeroMACS AAA sites.

5. Approaches, Ground Based Augmentation System (GBAS) ($5,000,000)
- Requirements development – finalize CATIII ground facility specification
- AMS Documentation - In addition the team will complete the preparation for a JRC presentation to seek a program decision.
- Following a favorable JRC decision, the team will proceed with the source selection activities leading to a contract award for Cat III GBAS systems.

6. Closely Spaced Parallel Runway Operations (CSPO) ($3,000,000)
- Update CSPO Program Plan and detailed schedule
- Deliver Test report for FY11 HITL 2-11 test
- Perform data collection and analysis reports to support reduced separation standards in runway spacing
- Develop SMS requirements for approaches at reduced separations standards in runway spacing
- Develop performance requirements for independent and paired approaches

7. Approaches, NextGen Navigation Initiatives ($1,500,000)
- Enhanced Low Vis Ops-Initiate Work at 2 Sites and finish FY10 work.
- Terminal RNAV DME-DME-Initiate at OEP Airport
- Surface Situational Awareness-Finalize Coord of CONOPS

8. Approaches, Optimized Navigation Technology ($1,500,000)
- Complete Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) Light Emitting Diode (LED)/Infrared (IR) lamps prototype design
- Conduct functional configuration audit for Precision Approach Path Indicator (PAPI) LED program

9. Trajectory Management – Arrivals ($3,000,000)
- Complete evaluating the ability of aircraft to accurately meet vertical constraints and required time of arrival
- Complete evaluating DataComm for aircraft messaging for Required Time of Arrival (RTA), reroutes, and waypoint verification data integrity
- Human factors analysis shifting to control by time of arrival through controller-in-the-loop simulations and field trials
- Seek certification approval of initial TBO procedures/scenarios
- Draft Plan for limited implementation (includes new RNAV/RNP route requirements if needed)

10. Trajectory Mgmt - Reduced RVR Minima ($2,000,000)
- Identify project demand for services

For FY 2012, $21,800,000 of mandatory funding will provide for the following:

1. Wake Turbulence Mitigation for Departures (WTMD) ($1,400,000)
- Provide WTMD training for MEM personnel.
- Maintain and provide corrective maintenance to the MEM WTMD system.
- Complete regional service center engineering and installation of WTMD components in MEM's ATCT.
- Install data links necessary for WTMD operation at MEM.
- Setup data collection equipment, processes and procedures for the MEM operational evaluations.
- Assist MEM in developing modifications to their departure procedures to incorporate the WTMD.

2. Wake Turbulence Mitigation for Arrivals (WTMA) ($1,400,000)
- Contractual support to design and develop the software modification to the WJH Technical Center automation test bed to allow the evaluation of the single runway application (WTMSR) of the WTMA technology.

3. Surface/Tower/Terminal Systems Engineering (TFDM) ($7,000,000)
- Support Technology Transfer of advanced TFDM capabilities from R&D
- Define Terminal Architecture enhancements for NextGen

4. Approaches, Ground Based Augmentation System (GBAS) ($5,000,000)
- Operational Implementation - Conduct preliminary planning to field and implement CAT III GBAS.
- Procure Equipment/Solution Development-Complete technical validation necessary to achieve a low technical risk for acquisition. Complete avionics prototype development.

5. Closely Spaced Parallel Runway Operations (CSPO) ($3,000,000)
- Develop final SAPA system description for avionics integration and installation in FAA simulators and flight test aircraft
- Refine NTZ, NOZ and other assumptions via modeling and analyses

6. Trajectory Management – Arrivals ($2,000,000)
- Evaluate ground merging and sequencing tools that will employ control by time of arrival (identify enabling requirements)
- Analysis of human factors and flight deck automation requirements to minimize errors and provide integrity assurance
- 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

7. Trajectory Mgmt - Reduced RVR Minima ($2,000,000)
- Identify project demand for services

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 757 and heavier aircraft. Presently, aircraft must wait a minimum of two minutes to depart after the departure of a 757 or heavier 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 2 to 3 minute wait time following a 757 or heavier 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.

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 the existing airspace 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 will continue 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 heavier aircraft when landing on an airport's set of closely spaced parallel runways (runways less than 2500 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.

The FY 2012 evaluation of WTMA will lead to an FAA decision in FY 2013 to transform the capabilities of the prototype software tool into a functioning decision support tool integrated into the terminal automation system for use by the FAA air traffic controllers. First operational benefit will be realized during FY 2015 when the WTMA controller decision support tool capability is fielded as part of a software release to a FAA terminal automation system.

c. Surface/Tower/Terminal Systems Engineering (TFDM)

The primary goal of this activity is to provide engineering analyses, 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 safely increase capacity, reduce traffic delays, lower costs and reduce impact on the surrounding environment. 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 object, 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 will enhance/optimize airport surface traffic management efficiency, mitigate risk of safety related incidents, and support the overall movement of air traffic in the Terminal environment.

d. Approaches, Ground Based Augmentation System

The Local Area Augmentation System (LAAS) is the United States system that meets internationally accepted standards for a Ground Based Augmentation System (GBAS). GBAS augments the current Global Positioning System (GPS) service for terminal, non-precision, and precision approaches in the NAS. GBAS is the only cost effective alternative to ILS for Category II/III operations because a single facility can serve an entire airport versus multiple ILS facilities (one at each runway end).

The FAA identified GBAS as an "Enabler" for the NextGen. The FAA plans to replace legacy navigation systems with satellite based navigation technology. The strategy to achieve this capability is to initially build a system that uses the existing GPS single civil frequency to provide Category II/III service and improve this architecture when additional civil frequencies become available.

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.

e. 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 ft and 4,300 ft.

f. 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 three main program elements addressing each of these areas.

The first program element supports low visibility enhanced operations by lowering required Runway Visual Range (RVR)-defined minimums during IMC, and is a collaborative effort between Flight Standards and Navigation Services. This work allows a greater number of takeoffs and landings when visibility is limited. Lower takeoff minimums could achieve a 17 percent increase in throughput for San Francisco International Airport (SFO), for example. This effort is in the implementation phase and will have near-term NextGen operational benefits by increasing NAS capacity and throughput. For this program element, work is ongoing to develop the benefit-cost analysis to propose this as a NAS-wide implementation, scheduled in the FY 2011 timeframe. If successful, this program element will be broken out into its own program. The initial program element achieved use of Category I runway procedures using RVR minimums of 1,800 feet, a 25 percent improvement for these runways over the prior 2,400-foot requirement.

The second 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 third 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.

g. Approaches, Optimize Navigation Technology

This program supports developing new technology for existing Navigation systems that improve reliability and lower the cost of operations.

The Navigation systems to be improved include all existing approach lighting systems, other lighted navigation aids, precision and non-precision approach systems, and terminal and en route navigation systems. The new technology efforts will include analyses of the physical, electrical (electronic) and economic characteristics of these systems to determine what type of technology insertion or changes in the system would result in improved efficiency.

Two of the initiatives will focus on the current Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). These lights are required when pilots are making Category I precision approaches in the NAS. The first initiative is to replace the existing incandescent lamps with Light Emitting Diode (LED) technology, without modifying the rest of the MALSR system. The second initiative is to redesign the entire MALSR system to include LED technology, and solid state switching and electrical distribution technology. This technology redesign will provide a more reliable lighting system (with at least two times the mean time between failures) that will consume approximately one-third of the electrical energy that existing MALSR systems with incandescent lamps and mechanical switching and distribution system use.

LED Lamps have been under prototype development for some time. In order to gain the full benefits of modernizing the MALSR, the second initiative for a complete MALSR redesign of the power and control system is needed to optimize efficiency and reliability. Development of a new system is estimated to take approximately three years.

A third initiative is to develop an LED based Precision Approach Path Indicator (PAPI) to replace incandescent based Visual Approach Slope Indicators (VASI) and existing PAPI Systems in the NAS. This redesigned system would improve efficiency and reliability and result in cost savings.

h. 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.

i. 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.

j. Future Communications Infrastructure

The Future Communications Infrastructure contains communications projects in both the C & 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 5000-5030 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

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.

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 prototype system to first site (IAH)
- Deliver WTMD training package for controller to first site (IAH)

b. Wake Turbulence Mitigation for Arrivals

- Readiness for concept and requirements definition decision

- Initial investment decision

c. Surface/Tower/Terminal Systems Engineering
- ICAO 2012 Flight Plan Change Requirements
- TFDM IARD
- TFDM Initial Investment Decision

d. Approaches, Ground Based Augmentation System
- Award Contract to validate CAT III Avionics Standards and interoperability
- Investment Analysis Readiness Decision
- Initial Investment Decision

e. Closely Spaced Parallel Runway Operations
- Conduct further HITL tests to evaluate operational application for Dual ILS/RNAV/PRM/Wake/Blunder/ADS-B

f. NextGen Navigation Initiatives
- Complete Initial Concept of Operations for Navigation Surface Requirements

g. Optimize Navigation Technology
- LED MALSR Contract Award
- LED PAPI Contract Award

h. Trajectory Management – Arrivals
- Perform initial 4D FMS TBO concept validation and analyses of performance capabilities and standards.

i. Trajectory Mgmt - Reduced RVR Minima
- Program has not started

j. Future Communications Infrastructure
- Program has not started

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

$58,100,000 is required to continue the execution of work within the Flexibility in the Terminal Environment (FLEX) solution set. The FY 2012 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.

Detailed Justification for - 1A14 Next Generation Transportation System – Safety, Security and Environment

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

FY 2012 – Next Generation Transportation System – Safety, Security and Environment ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Safety, Security and Environment	$8,200	$5,000	$3,000	$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
Security Integrated Tool Set	---	$5,000.0
Total	Various	$5,000.0
Activity Tasks - Mandatory		
Security Integrated Tool Set	---	$3,000.0
Total	Various	$3,000.0

For FY 2012, $5,000,000 of discretionary funding will provide for the following:

- Obtain Final Investment Decision

For FY 2012, $3,000,000 of mandatory funding will provide for the following:

- Award contract for SITS development
- Initiate development activities

2. What Is This Program?

The Security Integrated Tool Suite (SITS) is a suite of applications designed to provide integrated security solution support for the Federal Aviation Administration (FAA) Air Domain security operation by leveraging Air Navigation System (ANS) capabilities, including personnel, systems, and data, and by integrating these security activities into Air Traffic Management (ATM) operations. SITS automation capabilities will integrate with FAA and interagency systems such as the Department of Defense (DoD), Transportation Security Agency (TSA), and Customs and Border Protections (CBP) to ensure seamless and effective delivery of capabilities. In order to support the increase in air demand in the future while simultaneously sharing information and responsibility for Air Domain security with other agencies, the FAA must ensure the SITS automation includes a robust ability for providing shared situational awareness (SSA), decision support (including risk analysis leveraging interagency resources), information sharing, automated threat detection, monitoring, and post-event analysis and playback. The NextGen timeframe will see a substantial off-loading of routine tasks from the user to automation. SITS will apply this approach while ensuring that there is a "human in the loop" to make crucial security decisions when required. The NextGen environment will have a tremendous amount of information which needs to be processed, consolidated, and presented to stakeholders in an efficient and logical way. For example, managing security airspaces requires the capability to create constrained airspace and limit access to that airspace by aircraft meeting specified criteria. DHS and DOD define the constraints and categories of aircraft that are prohibited from entering the airspace. The FAA implements the plan by identifying which aircraft meet these criteria. The lack of automation support in the current process creates the potential for major disruptions. The SITS CONUSE and the functional analysis identified eight functions integral to SITS:

Manage Security Airspaces based on airspace security constraints provided by DHS and DOD	Coordinate Event and Incident Responses
Manage Flight Security Information	Manage Classes and Rules
Monitor Airspace Tracks and Trajectories	Log, Analyze, and Generate Reports on Security Information
Monitor and Correlate Security Reports and Events	Collaborate and Share Information

3. Why Is This Particular Program Necessary?

The FAA has distinct responsibilities for Air Domain security as the nation's Air Navigation Service Provider (ANSP) and airspace controlling authority including executing constraints defined by DHS or DOD as security events dictate. As a direct result of the changed security environment following the September 11, 2001 terrorist attacks, the FAA's well established Air Domain responsibilities have been significantly impacted. In addition to planning for the substantial air demand increases envisioned in the Next Generation Air Transportation System (NextGen) timeframe, the FAA's Air Traffic Organization (ATO) must establish new capabilities to meet the increasingly complex and expanding security and emergency operations challenges while improving the safety and efficiency of the National Airspace System (NAS). The FAA must balance its support of national defense, homeland security, law enforcement and emergency operations efforts with its core mission to maintain the safety and efficiency of the NAS to include notification of potential security events.

The FAA Air Domain security mission is currently supported by a variety of communications and coordination tools, aircraft situational displays, and security related databases, however, there is limited connectivity among these systems. Analysis and data correlation to determine potential security risk is performed manually, and sharing of information that the FAA has direct responsibility for such as flight plan, flight path, transponder code, radio calls, etc is limited to voice communications. In addition, some tools are prototypes and do not have stable resources for needed improvements, sustainment, or plans for future enhancement. During the past six years, FAA has begun to develop basic automation tools to support the Air Domain security mission, principally by leveraging pre-existing systems used for Air Traffic Management (ATM) services and by implementing interim solutions. However, FAA requires additional automation capability with the robust, integrated tool sets to effectively support this critical mission area. The SITS automation capabilities are intended to close this potentially dangerous gap. The FAA has identified the following capability shortfalls:

- Limited automated shared situational awareness (SSA) and collaboration
- Limited alerting and update capabilities
- Only manual capabilities to assess the impacts of security measures
- Limited tools to support informed decisions
- Limited tools and manual processes to support data correlation and analysis
- Inadequate manual process for implementing tiered security airspace - (While Special Use Airspace (SUA) is one piece of Air Domain Security, future plans include many different levels of security restricted airspace based on individual flight risk profiles and risk levels)
- No locally independent and remote/mobile access capabilities (restriction of required information flows).
- Lack of metrics to analyze security operations effectiveness

4. How Do You Know The Program Works?

The envisioned security environment is comprised of a layered, adaptive approach that will permit timely and effective responses, appropriate risk management to security situations through automation, and decision support systems that inform human decision making.

The operational security environment consists of various security partners, each with a user-defined operational picture (UDOP) based on common information shared rapidly and securely. This SSA capability will improve security operational effectiveness. Digital communication, added to voice communication, will ensure accurate information sharing and timely decision-making.

SITS will provide data correlation, NAS impact analysis of security and emergency actions, and trend analysis capabilities. SITS will also support integrated security-restricted Air Domain development and sharing capabilities. The automation will seamlessly integrate these capabilities with ATM and may support defense, homeland security, disaster recovery, and law enforcement operations. Further, SITS will scale to meet required response and projected air traffic demand.

SITS, through automation, will streamline processes, improve operational security shared situational awareness, and enable the agency to meet the increased demand for security. SITS will improve FAA's ability to coordinate and collaborate with its various security partners. Finally, SITS will provide for the monitoring of any operational radio voice frequencies needed to understand a security event.

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

$8,000,000 is required in order to continue work within the Safety, Security, and Environment (SSE) solution set. The FY 2012 work will continue to develop SITS as part of the FAA's Operational Evolution Partnership (OEP) and efforts to develop NextGen.

With a reduction in the SSE solution set, the SITS program will not be funded. As a result the key benefits contained in this program will be affected. This program will allow for an automated system to identify airborne security threats in the NAS and communicate that information to the appropriate information system or agency. With a loss in SSE funding, the FAA's future ability to support the identification, tracking and mitigation of aviation related national security events will be significantly degraded.

Detailed Justification for - 1A15 Next Generation Air Transportation System (NextGen) – System Networked Facilities (FAC)

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

FY 2012 – System Networked Facilities (FAC)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FAA Mandatory	FY 2012 Total
System Networked Facilities	$3,000	$9,000	$1,000	$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Integration, Development and Operations Analysis	---	$3,000.0
2. Test Bed/Demonstration Sites	---	6,000.0
Total	Various	$9,000.0

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Test Bed/Demonstration Sites	---	1,000.0
Total	Various	$1,000.0

For FY 2012, $9,000,000 of discretionary funding will provide for the following:

Facilities Integration Development & Operations Analysis
- Continue development of the integration, development, and operations analysis capability.
- Integrate 3 additional capabilities into the NextGen Integration and Evaluation Capability (NIEC) display area:
    - Traffic Flow Management Capability (a.k.a. Mini TPC)
    - ERAM Evaluation System (a.k.a. ERAM in-the-Box)
    - Traffic Management Advisory (TMA) capability

Facilities Test Bed/Demonstration Sites
- Expand NextGen test bed capabilities in Florida
- Establish information exchange capabilities with other NextGen Test Bed and stakeholder sites
- Perform arising NextGen technology integration and demonstration activities in Florida. Initiate initial NextGen interactivity between Florida and NASA's North Texas Facility (NTX)
- Continue coordination with NASA NTX
- Perform site installation and maintenance activities Technology site refresh and maintenance at all three Test Bed sites
- Maintain NextGen Test Bed sites to allow continual NextGen demonstrations
- Continue coordination with William J. Hughes Technical Center (WJHTC) and NASA NTX as well as other NextGen stakeholders.

For FY 2012, $1,000,000 of mandatory funding will provide for the following:

Facilities Test Bed/Demonstration Sites
- Perform technology refreshes to install and evaluate arising NextGen technologies
- Expand telecommunication infrastructure to allow improved live data capabilities. Expand site integration capabilities among all three sites

2. What Is This Program?

The Next Generation Air Transportation System (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. It redesigns the air traffic control systems to make them flexible, scalable, and maintainable. It breaks down the geographical boundaries that characterize air traffic control and leads 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. This includes facilities and the personnel who staff them.

NextGen redesigns the air traffic control systems to make them flexible, scalable, and maintainable. It breaks down the geographical boundaries that characterize air traffic control and leads to a more seamless view of traffic, organized not be 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. 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.

Since requirements for facilities are no longer geo-dependent and do not require proximity of air navigation services being provided to the air traffic being managed, facilities are sited and occupied to provide for air traffic management facility optimization. This may include collocating several facilities (e.g., air route traffic control centers (ARTCCs) and terminal radar approach control (TRACONs) within a single facility).

The Networked Facilities solution set focuses on delivering an infrastructure that supports the transformation of air navigation service delivery unencumbered by legacy constraints. Networked facilities will provide for expanded services; service continuity; and optimal deployment and training of the workforce all supported by cost effective and flexible systems for information sharing and back-up. Traffic is assigned to facilities on both a long-term and daily basis with service continuity a foremost requirement. Business continuity is built into the system and provides for a more resilient infrastructure, better contingency operations, and a higher degree of service.

In addition, 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.

DOT Strategic Goal – Economic Competitiveness
- Maximize economic returns on transportation policies and investments.

Integration, Development, and Operations Analysis

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 low 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 2012, 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.

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 Altitude TBO
- High Density Airports
- Networked Facilities
- Reduced Weather Impact
- Collaborative Air Traffic Management (ATM)
- Flexible Terminal and Airspace
- Safety, Security, Environment.
- 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. The Test Bed is envisioned to be physically distributed in order to allow for gate-to-gate demonstration of NextGen components. Specifically, the following three sites are planned:

- NASA NTX is located near the Dallas/Fort Worth Airport (DFW)
- WJHTC located near Atlantic City, NJ
- Daytona Beach International Airport (DAB) located in Daytona Beach, FL.

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.

Integration, Development, and Operations Analysis

- Full Initial capability of the NextGen Integration and Evaluation Capability Lab (NIEC) completed
- Integrate cockpit simulator into the NIEC
- Continue to integrate additional capabilities into the NIEC display area

Test Bed/Demonstration Sites

- Complete Florida Test Bed Segment 1 Implementation

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

$10,000,000 is required to continue work within the Networked Facilities solution set. The FY 2012 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 - 1A16 Next Generation Air Transportation System (NextGen) – Future Facilities Investment Planning

What Do I Need To Know Before Reading This Justification?

- The NextGen Facilities Special Program Management Office (SPMO) is the responsible organization for Future Facilities Investment Planning to transform the FAA's air traffic facilities by developing and implementing a comprehensive plan for managing this multi-year process. The charter and activities of the SPMO 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 Facilities SPMO plans to obtain its Investment Analysis Readiness Decision (IARD) in September 2010, as well as continue its business case development process in preparation for an Initial Investment Decision (IID) in June 2011 and a Final Investment Decision (FID) in June 2012.
- The SPMO strategy is to fully engage union representatives in the overall planning of the program and is awaiting Article 48 representatives to the program office.

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

FY 2012 – Future Facilities Investment Planning
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Future Facilities Investment Planning	$21,000	$19,500	$0	$19,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Business Case Decision Activities/Products – FID Segment 1 Project 1		$4,000.0
2. Systems Engineering Support – Segment 1 Project 1	---	3,000.0
3. Facility Planning and Design – Segment 1	---	9,500.0
4. Program Management	---	10,000.0
5. Program Management, Contract Evaluation and Award	---	2,000.0
6. Contract Preparation and Evaluation	---	1,000.0
Total	Various	$19,500.0

For FY 2012, $19,500,000 is requested for the critical business case development support, systems engineering services, and engineering/architectural expertise needed to complete the business case artifacts and final Segment 1 Project 1 facility design activities for the approval of the Business Case Final Investment Decision (FID) by the Joint Resources Council (JRC) in June 2012. Contract preparation/evaluation activities will include the development of a Request for Proposal (RFP) and a qualified vendor's list in preparation for a contract award in FY 2013 for the construction for the first Project of Segment 1.

2. What Is This Program?

Future Facilities Investment Planning

The NextGen Facilities SPMO primarily seeks to upgrade and transition 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. It redesigns the air traffic control systems to make them flexible, scalable, and maintainable. 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.

Since requirements for facilities are no longer geo-dependent and do not require proximity of air navigation services to the air traffic being managed, facilities are sited and occupied to provide for air traffic management facility optimization. This may include collocating several facilities (e.g., air route traffic control centers (ARTCCs) and terminal radar approach control (TRACONs) within a single facility.

The SPMO will coordinate with other agency initiatives to evaluate alternatives for new facilities as well as alternatives for retrofitting existing facilities. The SPMO will develop business cases for new facilities and/or alterations to existing facilities, and create transition and implementation plans. The SPMO will design FAA facilities that meet the needs of the future through a program that is consistent with facilities-oriented legislation within anticipated FAA Reauthorization then transfer requirements and standards to enable implementation.

The NextGen Facilities program will be structured into multiple segments, with several projects planned under each segment. The NextGen Facilities SPMO plans to obtain its IARD in September 2010, as well as continue its business case development process of Segment 1 of its proposed plan in preparation for IID in June 2011 and a FID in June 2012.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

Future Facilities Investment Planning

The SPMO will coordinate with other agency initiatives to evaluate alternatives for new facilities as well as alternatives for retrofitting existing facilities. The SPMO will develop business cases for new facilities and/or alterations to existing facilities, and create transition and implementation plans. The SPMO will then transfer requirements and standards to enable implementation.

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. It redesigns the air traffic control systems to make them flexible, scalable, and maintainable. It breaks down the geographical boundaries that characterize air traffic control and leads 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.

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.

Since requirements for facilities are no longer geo-dependent and do not require proximity of air navigation services to the air traffic being managed, facilities are sited and occupied to provide for air traffic management facility optimization. This may include collocating several facilities (e.g., air route traffic control centers (ARTCCs) and terminal radar approach control (TRACONs) within a single facility.

3. Why Is This Particular Program Necessary?

As a result of limitations in the current air traffic system, the number of terminal and En Route air traffic control facilities has grown significantly. 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 161 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, further 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 NextGen facility and infrastructure improvements.

In summary, a recent DOT Inspector General Report ("FAA's Management and Maintenance of Air Traffic Control Facilities," Report Number AV-2009-12, December 15, 2008), 59 percent of the current U.S. air traffic control facilities are over 30 years old.

The NextGen Facilities SPMO must 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. Some smaller airports have limited service due to cost of service; creating a need to increase service in these locations, while reducing costs.

The NextGen Facilities SPMO 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?

With the flexibility offered by geo-independent technological advancements, the FAA can create scalable, economical, environmentally responsible facilities that are designed, located, equipped and staffed to deliver all of the services needed to provide safe, orderly, efficient, and secure air traffic services to aircraft operators for now and years to come. The NextGen Facilities SPMO will manage the transformation effort by dividing it into operational segments that correspond to service volumes in the NAS. The segments will be defined based on objective criteria in accordance with legislative authority and recommended practices.

The NextGen Facilities SPMO will develop a comprehensive process for planning, designing and implementing facility changes 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, 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. The multi-year transformation of FAA air traffic control facilities runs between now (2010) through 2025 and beyond.

Initial research on Business Continuity Benefits has been done in support of this program. In a MITRE study, an estimate of lost airline revenues due to an ARTCC outage was calculated. The estimate of lost revenue (2004 dollars) ranged from just $6 million per day for Salt Lake City to over $40 million per day for New York. The median estimate (for Houston) was estimated to be $20 million per day (source: NextGen Facilities Shortfall Analysis Report 5.5, dated July 17, 2009.)

Beginning in FY 2011, the NextGen Facilities SPMO will further refine the development of critical operational requirements and identify facility-specific operational performance metrics that will help validate the program implementation success.

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

For FY 2012, $19,500,000 is requested for the critical business case development support, systems engineering services, and engineering/architectural expertise needed to complete the business case artifacts and final Segment 1 Project 1 facility design activities for the approval of the Business Case FID by the Joint Resources Council (JRC) in June 2012. Contract preparation/evaluation activities will include the development of a Request for Proposal (RFP) and a qualified vendor's list in preparation for a contract award for the construction for the first Project of Segment 1.

- The SPMO team will develop of the required FID artifacts to fully comply with AMS guidance. This effort entails a high degree of coordination with programs/stakeholders that are part of the NextGen Facilities portfolio and have critical investment interdependencies with each other across the FAA portfolio. The SPMO team will ensure that the NextGen Facilities business case contains a comprehensive corporate perspective and evaluates the relevant FAA-wide investment synergies that are critical for a JRC FID.
- The SPMO engineering/architectural services support will finalize detailed facility layout designs to accommodate equipment and systems in the operational areas, National Airspace System (NAS) equipment areas, operational support areas, and administrative areas. The SPMO develop a draft construction Request For Proposal (RFP) and a qualified vendor list by June 2012 in preparation for a construction contract award in FY 2013.

Any reduction in the required funding will be a delay in realization of FAA's goals for facility improvements.

Detailed Justification for - 1A17 Joint Planning and Development Office (JPDO)

What Do I Need To Know Before Reading This Justification?

NextGen was enacted in 2003 by Congress under VISION 100 – Century of Aviation Reauthorization Act (P.L. 108-176). In this initiative, the Joint Planning and Development Office (JPDO) is responsible for managing a public/private partnership to bring NextGen online by 2025. The JPDO is the central organization that coordinates the specialized efforts of the Departments of Transportation, Defense, Homeland Security, Commerce, FAA, NASA, and the White House Office of Science and Technology Policy.

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

FY 2012 – Joint Planning and Development Office (JPDO)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Joint Planning and Development Office (JPDO)	$3,800	$3,000	$0	$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Report Progress and Maintain NextGen National Integrated Plan's Enterprise Architecture, Concepts of Operations and Integrated Workplace		$3,000.0

For FY 2012, $3,000,000 is requested to enhance the NextGen planning information in the Enterprise Architecture and Integrated Work Plan. This will include incorporating information on the following activities:

- NextGen trajectory-based flight processing, including air navigation service provider, flight operations center, and flight crew roles and responsibilities
- Integration of networked enabled weather into automation decision making
- Enhanced operational scenarios that describe information sharing and procedures between flight/airline operations

2. What Is This Program?

The JPDO is responsible for defining and facilitating the implementation of NextGen. At this stage in the transformation, outputs are a series of plans and analyses that define a proposed end-state and a path for achieving it. The objective is to drive collaborative decisions—involving government and industry—that will ultimately achieve the transformation.

As the steward of NextGen, JPDO seeks to address long-term imbalances in aviation capacity and demand. At the same time, it seeks to ensure that the future operating environment is safe, well managed, environmentally responsible, and harmonized with international standards. JPDO's mission is to lead the transformation of today's aviation system into that of the future, the scope of which contributes to all of FAA's current strategic goals.

The JPDO is truly a collaborative enterprise. Employees from the National Aeronautics and Space Administration (NASA) and the Departments of Transportation, Commerce, Defense (DoD), and Homeland Security (DHS) actively lead and/or participate in JPDO activities. Similarly, the JPDO Board includes executives from each department/agency, as well as the White House Office of Science and Technology Policy. And the Senior Policy Committee includes Secretaries, Deputy Secretaries, and/or Administrators from the participating organizations, as well as the Director of the Office of Science and Technology Policy.

The private sector is also an integral part of JPDO's work. In FY 2006, the NextGen Institute was established as an alliance of major aviation stakeholder communities.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

In Public Law 108-176 Congress recognized the need to do business differently. To ensure this change occurs, Congress created the Joint Planning and Development Office established by the Department of Transportation within the Federal Aviation Administration will manage the work related to NextGen.

The JPDO provides the multi-agency governance structure that guides the development of the nation's air transportation system of 2025. The JPDO together with partner agencies defines the capabilities and mechanisms that build new capacity to accommodate a wide range of customers and address an even wider spectrum of issues. These include increasing mobility for private, commercial, civil, and military aviation, airport and airspace capacity that is adaptable to unforeseen changes in traveler and shipper needs, and capacity increases that are balanced within safety and security guidelines.

The JPDO maintains the plan and provides biennial reporting on the progress that participating agencies make in transforming the air transportation management system into a space-based system capable of avoiding future capacity gridlock regardless of weather conditions.

4. How Do You Know The Program Works?

VISION 100 directs the Secretary of Transportation to establish a Senior Policy Committee (SPC) to oversee the work of the JPDO. By law, the SPC is chaired by the Secretary of Transportation, and is composed of:

- The Secretary of Transportation
- The Administrator of the Federal Aviation Administrator (or designee)
- The Administrator of the National Aeronautics Administration (or designee)
- The Secretary of Defense (or designee)
- The Secretary of Homeland Security (or designee)
- The Secretary of Commerce (or designee)
- The Director of the Office of Science and Technology Policy (or designee)
- Designees from other Federal agencies that the Secretary of Transportation determines have an important interest in, or responsibility for, other aspects of the system.

The SPC provides high-level guidance, resolves major policy issues, and identifies resource needs

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

A reduction would limit the activities associated with multi-agency architecture federation.

A further reduction would limit information sharing information included in the Enterprise Architecture.

Detailed Justification for - 1A18 NextGen Performance Based Navigation (PBN)-Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)

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

FY 2012 – NextGen Performance Based Navigation (PBN) - Metroplex Area Navigation Performance (RNAV)/Required Navigation Performance (RNP)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
NextGen Performance Based Navigation (PBN)- Metropex Area Navigation (RNAV)/Required Navigation Performance (RNP)	$0	$26,200	$0	$26,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Optimization of Airspace and Procedures for Metroplexes (OAPM)		$19,500.0
2. NextGen Safety		6,700.0
Total	Various	$26,200.0

For FY 2012, $26,200,000 of discretionary funding will provide for the following:

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. Recommendations for the implementation of NextGen within the aviation community were consolidated by the RTCA and are the industry's top priorities for the near- and mid-term NextGen programs. 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 as a proof of concept 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.

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 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.

2. What Is This Program?

The Airspace Optimization Group will begin integrated 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.

DOT Strategic Goal – Economic Competitiveness

- With regards to RTCA Task Force 5 recommendations, develop and implement PBN routes and procedures, including RNP, RNAV, and OPD to expand development in Metroplex and non-Metroplex areas, based on targeted benefits.

3. Why Is This Particular Program Necessary?

Optimization of Airspace and Procedures in the Metroplex is the starting point for 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 we redesign 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.

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. 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?

$26,200,000 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.

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 $1,567,950,000 for FY 2012, a decrease of $13,294,000 below our FY 2010 budget request. The Activity 2 funding request is needed for the following programs:

- $521,750,000 is requested for NextGen technologies, tools, and systems; and
- $1,046,200 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
- 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:
    - Baltimore, MD
    - Fort Lauderdale International, FL
    - Tulsa-Riverside, OK
  - Phase III construction starts at three sites:
    - Champaign, IL
    - San Francisco, CA
  - Phase IV/V continuation funding for five sites:
    - Cleveland, OH,
    - Kona, HI,
    - Las Vegas, NV,
    - Wilkes Barre, PA,
    - Oakland, CA.
- ADS-B will 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.
- NAS Voice Switch (NVS) will complete the activities leading to the Final Investment Decision (FID) and to award a contract.
- Navigational and Landing Aids will complete 97 initial procurements and 110 new procurements.
- WAAS Satellite Leases program will fund GEO satellite acquisitions.
- Repair 266 unstaffed infrastructure projects located in all three service areas.
- The UIS program office will conduct 10 seismic evaluations of FAA facilities located in high seismic areas.
- Complete Next Generation Flight Inspection System (NAFIS) Phase I installation on two aircraft.
- Electrical Power Systems Sustain Support program will procure various power systems and related equipment.
- Aircraft Fleet Modernization program will procure three flight inspection aircraft.

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, we have 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 the 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.

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 a proven track record in recent years of meeting major acquisition goals and mitigating risks through business process improvements and management oversight. Since 2004, we have successfully met the FAA Flight Plan's acquisition metrics for program budget and schedule performance. We also institutionalized acquisition best practices. These two elements contributed to our success in being removed from GAO's High Risk List for Acquisitions in FY 2009. 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 would defer emerging, 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 would enable us 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 - 2A01 En Route Automation Modernization (ERAM)

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

FY 2012 – En Route Automation Modernization (ERAM)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
En Route Automation Modernization (ERAM)	$171,750	$120,000	$0	$120,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
ERAM	---	$120,000.0

Although orifginially planned to complete deployment in December 2010, the ERAM program is an estimated 4 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 2012, $120,000,000 of discretionary funding will 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; and 2nd level engineering support for sites engaged in ERAM limited and continuous operations. Based on the rebaseline plan that extends the program by 4 years and 4330 million, six (6) ERAM operational sites will achieve IOC during FY 2012. The FY 2012 funding supports the prime activities and support contractor activities to achieve this objective.

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.

From a functionality standpoint, the ERAM program baseline was originally scoped to include three major 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 Next Generation Air Transportation System (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.

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 is planned to be the deployment baseline for all remaining waterfall sites beginning with Kansas City 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 twenty (20) ARTCCs.

4. How Do You Know The Program Works?

Three of the ARTCCs have reached initial operational capability (IOC). 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 ERAM D-Position Upgrade and System Enhancements

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

FY 2012 – ERAM D-Position Upgrade and System Enhancements ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
ERAM D-Position Upgrade and System Enhancements	$0	$0	$64,500	$64,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
Program Initiation Activities, Program Management and Data-Position Infrastructure Upgrade	---	$64,500.0

For FY 2012, a total of $64,500,000 of mandatory funding is requested for ERAM D-Position Upgrade and System Enhancements. With this funding, system engineering and initial software development of the D-Position Upgrade will commence. Specific ERAM D-Position Upgrade and System Enhancements capabilities include: completion of the system engineering and design for the D-position upgrade, both hardware and software; finalization of initial software requirements for initial D-Position CHI redesign and new display views, start of initial software development; procurement of developer and test lab replacement D-Position displays and R-Position processors, and planning for development operational testing of D-Position software and planning for deployment of hardware. 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.

From a functionality standpoint, 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 extenally funded by the SWIM and Data Communications programs for new functionality and by ERAM basleine for operational (maintenance) software fixes. This program upgrades the D-side displays, associated computer human interface, and associated processors at all Air Route Traffic Control Centers which currently are near maximum capacity both in viewable area as well as processing abaility. System engineering and software design and development would be accomlished in FY12 and FY13 with hardware purchases starting in FY13; deployment is planned for FY14 and FY15 to be completed in calendar year 2015. Software enhancements such as non-radar control will be accomplished in FY15 and FY16. This program includes 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 will begin in FY 2011 with system engineering tasks associated with scoping and defining the software release projections, issuance of the Screening Information Request (SIR) and negotiation of the contract modifications and detailed work on the initial hardware performance upgrade implementation planning. In addition, the program will undergo acquisition and investment analysis review in FY 2012.

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 2012 and completes in 2019. Hardware upgrades start in 2012 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 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.

Mission Need Statement (MNS) 309 addresses the supportability of en route and oceanic facilities and the architecture needed to support projected air traffic growth. It incorporates 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. MNS-309 also addresses inefficiencies in the current systems that impacts FAA's mission in these areas.

Although many of these inefficiencies are being corrected and goals achieved in the ERAM acquisition baseline was 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 2012, it 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 2012 – En Route Communications Gateway (ECG)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
En Route Communications Gateway (ECG	$3,600	$2,000	$4,000	$6,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Workstations/Monitors/DVD	---	$800.0
2. Printers	---	200.0
3. Operational Analysis, STEP, RMA	---	300.0
4. In-Service Engineering	---	700.0
Total	Various	$2,000.0
Activity Tasks – Mandatory		
Interface Processors	---	4,000.0
Total	Various	$6,000.0

For FY 2012, $2,000,000 of discretionary funding will provide for the following:

- Maintenance workstations (MWS) required for the monitoring and control of the ECG Interface Processors (IP) during operations.
- Support workstations (SWS) required for the provision of ECG support functions, such as off-line data reduction and local adaptation management.
- Monitors required for the status display of ECG software and hardware components.
- Printers required for printing functions of ECG data, such as local adaptation, error log reports, and data reduction reports.
- Program Support services provides assistance with Operational Analysis (OA), Sustainment Technology Evolution Plan (STEP), Reliability Maintainability Availability (RMA) for the ECG Program. These services 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.

For FY 2012, $4,000,000 of mandatory funding will provide for the following:

- Interface processors receive data such as radar information, interfacility data, Coded Time Source (CTS), and Automatic Dependence Surveillance Broadcast (ADS-B) information from external sources through the modem splitter and external Local Area Network (LAN) switches and passes the data to the Host Computer System (HCS) and En Route Automation Modernization (ERAM). The data is used in the provision of air traffic operations.

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 US. 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. ECG is the first step in FAA's plan to replace aging automation systems with modern technology. 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. Sometimes, technology upgrades improve capability. The ECG program allows the FAA to monitor, maintain, and evolve the ECG system to take advantage of technical advances. The problem therefore, is to maintain the viability of the ECG system while the air traffic technology evolves, maintaining the service capability that ECG provides.

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 that was end of life. 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 Data Input/Output (FDIO), Surveillance and Broadcast Services (SBS)/Automated Dependence Surveillance – Broadcast (ADS-B) at Houston ARTCC (ZHU) and new 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. As of March 31, 2010, the ECG system has been operational at all 20 sites. This represents 866,904 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 $6,000,000 level, the program office would be unable support the new Wide-Area Multilateration system being installed in Denver ARTCC.

With a reduction, ECG will be unable to support ADS-B at Houston (ZHU) and new system WAM at Denver (ZDV) without architectural changes to meet mission needs and the NextGen programs

Detailed Justification for - 2A04 Next Generation Weather Radar (NEXRAD)

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

FY 2012 – Next Generation Weather Radar (NEXRAD
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Weather Radar (NEXRAD	$6,900	$2,800	$0	$2,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. FAA Share for NPI Science Evolution	---	$845.0
2. Icing and Hail Algorithm Enhancement	---	900.0
3. Procure Technology Refresh Hardware	---	474.0
4. Configuration Management	---	581.0
Total	Various	$2,800.0

For FY 2012, $2,800,000 is requested to support National Weather Service's (NWS) Dual Polarization contract management efforts and NEXRAD technology refresh planning and procurement efforts. In additional, 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.

Dual Polarization upgrades will be installed and tested at two FAA Beta sites in late fall 2011. The remaining ten FAA sites will be upgraded in the spring and summer of FY 2012. 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.

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?

$2,800,000 is required to fulfill the FAA's continuing commitment to NEXRAD sustainment and product improvement, in accordance with the Tri-Agency MOA. The memorandum of agreement (MOA), originally implemented in 1980, was renewed in October 2009 for another 5-year period. Specifically, this includes the FAA's share in FY 2012 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 2012 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 Air Traffic Control System Command Center (ATCSCC) Relocation

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

FY 2012 – ATCSCC Relocation
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
ATCSCC Relocation	$10,300	$3,600	$0	$3,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program and Schedule Management	---	$500.0
2. Telecommunications Cost	---	1,200.0
3. Moving and Disposal	---	400.0
4. Utilities Costs	---	500.0
5. Change Orders	---	500.0
6. Miscellaneous Service Contracts	---	500.0
Total	Various	$3,600.0

For FY 2012, $3,600,000 is requested for continued performance of program and schedule management, paying additional telecommunication costs, addressing the final moving and disposal costs, processing final change orders, covering utilities costs, and miscellaneous service contracts.

In FY 2010, $10,300,000 was appropriated for equipment and installation costs, project management, construction modifications, site preparation and installation, and FAA Telecommunications Infrastructure (FTI) administrative circuits.

2. What Is This Program?

This program relocates and constructs a new ATCSCC facility on FAA owned property collocated with the FAA Potomac Consolidated Terminal Radar Approach Control (TRACON) Facility in Warrenton, Virginia. Since FAA owns the 33 acres of property where the Potomac TRACON is located, no new land acquisition will be required to build this new ATCSCC facility.

The existing ATCSCC is in a leased facility (located in Herndon, VA) that does not meet evolving FAA security standards. The new facility is moving to a secure FAA site that meets all existing FAA security requirements. In fact, the Potomac TRACON site is one of the few FAA sites that have received full Security Accreditation.

In addition to reducing FAA costs to operate the ATCSCC, the new facility is being designed to overcome the constraints of the existing building. Over the years the Traffic Flow Management equipment has been going through a relatively constant change with new equipment arriving nearly every year. The existing control room and the consoles were not designed with reconfigurations in mind. As a result, FAA continues to incur a significant cost for each minor reconfiguration or each new tool being deployed. The new facility is being designed from the ground up with the ability to reconfigure at little or no cost as a primary objective. This flexibility will not only allow low cost adaptability, it will also allow for faster deployment of equipment.

DOT Strategic Goal - Organizational Excellence

- Diverse and collaborative DOT workforce.

3. Why Is This Particular Program Necessary?

The ATCSCC relocation will lower FAA's life cycle costs. The FAA will achieve cost avoidance benefits projected at $121.4 million from fiscal year 2010 through fiscal year 2031. Collocation will also lower capital costs by eliminating the need for land acquisition, reducing site work costs, and significantly reducing backup power system and utility costs. Operations and Maintenance (O&M) costs will be reduced as well for the ATC system maintenance, facility security, telecommunication services, and grounds maintenance through collocation.

The FAA Air Traffic Control System Command Center (ATCSCC) is responsible for the tactical command and control of the National Airspace System (NAS) on a daily basis. The ATCSCC plays a key role in the safe and efficient operation of managing the NAS. The ATCSCC plays a key national security role and in the current leased facility, the security requirements do not continue to meet FAA security standards. Since 1994, the facility has been housed in commercially leased space with the current cost in excess of $4 million annually. The long term lease is set to expire in May 2011 (previously September 2013). The FAA must have a permanent location for this critical NAS function that continues to meet and stay ahead of evolving FAA security standards. In addition, there are many physical constraints in the existing leased ATCSCC facility operations room for reconfiguration and expansion for new Traffic Flow Management (TFM) equipment deployments. In the past, in order to meet new equipment deployments, the FAA has had to pay significantly for modifications to the existing leased space to accommodate these new TFM equipment deployments.

4. How Do You Know The Program Works?

Since the beginning of construction in January 2009, all major milestones have been met on schedule and on budget. Partial Building Occupancy was scheduled for May 3, 2010 and was actually completed three days early. The Full Building Occupancy Date (BOD) is scheduled for July 3, 2010 and we will meet that major milestone as well. Commissioning remains on schedule for March 5, 2011. The ATCSCC Relocation team continues to track and report all spending since the beginning of the program back in FY 2007.

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

$3,600,000 is required for continued performance of program and schedule management, paying additional telecommunication costs, addressing the final moving and disposal costs, processing final change orders, covering utilities costs, and miscellaneous service contracts.

FY 2012 is the final build out/closeout of this project. Most of these funds will be used to pay down the FTI Telco costs that were deferred to FY 2012. These costs were substantially higher than the initial assessment made at the JRC briefing back in May 2006. It is critical that the FTI bill be paid in full in FY 2012.

Detailed Justification for - 2A06 ARTCC Building Improvements/Plant Improvements

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

FY 2012 – ARTCC Building Improvements/Plant Improvements
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
ARTCC Building Improvements / Plant Improvements	$48,700	$46,000	$6,000	$52,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. ARTCC Facility Modernization	---	$36,000.0
2. ARTCC Sustainment	---	8,000.0
3. In Service Engineering	---	2,000.0
Total	Various	$46,000.0

Work to be completed with discretionary funding:

1. Automation Wing 2nd Floor Renovation-ZAB	TBD	$0.0
2. Control Wing Basement/Chiller/Cooling Tower Sustain-ZNY, ZME, ZFW, ZAU	TBD	0.0
3. Building Automation Control Systems-ZNY,ZSU,ZJX,ZMA	TBD	0.0
4. Sustain Funding-All ARTCC's	TBD	0.0
5. Engineering & Program Support	TBD	0.0

Activity Tasks – Mandatory		
1. ARTCC Facility Modernization	---	$3,000.0
2. ARTCC Sustainment	---	3,000.0

Work to be completed with mandatory funding:

1. Sustain Funding-All ARTCC's	TBD	$6,000.0

For FY 2012, $46,000,000 of discretionary funding will provide for the following:
- Funding to reduce Operations and Capital Liability risks at all ARTCC's

For FY 2012, $6,000,000 of mandatory funding will provide for the following:
- Funding to reduce Operations and Capital Liability risks at all ARTCC's

For FY 2012, $46,000,000 of discretionary funding is requested to continue ARTCC modernization and sustainment projects. Major construction projects will replace obsolete plant equipment. These projects will perform asbestos abatement, replace mechanical/electrical system, and install fire detection and protection upgrades as well as interior architectural construction. All facilities will also receive smaller sustainment projects to eliminating infrastructure failure by replacing mission critical components. An additional $2,000,000 is requested for in service engineering activities.

For FY 2012, $6,000,000 of mandatory funding is requested to continue working on backlog of ARTCC modernization and sustainment projects.

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 Air Route Traffic Control Centers (ARTCCs) as well as the Combined Center Radar Approach Control (CERAP) facilities at San Juan and Guam. These facilities were originally constructed over 40 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 Plan 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 over 40 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 necessary at ARTCC's in seismic areas.

In FY 2009, a national condition assessment survey identified a $98 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 four years this program has been able to reduce the national backlog by approximately $24 million. The associated reduction in out year capital liabilities is approximately $96 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 13 standard projects that are implemented at all facilities. Currently 9 of the 13 projects are complete. While the remaining 4 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. Funding at the requested level is required to 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 liability associated with the Backlog Infrastructure Failures.

Detailed Justification for - 2A07 Air Traffic Management (ATM)

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

FY 2012 – Air Traffic Management
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Air Traffic Management	$31,400	$7,500	$0	$7,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. ATM Infrastructure Modernization	---	$3,300.0
2. Collaborative ATM Technologies (CATMT) – WP1	---	3,200.0
2. In Service Engineering	---	1,000.0
Total	Various	$7,500.0

For FY 2012, $7,500,000 is requested to close out the CATMT Work Package 1 (WP1) activities and to continue planning for the next phase of Traffic Flow Management (TFM) technology refresh 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.

Traffic Flow Management - Modernization (TFM-M): The TFM-M program has recently replaced the obsolete hardware at FAA's field ATC facilities and in the process of modernizing the hub site facility hardware and software of the current infrastructure. When completed, TFM-M will provide a hardware and software infrastructure that will enable continued development of products and services to more effectively manage the flow of air traffic, while reducing the cost of ownership and ensuring the technological capacity to meet future user and customer needs.

Collaborative Air Traffic Management Technologies (CATMT): CATMT Work Package 1 focuses on four areas: Airspace Flow Management, Impact Assessment and Resolution, Domain Integration, and Performance Management. These capabilities will improve the usage of existing NAS capacity by improving automation tools and procedures to make air traffic more efficient during periods of adverse weather or excessive volume. Additionally, it will promote the use of automated systems that provide more accurate and timely information to all users and customers, and will implement tools and processes that promote collaborative decisions regarding best routing and scheduling alternatives.

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 its 81 TFM-equipped ATC facilities for its customers and continue to provide enhanced TFM services. Air Traffic Management (ATM) includes: modernization of the Traffic Flow Management Infrastructure (TFM-I), development of Collaborative Air Traffic Management Technologies (CATMT), technology refreshment of the Departure Spacing Program (DSP), and development of the Route Availability Planning Tool (RAPT) prototype, and provides direct mission support to the FAA by ensuring efficient flow of air traffic through the NAS.

4. How Do You Know The Program Works?

Since FY 2005 before the deployment of any of the 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 2 percent in FY 2005 to 1 percent in FY 2009*, the last year data is available for.

*Metrics and Analysis report performed by Flatirons Solutions, Inc. (November 2009)

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

Funds are needed at the requested level so we can complete the technology refresh activities for the TFM hub site at the William J Hughes Technology Center and initiate technology refresh activities at previously implemented sites as a part of the overall TFM-M effort. The required funds will also allow us to close out all CATMT WP 1 activities and continue in service engineering efforts.

Detailed Justification for - 2A08 Air/Ground Communications Infrastructure

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

FY 2012 – Air/Ground Communications Infrastructure
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Air/Ground Communications Infrastructure	$8,600	$4,800	$0	$4,800

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. Radio Control Equipment - Sustain	---	1,000.0
3. In Service Engineering	---	800.0
Total	Various	$4,800.0

For FY 2012, $3,000,000 is requested to fund eight CFE expansion/relocation sites, procure replacement radios, equipment racks, antennas, towers, and site preparation. $1,000,000 is requested to fund RCE equipment to sustain the National Airspace System (NAS) through the transition from existing RCE equipment and legacy interfaces to NextGen interfaces. Also requested is $800,000 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.

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.

The current RCE equipment will be maintained until 2015. There exists some uncertainty as to what systems will be deployed between 2015 - 2025; however, by funding a new RCE acquisition effort in FY 2011 the FAA will help to quantify these uncertainties through an RCE investment analysis and acquisition. According to the February 2006 A/G Communications Roadmap, and its subsequent updates, the current RCE infrastructure is required until 2025 to support FAA's ongoing need for voice communications. The benefit of the new RCE product is to provide a technology refresh to bridge the gap between 2015 - 2025 and beyond, leading to a more capable infrastructure.

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 funding site surveys for several projects and will delay implementation of one site out of approximately eight planned sites for FY 2012.

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 2012.

RCE:

A reduction would result in FAA not being able to purchase all of the equipment needed to sustain in FY 2012.

Detailed Justification for - 2A09 Air Traffic Control En Route Radar Facilities Improvements

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

FY 2012 – Air Traffic Control En Route Radar Facilities Improvements ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Air Traffic Control En Route Radar Facilities Improvements	$5,300	$5,800	$0	$5,800

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	---	800.0
Total	Various	$5,800.0

For FY 2012, $5,000,000 is requested to continue facility maintenance and upgrades to the 161 Long Range Radar (LRR) sites. An additional $800,000 is requested for in service engineering activities.

2. What Is The Program?

The LRR Facilities program continues to renovate all existing FAA-owned surveillance facilities and structures serving the National Airspace System (NAS). The NAS requires reliable and continuous operation of surveillance equipment. Repairs, improvements, and modernization to existing infrastructure will enable facilities to meet current operational, environmental, and safety needs, extend the service life of facilities, and reduce the chance of outages that often cause air traffic delays. Infrastructure failure will result in surveillance equipment failures directly reducing the capacity of the NAS.

The NAS currently has 161 en route surveillance facilities. All of these facilities contain critical long-range secondary beacon radars. Many of these en route (long range radar) sites were established in the early 1950's. Today, FAA air traffic control (ATC) requires seamless surveillance information provided within each air traffic controller's area of responsibility. In order to reliably provide seamless surveillance information in the en route environment and due to the extreme age of these facilities, the need for facility infrastructure improvements are required at all of the operational en route surveillance facilities. Failures and deficiencies in the existing infrastructure resulted in operational outages each year that have severe and immediate impacts on air traffic control en route services.

The current air surveillance infrastructure has shortfalls that must be addressed to ensure that the air surveillance system can continue to 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 reduced the potential for reduced coverage. Projects include replacement of heating, ventilation, air conditioning, engine generators, uninterruptible power supplies, lightening protection, grounding, bonding, and shielding (LPGBS) systems, and structural upgrades to support Air Traffic Control Beacon Interrogator model 6 (ATCBI-6) deployments.

4. How Do You Know The Program Works?

The number of unscheduled outages of Air Route Surveillance Radar (ARSR) and FPS equipment over the previous 12-month period (ending March 31, 2010) has continued in a downward trend. The LRR Infrastructure Improvements Program is the reason the 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 directly impacting the NAS.

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

Any reduction would delay required repair, upgrade, and decommission to LRR facilities.

Detailed Justification for - 2A10 Voice Switch and Control System (VSCS)

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

FY 2012 – Voice Switch and Control System (VSCS)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Voice Switch and Control System (VSCS)	$16,700	$1,000	$0	$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Investment Analysis	---	$1,000.0

For FY 2012, $1,000,000 is requested to conduct VSCS Technology Refresh Phase 3 Investment Analysis.

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. It provides 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:

VTABS Power Supply Replacement allows continued power supply backup to VTABS; Repeater/ LAN Modification allows future expansion of LAN; Depot Test Equipment allows continued depot-level repair, ensures timely depot-level repair, and eliminates dependency on PL/M SW engineers; PL/M to C++ Software Conversion eliminates dependency of scarce PL/M SW engineers. In addition, VAX Compilers are obsolete; and Enhanced technician diagnostic software reduces technician fault assessment time and reduces depot test of non-faulted LRUs. 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?

$1,000,000 is requested to conduct Investment Analysis to determine the technology refresh requirements for the Phase 3 VSCS Technology Refresh which will ensure that VSCS continues to provide reliable voice communications, which can support the current and future en route operations.

The $1M is requested to determine what areas of the VSCS require a technical refresh. NAS Voice Switch funding is being reduced, requiring the VSCS to provide reliable voice communications for En Route operations for an additional 5 years. The $1M is required to mitigate risk.

Detailed Justification for - 2A11 Oceanic Automation System

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

FY 2012 – Oceanic Automation System
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Oceanic Automation System	$7,700	$6,000	$2,000	$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Prime Contract, System Engineering, Planned Product Improvement, Program Management	---	$5,060.0
2. OAS Program Management	---	940.0
Total	Various	$6,000.0

Activity Tasks – Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. OAS Program Management	---	1,460.0
2. Oceanic Integration & Interoperability Facility Lab	---	400.0
3. Facility Modifications and Site Support	---	140.0
Total	Various	$2,000.0

For FY 2012, $6,000,000 of discretionary funding will provide for the following:

- Provides prime contract support to continue the improvements in the safety and efficiency of oceanic air traffic control
- Provides limited contract personnel support for the FAA program office

For FY 2012, $2,000,000 of mandatory funding will provide for the following:

- Provides total contract personnel support for the FAA program office
- Support required to enhance the Oceanic Integration & Interoperability Facility Laboratory for future growth of the Ocean 21 system
- Allows for oceanic facilities modernization and support to adjust to the enhancements being made with the Ocean 21 systems operations.

For FY 2012, a total of $8,000,000 is requested 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 Pre-planned Product Improvements (P3I) for ATOP operational improvements, safety enhancements, and Agency commitments to the three Oceanic Air Route Traffic Control Centers (ARTCCs) at Oakland, New York and Anchorage. The budget will also provide for the required level of program management and engineering support to support these efforts.

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 Preplanned Product Improvements through FY 2015 to enhance safety, provide operational efficiency improvements, and support FAA and International Civil Aviation Organization (ICAO) mandated system changes.

DOT Strategic Goal - 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?

$8,000,000 is requested 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 Preplanned Product Improvements (P3I) for 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.

A reduction below the request level will impede the program's ability to deliver external and internal agency commitments, specifically the International Civil Aviation Organization (ICAO) 2012 flight plan initiative.

Detailed Justification for - 2A12 Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)

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

FY 2012 – Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$64,200	$45,150	$0	$45,150

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$1,900.0
2. In Service Engineering	---	300.0
3. Hardware/Software	---	17,500.0
4. Logistics	---	4,500.0
5. Implementation	---	12,500.0
6. UHF Radio Replacement	---	8,000.0
7. Independent Operational Test and Evaluation	---	450.0
Total	Various	$45,150.0

For FY 2012, $19,700,000 is requested for NEXCOM Segment 1a. Segment 1a multimode digital radios will be installed at approximately 160 en route sites across the United States. For NEXCOM Segment 2, $17,000,000 is requested to install 2,069 radios in terminal and flight Services facilities. For the UHF Radio Replacement program $8,000,000 is requested to procure 1,250 UHF radios, site preparation, training and spares. An additional $450,000 is requested for Independent Operational Test and Evaluation (IOT&E).

By the end of FY 2009, over 8,286 multimode digital radios were operational at approximately 713 sites across the United States.

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 - 2023) will implement MDRs that will service the high-density terminal areas and the flight service operations.

The UHF radio replacement program 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. Another benefit is the cost reduction of using existing radios removed from the en route facilities to meet near term non-en route growth requirements from 2004 – 2007. 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? (Should this be updated)?

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 late 2012 or 2013. Currently 808 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 requested funding will be necessary to do so.

This reduction will delay implementation of (multiple sites and push the installation out past 2023) four terminal or flight services NEXCOM two sites.

A further reduction would delay implementation of nine terminal or flight services NEXCOM two sites.

UHF Replacement: 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 - 2A13 System-Wide Information Management (SWIM)

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

FY 2012 – System-Wide Information Management (SWIM)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
System-Wide Information Management (SWIM)	$58,548	$66,350	$0	$66,350

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
Segment 1:		
1. Traffic Flow Management Data Publication	---	$3,500.0
2. Terminal Data Distribution System Publication	---	8,700.0
3. Corridor Integrated Weather System Publication	---	100.0
4. Integrated Weather Terminal Weather Publication	---	200.0
5. Weather Message Switching Center Replace Publication	---	2,700.0
6. SWIM Core Services	---	8,900.0
7. ERAM Publication	---	8,000.0
Segment 2:		
8. Analyze Requirements and Develop Specifications	---	5,000.0
9. Analyze Segment 2 Architecture Alternatives	---	6,000.0
10. Prototype Candidate Solutions	---	5,000.0
11 Conduct Acquisition for Integration Contract	---	6,000.0
12 Core Services Development by Contractor	---	12,000.0
13 Independent Test and Evaluation (IOT&E)	---	250.0
Total	Various	$66,350.0

For FY 2012, $66,350,000 is requested for Segment 1 development efforts and Segment 2 follow-on analysis initiatives.

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.

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:

- <u>Expand System Capacity</u> - 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.

- <u>Increase Predictability</u> - 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.

- <u>Reduce Costs for Aviation</u> - 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.

- <u>Shared situational awareness</u> - SWIM will help to provide shared situational awareness so that all appropriate parties are privy to the same complete set of information.

- <u>Collaborative Decision Making</u> - 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.

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.

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

$ 32,100,000 is required for the development of Segment 1. Efforts in FY 2012 include development, and test of initial Segment 1 capabilities. For FY 2012, SWIM funding will:

- Conduct OT&E, Key Site and begin the deployment of the Terminal Data Distribution System Capability
- Continue to operate the deployed Corridor Integrated Weather System Publication and Integrated Weather Terminal Weather Publication Services
- Conduct Development Test and Evaluation of the Traffic Flow Management Flow Information Publication and begin work on the Runway Visual Range Capability
- Complete deployment of the Weather Message Switching Center Replace Publication Service and begin operations
- 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 Implement Programs.

$ 34,250,000 is required for Segment 2 to:

- Analyze requirements and develop specification
- Analyze Segment 2 architecture alternatives
- Prototype candidate solutions
- Conduct acquisition for integration contract.
- Begin core services development by integration contractor

Detailed Justification for - 2A14 ADS-B NAS Wide Implementation

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

FY 2012 – ADS-B NAS Wide Implementation
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
ADS-B NAS Wide Implementation	$201,350	$285,100	$0	$285,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Solution Development	---	$98,000.0
2. Implementation	---	42,200.0
3. In-Service Program/Management	---	144,000.0
4. In-Service Engineering	---	900.0
Total	Various	$285,100.0

In FY 2012, NAS Wide deployment of ADS-B will continue with subscription services operational for surveillance in the Gulf, Louisville/Philadelphia, the East Coast, Alaska, and for weather in the Gulf and Alaska. Additionally Advanced Technologies and Oceanic Procedures (ATOP) automation platform ADS-B software development will occur, merging and spacing conceptual development will be ongoing and may include software development, WAM (Wide Area Multilateration) for surface surveillance implementation will be ongoing. Finally, further development of future applications is planned.

2. What Is This Program?

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 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.

DOT Strategic Goal - Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

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 National Airspace System (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.

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, FIB-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 - In Service Decision was approved in 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 all underwent significant testing and evaluation to support the requirements. All sites have achieved operational readiness through Initial Operational Capability (IOC) as of April 2010. The completion of these sites and all separation services enabled the FAA to release the Final Rule for avionics. An In Service Decision for Critical Services is planned for September 2010.

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

In FY 2012 NAS Wide deployment of ADS-B will continue with subscription services operational for surveillance in the Gulf, Louisville/Philadelphia, the East Coast, and Alaska and for weather in the Gulf and Alaska. Additionally ATOP automation platform ADS-B software development will occur, Merging and Spacing conceptual development will be ongoing and may include software development, WAM (wide area multilateration) for surface surveillance implementation will be ongoing. If funded at less than the

$285,100,000 level the program office would have to extend the ADS-B schedule. A reduction would impact the program schedule and cause a slip putting the NextGen program at risk. The ADS-B service is a critical to the implementation of NextGen.

Detailed Justification for - 2A15 Windshear Detection Services (WSDS)

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

FY 2012 – Windshear Detection Services (WSDS)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Windshear Detection Services (WSDS)	$1,000	$1,000	$0	$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Business Case Development	---	$500.0
2. Legacy Sustainment/Repair	---	500.0
Total	Various	$1,000.0

For FY 2012, $1,000,000 is requested to continue business case development activities, and to seed sustainment, and repair initiatives aimed at sustaining the legacy wind shear detection systems currently deployed in the National Air Space (NAS). Task 1 involves developing the necessary Acquisition Management System (AMS) artifacts to receive an Final Investment Decision (FID) for Work Package (WP) 1 the legacy component which include the Implementation Strategy and Planning Document (ISPD), Business Case Analysis Report (BCAR), Final Requirements Document (fRD), and the Safety Risk Management Documentation (SRMD).

Task 2 involves seeding projects aimed at maintaining the legacy wind shear detection systems. These projects include repairing or replacing failed Low Level Wind Shear Alerting System (LLWAS) master stations and remote stations used to generate wind shear alerts in the approach and departure corridors; repairing or replacing Weather System Processor (WSP) failed components such as the aging Central Processing Units (CPUs), and Operating System (OS) which are both no longer supportable, and initiating phase 2 of the Terminal Doppler Weather Radar (TDWR) Service Life Extension Program (SLEP) which includes such projects as Radio Frequency Interference (RFI) hardening, refurbishing the grounding system, replacing the Direct Digital Controller (DDC), and replacing the facility Uninterruptible Power Supply (UPS).

2. What Is The Program?

Wind Shear Detection Services (WSDS) is a portfolio of ground-based wind shear detection systems. WSDS contains two components or Work Packages (WP).

- WP1 (Legacy) contains the legacy wind shear technology currently present within the National Airspace System (NAS); Weather Systems Processor (WSP), Terminal Doppler Weather Radar (TDWR), and Low Level Wind Shear Alert System (LLWAS)

- WP2 (New/Expansion) contains new wind shear detection technology such as Light Detection and Ranging (LIDAR) and the potential use of NEXRAD RADAR or other wind shear technology such as TDWR to add or augment wind shear detection service at unprotected, and under protected sites.

The goal of WSDS is to maintain existing wind shear detection performance levels, and optimize wind shear detection through modernization and rightsizing while becoming NextGen-centric.

An FY 2008 Wind Shear Study revalidated service at 110 of the 158 airports. The study also identified other airports that may meet the need for wind shear detection services considering traffic growth and other determining circumstances in the NAS today. This requires the FAA to examine the numbers and types of systems needed to serve the existing and new runways as well as ensuring that all NextGen requirements for wind shear detection are met. Together the FY 2008 Wind Shear Study, a market survey conducted in 2009 and the FY 2010 through FY 2014 WSDS business case will identify, in detail, technology refresh alternatives, benefits, costs, and program options for legacy sustainment, and new wind shear technology for existing and new airports to extend wind shear service within the NAS.

In FY 2010, $1,000,000 was appropriated to initiate the business case development activities for WP1.

3. Why Is This Particular Program Necessary?

Several aircraft related fatalities have been attributed to wind shear. Without the systems contained within the WSDS program, pilots and controllers would not have knowledge of weather phenomenon such as microburst, and gust fronts, which are extremely dangerous, especially in the approach and departure corridors; the most critical phases of flight. The goal of WSDS is to maintain existing wind shear detection performance levels, and optimize wind shear detection through modernization and rightsizing to become net-centric. WSDS contributes directly to the FAAs goal of reducing aircraft related fatalities, and provides pilots and controllers situational awareness for which to make better decisions.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

4. How Do You Know The Program Works?

The projects contained within the WSDS portfolio contribute significantly to the overall safety of the NAS by preventing wind shear related aircraft accidents. The Wind Shear Cost Benefits Study developed by the Massachusetts Institute of Technology/Lincoln Laboratories (MIT/LL) along with the Sensor Network Assessment at NextGen IOC and the Sensor Rightsizing Study both published in 2009 determined that ground-based sensors are key contributors to the safety goals and objectives of the FAA. The WSDS project intends to continue the level of service provided historically by the legacy ground-based systems, and improve the level of service and coverage of wind shear detection service at under protected and unprotected sites.

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

$1,000,000 is requested to continue business case development activities, and to seed projects aimed at maintaining legacy wind shear detection system. Not funding this program will delay the development of the AMS artifacts refquired for WP1 to obtain an FID decision, and the initiation of projects planned to sustain the legacy programs

Detailed Justification for - 2A16 Weather and Radar Processor (WARP)

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

FY 2012 – Weather and Radar Processor (WARP)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Weather and Radar Processor (WARP)	$17,600	$2,500	$0	$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Sustainment Activities	---	$1,735.0
2. Security Requirements	---	115.0
3. Telecommunications Requirements	---	650.0
Total	Various	$2,500.0

For FY 2012, $2,500,000 is requested for WARP Sustain to conduct Site Acceptance Test (SAT) of the Weather and Radar Processor (WARP) "Sustain Configuration" -- Segment 1 and to complete deployment of the Weather and Radar Processor (WARP) "Sustain Configuration". Specific activities include addressing security and telecommunications requirements and the continued deployment of limited technical refresh activities, stratification of weather information to controller displays, data format adaptation changes, interface and communications implementation changes, start of the removal and reengineering of the Harris Weather Data Service, as well as the continuation of Automatic Product Generation (APG) processing and decoding server refresh activities. In order to address hardware obsolescence issues, the WARP contractor will deliver servers, workstations and printers.

2. What Is The Program?

The Weather and Radar Processor (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 will also provide the most timely and accurate forecast weather products to other NAS systems, significantly improving NAS capacity.

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, reduced 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. This measure will be converted from a number to a rate at the beginning of FY 2010.

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 2 fatal weather-related accidents involving GA aircraft w/o on-board weather radar encountering thunderstorms while receiving En Route Services in each of the years 2004, 2005, and 2006. 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 security certification and authorization package (SCAP) 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 Security Certification and Accreditation Package (SCAP) mitigation activities for the WARP Program.

A further reduction would impact the implementation of telecommunications as WARP transitions off of the remaining interfaces of NAS Data Exchange (NADIN) to FAA Telecommunications Infrastructure (FTI).

Detailed Justification for - 2A17 Collaborative Air Traffic Management Technologies Work Package 2 and 3

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

FY 2012 – Collaborative Air Traffic Management Technologies
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Collaborative Air Traffic Management Technologies (CATMT)	$18,100	$41,500	$0	$41,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. CATMT WP 2	---	$27,600.0
2. CATMT WP 3	---	13,900.0
Total	Various	$41,500.0

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 will start 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?

$41,500,000 is requested 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.

Detailed Justification for - 2A18 Colorado ADS-B WAM Cost Share

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

FY 2012 – Colorado ADS-B WAM Cost Share
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Colorado ADS-B WAM Cost Share	$0	$3,800	$2,000	$5,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Hardware/Software Design	---	$1,800.0
2. Engineering Support	---	1,400.0
3. Program Management	---	600.0
Total	Various	$3,800.0

Activity Tasks - Mandatory

IOC and ORD – Durango/Telluride
$2,000.0

For FY 2012, $3,800,000 of discretionary funding will be used to support the following activities:

- Finalize Integration of Multilateration (MLAT) and ADS-B Services with ERAM Release 3
- Key site (Montrose) Site Acceptance Testing
- Key site (Montrose) Operator's Test and Evaluation of the Montrose Service Volume (Key site for Colorado Phase 2)
- Finalize Safety Risk Management Document (SRMD) for Colorado Services
- Finalize Security Certification and Authorization Package (SCAP) updates for Colorado Phase 2 services
- Flight Inspection Montrose Service Volume for Initial Operating Capability (IOC)
- Perform Operators Suitability Demonstration (OSD) to support the Operators Readiness Demonstration(ORD)
- Finalize Gunderson Service Volume Implementation (Radio Sighting and Integration Testing)
- Perform Gunderson SV Implementation Site Acceptance Testing.
- Perform OT&E for Gunderson SV
- Perform Flight Inspection for Gunderson IOC
- Perform Gunderson SV OSD to support ORD

For FY 2012, $2,000,000 of mandatory funding will be used to support the following activities:

- All necessary activities to support the IOC and ORD of the Durango Service Volume
- All necessary activities to support the IOC and ORD of the Telluride Service Volume

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, as illustrated on Attachment A map. 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 proposed ADS-B/Multilateration system 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.

The nonrecurring costs will provide for development of an ADS-B/Multilateration surveillance system constituting Phase II of the Colorado Surveillance implementation plan. The system will be an ADS-B 1090 Extended Squitter (ES) surveillance system with integrated multilateration. The multilateration component will provide beacon only surveillance in the near term until the transition to ADS-B is complete. The 1090-ES capability provides surveillance of aircraft equipped to DO-260B avionics. During the aircraft equipage period to DO-260B compliant avionics, the system will provide surveillance of traditional ATCRBS and Mode S equipped aircraft through Multilateration. For those aircraft that are DO-260B equipped, ADS-B surveillance will be provided. In addition, the system will provide ADS-B over the Universal Access Transceiver (UAT) link supporting Flight Information Services-Broadcast (FIS-B) and Traffic Information Services-Broadcast (TIS-B) services using this technology. The surveillance data will be provided to the automation system at Denver ARTCC from a service provider under contract with the FAA. The baseline performance of the system will be equal to that of the existing Air Traffic Control Beacon Interrogator – Model 6 (ATCBI-6) currently employed by the FAA in providing en route air traffic separation.

The Service Provider (SP) selected alternative transfer development, deployment, operation, maintenance, and ownership of the surveillance system from the FAA to a private non-federal contractor. Under the SP option, the SP will integrate the emerging technologies of ADS-B and multilateration under governmental oversight (FAA and the State of Colorado). After the system has successfully completed FAT, SAT, and OT&E, it will then be certified to provide surveillance data to the Denver ARTCC. Under the SP alternative, the SP will install the hardware and provide all necessary infrastructure (site, power, telecommunications and security). After the system is certified by the FAA and is operational, the SP will charge the FAA an annual service fee to provide the surveillance data.

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 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 safety and efficiently. FIS-B products include graphical and textual weather reports and forecasts, Special Use Airspace Information, Notices to Airmen, and other aeronautical information.

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.

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.

The same system is currently operational in two other locations (Juneau, Alaska and Rifle/Hayden, Colorado). The Juneau location is currently in IOC.

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

Funding is requested for the development and implementation of ADS-B /WAM surveillance to support the Denver ARTCC (ZDV) separation services into and out of the Durango, CO; Gunnison, CO; Montrose, CO; and Telluride CO airports to continue with the FAT; SAT; OT&E; and OSD. A reduction would cause the program schedule to slip.

Detailed Justification for - 2A19 Automated Terminal Information System (ATIS)

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

**FY 2012 – Automated Terminal Information System (ATIS)
($000)**

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Automated Terminal Information System (ATIS)	$0	$0	$1,000	$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$200.0
2. Technical Documentation	---	200.0
3. Contract Award	---	300.0
4. Engineering and Testing	---	300.0
Total	Various	$1,000.0

For FY 2012, $1,000,000 is requested for Initial Investment activities for ATIS Solution Development.

2. What Is This Program?

ATIS provides current, routine, non-control information to arriving and departing aircraft by means of continuous and repetitive broadcasts throughout the day. It is an automatic announcement device designed to record a message and continuously apply it to a transmitter for ground-to-air communications. Examples of this information include weather conditions, runway conditions, and approach or departure information. ATIS equipment is installed in Airport Traffic Control Towers (ATCTs).

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investment.

3. Why Is This Particular Program Necessary?

The existing ATIS equipment was acquired and fielded by the FAA Regions more than 20 years ago. The age and obsolescence of the equipment presents an expanding supportability risk to the NAS. Eventually, maintainability issues affect controller workload and safety. The ATIS program will replace existing obsolescent equipment with new equipment that will also provide new functionality. Without this program, the lack of standardization and configuration control along with the absence of an interface unit for automated weather observation will constrain future expansion and modernization of the National Airspace System (NAS).

4. How Do You Know The Program Works?

ATIS use reduces controller workload by pilots not having to ask otherwise frequent, general, non-control related questions regarding current weather and runway conditions as well as approach and departure information. Safety is increased as controllers can focus on more important, critical tasks such as Aircraft Separation.

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

$1,000,000 is required to fund the Initial Investment activities for ATIS Solution Development. Any reduction would delay the investment analysis.

Detailed Justification for - 2A20 Tactical Flow Time Based Flow Management (TBFM)

What Do I Need To Know Before Reading This Justification?

- Under the operation of the Traffic Management Advisor (TMA) currently, deployed and operational at 20 ARTCCs, 27 TRACONs, and 33 ATCTs (27 of the Nation's busies 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.
- Implementation of the System Re-Architecture and NextGen and Operational capabilities – NAS EA DP 195

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

FY 2012 – Tactical Flow Time Based Flow Management (TBFM)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Tactical Flow Time Based Flow Management (TBFM)	$0	$38,700	$0	$38,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
TBFM	Various	$38,700.0

For FY 2012, $38,700,000 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), 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, and displaying convective weather on the TMA display for better decision making.
- 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 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. 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 also 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 reduction in the logistical footprint. 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:

- 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?

$38,700,000 is requested to keep the program on its pace to complete during FY 2015. Funding at this level will enable TBFM to initiate the design and development of 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 by including surface movement data, RNAV/RNP route selection data, international traffic data, and sector capacity data. Also, design and deliver the TMA system to enhance the current operational system to further the efficiency of the TMA system with 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)

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

FY 2012 – Airport Surface Detection Equipment – Model X (ASDE-X)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Airport Surface Detection Equipment – Model X (ASDE-X)	$0	$2,200	$0	$2,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Tech Refresh analysis and implementation	---	$900.0
2. Optimization/Enhancements/Engineering Services	---	500.0
3. Program Management	---	600.0
4. Second Level Engineering	---	200.0
Total	Various	$2,200.0

For FY 2012, $2,200,000 is requested to initiate Tech Refresh activities. The ASDE-X team plans to complete a study to determine the equipment and/or software that needs to be included in the Tech Refresh. Using the results of the study, the team will also complete planning activities for the Tech 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 Tech 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 April 2010, ASDE-X systems are operational at the following 27 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	

The remaining 8 planned* ASDE-X airports are:

Baltimore-Washington International Airport, Baltimore, MD	Chicago Midway Airport, Chicago, IL
Honolulu International – Hickam AFB Airport, Honolulu, HI	Ronald Reagan Washington National Airport, Washington, DC
San Diego International Airport, San Diego, CA	New York LaGuardia Airport, New York, NY
Las Vegas McCarran International Airport, Las Vegas, NV	Memphis International Airport, Memphis, TN

* ASDE-X system deployment at these airports is scheduled to be completed in FY 2010 and FY 2011.

DOT Strategic Goal - Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

The ASDE-X Tech Refresh program will maintain the safety and efficiency benefits attained during ASDE-X system deployment. By replacing obsolete and high failure items, the Tech 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 Tech Refresh program will be considered successful if after the implementation of Tech 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 Tech Refresh program is not funded at the requested level, ASDE-X systems in National Airspace System (NAS) may see increased system outages.

A reduction would result in delays to the Tech Refresh study and to the implementation of Tech 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 2012 – Terminal Doppler Weather Radar (TDWR) – Provide
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Terminal Doppler Weather Radar (TDWR) – Provide	$9,900	$7,700	$0	$7,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management/Engineering and Software	---	$820.0
2. Procurement/Production	---	6,880.0
Total	Various	$7,700.0

For FY 2012, $7,700,000 is requested for completing the TDWR algorithm enhancements, for installation of the Antenna Drive Motor modification, for installation of production modification kits for the Radar Products Generator (RPG) computer technical refresh project, for the acquisition and installation of 15 radomes, 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, reporting, and display of hazardous weather conditions wind-shear events, microburst and gust fronts, and thunderstorms in and near an airports 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 also transmitted to FAA automation systems and 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 northeast 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. In addition, the system's radomes have reached the end of their service lives and need to be replaced.

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.

The SLEP has thus far reduced outages due to antenna gear failure, and service availability has been maintained 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 2012 funds are requested to continue some TDWR SLEP projects and complete others that have been started using prior year funding. Specifically, $7,700,000 is required to complete the TDWR algorithm enhancements and to continue installation of the Antenna Drive Motor modification. The funds will also allow completion of the RPG computer technical refresh project, the acquisition and installation of 15 more radomes and the continuation of software and siting concept studies needed for the eventual relocation of the New York TDWR.

A reduction would prevent us from continuing the New York Relocation project initial planning studies, causing a year's slip in the project. The required completion date of January 29, 2023, would not be accomplished.

A further reduction would result is one fewer radome being procured.

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 2012 – Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1) ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$28,000	$25,000	$0	$25,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Hardware/Software Integration and Test	---	$2,700.0
2. Software Design and Development	---	1,300.0
3. Software Test Support	---	2,000.0
4. Hardware Design and Development	---	1,300.0
5. Hardware Production and Procurement	---	12,600.0
6. Site Preparation and Installation	---	1,100.0
7. Program Management Support	---	2,300.0
8. Systems Engineering Support	---	1,700.0
Total	Various	$25,000.0

For FY 2012, $10,000,000 (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.

For FY 2012, $15,000,000 (Technology Refresh) is requested to fund the replacement of the Sun Ultra-5 processors with newly qualified processors and operating systems for the first block of operational sites: Operational Support Facilities (OSFs), FAA Academy, and William J. Hughes Technical Center (WJHTC). During FY 2012, the Program Office will procure Generation 2 and Generation 3 Tower Display Monitors (TDMs). Funds will also be used to develop, qualify and upgrade the System Architecture, Continuous Data Recording (CDR), Local Area Network (LAN) and unexpected end of life components.

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. Replacement of these processors began in FY 2010 and will complete in the FY 2014 timeframe. 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.

To enable full utilization of proposed NextGen/Automatic Dependent Surveillance-Broadcast (ADS-B) capabilities the system, Continuous Data Recording must be upgraded. Once design qualification is complete, deployment will begin.

4. How Do You Know The Program Works?

STARS systems are a vital link in the nation's air traffic control system. 18 of the 35 Operational Evolution Partnerships (OEP) airports are successfully operating with the STARS system. OEP airports are commercial U.S. airports with significant activity. These airports serve major metropolitan areas and also serve as hubs for airline operations. 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%.

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

$25,000,000 is requested 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 operational initiatives. Without the requested funding, STARS will be unable to support NextGen 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 2012 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 supports the immediate goal for ADS-B critical services at the 11 ARTS IIIEs that need to be upgraded and operational by FY 2013 with ADS-B.
    TAMR Phase 3 Segment 1 will upgrade the 11 ARTS IIIE sites with a Standard Terminal Automation Replacement System (STARS.)
- **Segment 2**
  - TAMR Phase 3 Segment 2 will conduct Business Analysis and Alternative Analysis to determine the best viable solution to support terminal automation convergence and NextGen capabilities for all terminal sites. Segment 2 focus is upgrade or replacement of up to 94 ARTS IIE systems.

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

**FY 2012 – Terminal Automation Modernization/Replacement Program (TAMR Phase 3)
($000)**

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Terminal Automation Modernization/Replacement Program (TAMR Phase 3)	$18,000	$98,750	$0	$98,750

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Segment 1 ARTS IIIE solution implementation	5	$75,300.0
2. Program Management	---	3,000.0
3. System Engineering	---	3,900.0
4. Site Activation	---	6,100.0
5. Other Government Furnished Equipment	---	10,000.0
6. Independent Operational Test and Evaluation	---	450.0
Total	Various	$98,750.0

For FY 2012, $98,750,000 is requested to complete the development of preferred solution for Segment 1.

2. What Is This Program?

Terminal Automation systems are essential for helping controllers manage the tempo of 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 solutions for the modernization/replacement of automation systems at the TRACON and tower facilities 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 Office received Joint Resource Council (JRC) approval to segment the program.

Segment 1 will provide ADS-B capability at 11 ARTS IIIE facilities by CY 2013 and enable convergence to a single Terminal Automation hardware and software platform, STARS.
The segment 1 implementation plan is as follows:

- Replace five (5) ARTS IIIE facilities with STARS and support ADS-B at these facilities by CY2013 (D10, NCT, A80, SCT, PCT)
- Continue N90 backroom upgrade to support ADS-B by CY2011 (ARTS IIIE)
- Support ADS-B software deployment at five (5) additional ARTS IIIE facilities (SDF, D01, M98, T75, C90) by CY2013
- Replace remaining six (6) ARTS IIIE facilities with STARS by CY 2015 to enable convergence to a single Terminal Automation hardware and software baseline (SDF, D01, M98, T75, C90, N90)

Segment 2 will conduct a Business Analysis and Alternative Analysis to determine the best viable solution to support NextGen Capabilities for all Terminal sites. The goal of Segment 2 is to test, qualify, and deploy a common hardware platform and operating system in the Terminal environment resulting in reduced future development and maintenance costs.

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 eleven (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.

4. How Do You Know The Program Works?

TAMR Phase 3 Segment 1 will replace the 11 ARTS IIIE sites with STARS. STARS is already operational at 51 terminal sites, and over the past five years, the average equipment availability for STARS is 99.9996 percent. Segment 1 utilizes the existing STARS contract.

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 discerning weather and lessening 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?

$98,750,000 is requested to complete the development of the preferred solution for TAMR Phase 3 Segment 1.and to procure deployment hardware for 5 sites in order to provide ADS-B capability at all critical Terminal sites by CY 2013.

Detailed Justification for - 2B05 Terminal Automation Program

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

FY 2012 – Terminal Automation Program
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Terminal Automation Program	$9,600	$2,500	$0	$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Technical Refresh Implementation	---	$1,375.0
2. Optimization, Enhancements, Engineering Services	---	400.0
3. Program Management	---	150.0
4. System Engineering	---	575.0
Total	Various	$2,500.0

For FY 2012, $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 and 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 requested 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 2012 – Terminal Air Traffic Control Facilities – Replace
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Terminal Air Traffic Control Facilities - Replace	$179,000	$51,600	$0	$51,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Phase I – V Funding	---	$44,400.0
2. Advanced Requirements Definition	---	1,200.0
3. Engineering, Siting, and Program Management	---	6,000.0
Total	Various	$51,600.0

For FY 2012, $51,600,000 is requested to fund five phases of facility deployment to continue replacing aging facilities. $3,374,753 is requested for Phase I/II funding for three sites, Baltimore, MD, Fort Lauderdale International, FL, and Philadelphia, PA; $22,441,447 is requested for Phase III construction for two sites Champaign, IL and San Francisco, CA; and $18,583,800 is requested for Phase IV/V continuation for five sites, Cleveland, OH, Kona, HI, Las Vegas, NV, Wilkes Barre, PA, and Oakland, CA. 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 $3,374,753 for three design starts.

Baltimore, MD - $1,300,000	Ft. Lauderdale International, FL - $1,200,000
Philadelphia, PA - $874,753	

Phase III - Funding of $22,441,447 for two construction starts.

Champaign, IL - $11,201,447	San Francisco, CA - $11,240,000

Phase IV/V – Continuation funding of $18,583,800 for five facilities started in previous years.

Cleveland, OH - $4,840,000	Kona, HI - $3,164,000
Las Vegas, NV - $5,500,000	Wilkes-Barre, PA - $1,467,000
Oakland, CA - $3,612,800	

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, 66 facilities have been commissioned, of which 28 were congressionally directed and 38 were FAA requested sites.

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

$51,600,000 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 2012 Baseline Funding will impact several tower and TRACON projects, which are planned for FY 2012.

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 2012 – ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Electrical Power System – Sustain/Support	$38,900	$56,900	$5,000	$61,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Initiate Modernization, Improvements, and Repairs	TBD	$40,600.0
2. Mold Remediation		10,300.0
3. System Eng. Configuration Mgmt. Risk Mgmt. Facility Planning and Program Support		1,500.0
4. Facility Condition Assessment		1,800.0
5. In Service Engineering		2,700.0
Total	Various	$56,900.0

Activity Tasks – Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Safety Operational	TBD	$ 5,000.0
Total	Various	$5,000.0

For FY 2012, $56,900,000 of discretionary funding will provide for the following:

- Initiate modifications, improvements, and repairs to ATCT/TRACON facilities, system engineering, configuration management, facility planning, and program support services, and in-service engineering.

For FY 2012, $5,000,000 of mandatory funding will provide for the following:

- Safety Operations funding is for repairs to address operational safety issues.
- Water Proof funding is for repairs to ensure facilities are water proofed.
- HVAC & Electrical funding is for repairs to ensure critical HVAC and electrical systems remain operational.
- Plumbing systems funding is for essential building components and failure of these components require immediate repair.
- Exterior and Interior funding is for repairs to building components that require periodic repair and renovations.

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 2010 – FY 2011, there has been an 8 percent increase in FAA maintained facilities rated in "Good" standing and a 7 percent decrease in those rated in "Poor" standing.

Data Source: Terminal Facilities Information Fact Sheet, dated 9/30/10.

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

$61,900,000 is requested 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 2012 Baseline Funding will impact several sustain projects, which are planned for FY 2012.

Detailed Justification for - 2B08 Terminal Voice Switch Replacement (TVSR)

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

FY 2012 – Terminal Voice Switch Replacement (TVSR)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Terminal Voice Switch Replacement (TVSR)	$10,500	$10,000	$0	$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Voice Switch Procurement	10	$5,430.0
2. Technical Support	---	800.0
3. Program Management Support	---	1,750.0
4. Logistics and Testing Support	---	1,150.0
5. Information Security	---	100.0
6. Site Preparation	---	770.0
Total	10	$10,000.0

For FY 2012, $10,000,000 is requested to procure, test, deliver and install 10 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?

$10,000,000 is requested to procure, test, deliver and install 10 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 2012 – NAS Facilities OSHA and Environmental Standards Compliance ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
NAS Facilities OSHA and Environmental Standards Compliance	$26,000	$26,000	$0	$26,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Environment Occupational Safety and Health (EOSH) Compliance	---	$16,000.0
2. Fire Life Safety for ATCTs	---	10,000.0
Total	Various	$26,000.0

For FY 2012, $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, Incident Response, Safety Integration, Environmental Occupational Safety and Health Training, Requirements Integration, and Workplace Inspections.

2. What Is This Program?

National Airspace System (NAS) Facilities OSHA and EOSH 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 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, EOSH services, 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 Airport Traffic Control Towers (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 binding agreements, lost work time and productivity, 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 a criminal investigation by the United States Environmental Protection Agency (EPA) over the improper management of asbestos containing materials at an Air Route Traffic Control Center (ARTCC) and multiple complaints of illnesses filed by FAA staff potentially exposed to molds and other air contaminants. Monthly, approximately 20 EOSH events result in disruptions to NAS operations. Effectively managing environmental and safety risks and maintaining compliance 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 binding commitments. Within the ATO, the EOSH Services Group directs these programs in close collaboration with the Service Areas and Service Centers.

In FY 2009, the Mike Monroney Aeronautical Center recordable rate of injuries/illnesses per 100 employees was 1.2. This represents a rate that is 50 percent below the goal of 2.44 injuries/illnesses per 100 employees. Also, the Fire Life Safety program initiated upgrades at 23 ATCTs and certified 20 completed upgrades, 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 requested 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.

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 2012 – Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP) ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$3,500	$6,000	$2,000	$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$1,020.0
2. System Engineering	---	1,201.0
3. HW/SW Design and Development	---	2,000.0
4. Test and Evaluation	---	700.0
5. Data and Documentation	---	100.0
6. Logistics Support	---	426.0
7. Implementation	---	553.0
Total	Various	$6,000.0

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$ 0.0
2. System Engineering	---	0.0
3. HW/SW Design and Development	---	1,275.0
4. Test and Evaluation	---	601.0
5. Data and Documentation	---	0.0
6. Logistics Support	---	124.0
7. Implementation	---	0.0
Total	Various	$2,000.0

For FY 2012, $6,000,000 of discretionary funding will provide for the following:

- Continue the design and development of Digital Remote Surveillance Communication Interface Processor (SCIP) Replacement (DRSR).
- Initial production units of transmitter backplane and cable sets will also be procured.
- The program will continue test and evaluation and procure initial production units of the receiver protector replacement unit.

For FY 2012, $2,000,000 of mandatory funding will provide for the following:

- Finalize the design and development of Digital Remote Surveillance Communication Interface Processor (SCIP) Replacement (DRSR) and procure test units.
- The program will finalize test and evaluation and procure initial production units of the receiver protector replacement unit.

2. What Is This Program?

ASR-9 SLEP Phase 2 will consist of implementing modifications to aging secondary ASR-9 subsystems architecture and peripheral equipment to sustain primary surveillance in terminal airspace through 2025. The sustainment of the ASR-9 aligns with the Surveillance Roadmap Decision Points[1], and the Surveillance and Broadcast Services (SBS)/ADS-B backup strategy.[2] Based on this strategy, 132 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:

- **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 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 extend the lifecycle for this function.

DOT Strategic Goal - Economic Competitiveness
- Maximum economic returns 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.

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.

[1] https://nasea.faa.gov/products/roadmap/main/display/7/tab/dps/
[2] https://nasea.faa.gov/products/roadmap/main/display/7/tab/assumptions/

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 was expected to remain operational until 2005; 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 2012 Baseline Funding will result in increased risk to the ability to award contracts for:

- Procurement of DRSR test units
- C&M initial production units
- Receiver infrastructure replacement initial production units

Detailed Justification for – 2B11 Terminal Digital Radar (ASR-11) Technology Refresh

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

FY 2012 – 2B11 Terminal Digital Radar (ASR-11) Technology Refresh
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Terminal Digital Radar (ASR-11) Technology Refresh	$12,863	$3,900	$0	$3,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Retrofit Installation (ASR-11 Tech Refresh)	---	$2,375.0
2. Program Management (ASR-11 Tech Refresh)	---	746.0
3. System Engineering (ASR-11 Tech Refresh)	---	279.0
4. Initial Requirements Definition (MASR)	---	250.0
5. Program Management (MASR)	---	250.0
Total	Various	$3,900.0

For FY 2012, $3,400,000 is requested for ASR-11 Technology Refresh to install 11 technical refresh retrofit modification kits and begin the ASR-11 Technology Refresh Segment 2 business case in support of the Final Investment Decision goal of September 2013. The Mobile Airport Surveillance Radar (MASR) requests $500,000 to fund Initial Requirements Definition and Program Management in support of Final Investment Decision goal of March 2012.

2. What Is This Program?

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 technical refresh kits are planned to be retrofitted into all ASR-11 systems previously fielded with the signal data processor (SDP). We have procured 50 retrofit kits thru FY 2010. The remaining balance of 18 FAA retrofit kits will be procured in FY 2011, with final installation completed in 2015.

For FY 2012, $3,400,000 is requested to install 11 technical refresh retrofit modification kits and initiate the ASR-11 Technical Refresh Segment 2 business case in support of the Final Investment Decision goal of September 2013.

ASR-11 Tech Refresh kits are scheduled to be installed at a rate of one site per month. As of May 2010, ASR-11 Tech Refresh systems have been installed at the following sites:

FAA (PSF)	Flint, MI (FNT)
Peoria, IL (PIA)	Green Bay, WI (GRB)
Lafayette, LA (LFT)	FAA Academy (OEX)
Pensacola South, FL (PNS)	Abilene, TX (ABI)
Boise, ID (BOI)	

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns transportation policies and investments.

The ASR 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 MASR is planned to eliminate an existing shortfall, which is the 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 air 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.

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 $45.5 million 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 MASR will provide us with 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. Loss of primary and secondary surveillance products, due to either catastrophic events or long term outages, would have a definite impact on our mission capabilities, specifically in the areas of controller situation awareness, safety, capacity, and industry vitality.

4. How Do You Know The Program Works?

The ASR-11 Tech 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 eight retrofit kits installed to date.

The MASR is on track for Final Investment Decision by March 2012.

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

$3,400,000 is requested for ASR-11 Technology Refresh to install 11 technical refresh retrofit modification kits and begin the ASR-11 Technology Refresh Segment 2 business case in support of the Final Investment Decision goal of September 2013.

$500,000 is required for MASR to fund Initial Requirements Definition and Program Management in support of the Final Investment Decision goal of March 2012.

A reduction to the ASR-11 Technology Refresh will delay hardware and software modification completion beyond the December 2012 milestone date, a reduction to MASR will put at risk the Final Investment Decision for March 2012.

Detailed Justification for – 2B12 Runway Status Lights (RWSL)

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

FY 2012 – Runway Status Lights (RWSL)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Runway Status Lights (RWSL)-Segment 1	$117,300	$29,800	$0	$29,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$2,500.0
2. Implementation	---	4,000.0
3. Hardware Procurement	---	3,900.0
4. Construction	---	7,400.0
5. Optimization/Enhancements/Engineering Services	---	3,500.0
6. ICDLS/Documentation	---	3,000.0
7. Installation / Check out	---	3,300.0
8. Second Level Engineering	---	1,400.0
9. Independent Operational Test and Evaluation (IOT&E)	---	800.0
Total	Various	$29,800.0

For FY 2012, $29,000,000 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 eight 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 $800,000 is requested for Independent Operational Test and Evaluation.

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 at 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 2012 – National Airspace System Voice System (NVS)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
National Airspace System Voice System (NVS)	$26,600	$19,800	$0	$19,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Investment Analysis Program Management	---	$5,000.0
2. Screening Information Request Development	---	2,500.0
3. Engineering Analysis	---	2,500.0
4. Documentation	---	2,000.0
5. Contract Award	---	7,800.0
Total	Various	$19,800.0

For FY 2012, $19,800,000 of discretionary funding is requested to complete the activities leading to the Final Investment Decision (FID) and to award a contract.

2. What Is This Program?

The NAS Voice System (NVS) will be a real-time, critical part of the air traffic control (ATC) infrastructure that provides the connectivity for efficient communications among air traffic controllers, pilots, and ground personnel. It connects incoming and out-going communication lines via a switching matrix to the controller's workstation. The controller via a panel on his workstation selects the lines needed to communicate with pilots, other controllers and other facilities. The NVS will replace the service that is currently provided by 17 different voice switch system configurations. The focus will be on designing a replacement switch with standardized components that will reduce maintenance and parts inventory costs.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The current voice switch system is aging and needs to be modernized to mitigate obsolescence. 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.

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?

$19,800,000 is requested to complete the activities leading to the final investment decision (FID) and to award a contract.

A reduction from the FY 2012 baseline funding would delay the development of the system and the initial program reviews.

Detailed Justification for - 2B14 Integrated Display System (IDS)

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

FY 2012 – Integrated Display System (IDS)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Integrated Display System (IDS)	$7,000	$8,800	$0	$8,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Procurement, Production and Deployment of IDSR systems	---	$6,837.8
2. Optimization/Engineering Services	---	962.2
3. Program Management/Engineering Support	---	1,000.0
Total	Various	$8,800.0

For FY 2012, $8,800,000 is requested for the IDS program to procure 445 workstations, and install 468 workstations at 14 Terminal Radar Approach Control (TRACONS) and their associated Air Traffic Control Tower (ATCT), including Philadelphia (PHL), Orlando (MCO), Denver (DEN), Memphis (MEM), San Juan (ZSU) Las Vegas (LAS), Tampa (TPA), Cincinnati (CVG), Minneapolis (MSP), Charlotte (CLT), Detroit (DTW), San Antonio (SAT), Cleveland (CLE), and Anchorage (ANC).

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 are schedule for completion early in 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.

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

[1] FAA Enterprise Architecture Roadmap

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 will be assessed on an annual basis beginning in FY 2011.

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

$8,800,000 is requested to procure 445 workstations and install 468 workstations at 14 TRACONS and their associated ATC Tower, including Philadelphia (PHL), Orlando (MCO), Denver (DEN), Memphis (MEM), San Juan (ZSU) Las Vegas (LAS), Tampa (TPA), Cincinnati (CVG), Minneapolis (MSP), Charlotte (CLT), Detroit (DTW), San Antonio (SAT), Cleveland (CLE), and Anchorage (ANC).

A reduction from the FY 2012 baseline funding will delay the procurement of and installation of the workstations.

Detailed Justification for - 2B15 Remote Monitoring and Maintenance System (RMMS)

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

FY 2012 – Remote Monitoring and Maintenance System (RMMS)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Remote Maintenance and Maintenance System (RMMS)	$1,000	$4,200	$0	$4,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Install RMLS equipment at ARTCCs	---	$2,780.0
2. Make RMLS operational at ARTCCs	---	450.0
3. Tech Refresh RMLS equipment at OCCs	---	970.0
Total	Various	$4,200.0

In FY 2012, $4,200,000 is requested to continue implementation of RMLS in the Western and Eastern Service Areas of the National Airspace System (NAS). RMLS is scheduled to be fully operational in FY 2013.

2. What Is This Program?

The RMLS is the design solution for technology refreshment of the existing Remote Maintenance Monitoring System (RMMS). RMLS is being implemented in two Phases, Phase 1 National Logging Network (NLN) and Phase 2 National RMM Network (NRN).

Phase 1 RMLS NLN became fully operational in FY 2010. RMLS NLN re-hosted Simplified Automated Logging (SAL) and Event Manager (EM) on hardware platforms, located at each of the Operational Control Centers (OCCs). RMLS NLN performs the same maintenance management functionality of the current RMMS.

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. RMLS NRN will perform the same monitor and control functionality of the current RMMS. The RMLS NRN will consist of the following:

- New RMLS NRN Server-Based Platforms. These server-based platforms will be installed in the existing infrastructure located at the Operations Control Centers (OCC).
- New RMLS NRN Protocol Converter Platforms. These platforms will be installed at the Air Route Traffic Control Centers (ARTCC) to replace the existing MPS Tandem computers.
- Data Connectivity. FTI will provide data connectivity from OCC to OCC, from OCC to ARTCC, and from ARTCC to OCC.

The MPS will be removed and disposed as the RMLS NRN is placed in service.

DOT Strategic Goal - Economic Competitiveness
- Maximum returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The FAA relies on the Remote Maintenance Monitoring System (RMMS) to insure all NAS facilities and systems are operational so that flights are safe and are on time. But, the MPS (a component of the RMMS) equipment is too old, unsupportable and needs to be replaced. The RMLS provides life cycle replacement of the existing MPS which is used by the FAA to maintain the operation of all National Airspace System (NAS) systems and facilities.

RMLS 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.

4. How Do You Know The Program Works?

In FY 2007 and 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?

$4,200,000 is requested to complete RMLS by FY 2013. This ensures a reliable system that can maintain the operation of all systems and facilities in the NAS,

A reduction from the FY 2012 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 2012 – Mode S Service Life Extension Program (SLEP) - Phase 2
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY2012 Total
Mode S Service Life Extension Program (SLEP) - Phase 2	$0	$4,000	$4,000	$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$500.0
2. System Engineering	---	200.0
3. HW/SW Design and Development	---	1,900.0
4. Test and Evaluation	---	500.0
5. Data and Documentation	---	100.0
6. Logistics Support	---	300.0
7. Implementation	---	500.0
Total	Various	$4,000.0

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$0.0
2. System Engineering	---	100.0
3. HW/SW Design and Development	---	3,900.0
4. Test and Evaluation	---	0.0
5. Data and Documentation	---	0.0
6. Logistics Support	---	0.0
7. Implementation	---	0.0
Total	Various	$4,000.0

For FY 2012, $4,000,000 of discretionary funding will provide for the following:
Re-engineer Mode S system components that were identified as not supportable during the required life cycle. This funding will provide for improved maintainability, reliability, and cost effectiveness for Mode-S operations, consistent with the NAS Enterprise Architecture, for NAS serviceability through Year 2023.[1]

For FY 2012, $4,000,000 of discretionary funding will provide for the following:

- Contract for Beacon Video Reconstitutor (BVR) Replacement test units

For FY 2012, $4,000,000 of mandatory funding will provide for the following:
is requested to re-engineer Mode S system components that were identified as not supportable during the required life cycle. This funding will provide for improved maintainability, reliability, and cost effectiveness

[1] https://nasea.faa.gov/

for Mode-S operations, consistent with the NAS Enterprise Architecture, for NAS serviceability through Year 2023.[1]

For FY 2012, $4,000,000 of mandatory funding will provide for the following:

- Contract for antenna array test units,
- Contract for receiver processor and interrogator replacement prototype units

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 2023. The sustainment of the Mode S aligns with the Surveillance Roadmap Decision[2], and the SBS (Surveillance and Broadcast Services)/ADS-B backup strategy.[3]

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 2023.

The Mode S SLEP will mitigate issues of obsolescence, reliability and maintainability, and lifecycle costs for:

- **Mode S Beacon Antenna System** - A 5-foot beacon antenna was deployed throughout the mid to late 1970's with a projected lifecycle of 20 years. All 5-foot beacon antennae currently servicing the NAS are operating at 10+ years past the intended lifecycle, and support for these assets is proving to become an increasing challenge for these obsolescent assets. The primary means of repair/refurbishment is cannibalization of unserviceable 5-foot beacon antennae for parts. There is an urgent need to manage the lifecycle issues of the legacy 5-foot beacon antenna issues.

- **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.

- **Beacon Video Reconstitutor -** The Beacon Video Reconstitutor is comprised of assemblies/components that have reached the end-of-life, and are not supportable. The FAALC relies on decommissioned BVRs to effect replacements repairs to the NAS Beacon Video Reconstitutors. The FAA cannot repair or reverse engineer these assemblies. The Original Equipment Manufacturer (OEM) has moved on to newer technologies, and declined requests to perform repair service(s). 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.

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

[1] https://nasea.faa.gov/
[2] https://nasea.faa.gov/products/roadmap/main/display/7/tab/dps/
[3] https://nasea.faa.gov/products/roadmap/main/display/7/tab/assumptions/

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 addresses the highest risk physical equipment repairs and replacement in order to sustain operations. Phase 1 was broken down into two elements, Phase 1A and Phase 1B. Phase 1A was successfully completed in October 2007 and consisted of the following: (1) ASR-9 and Mode S external antenna modifications to mitigate risk of structural collapse; (2) replacement of the obsolete ASR-9 Remote Monitoring System (RMS) and Mode-S Maintenance Data Terminals (MDT) which mitigated technical obsolescence risk (unavailability of spare parts); and (3) modifications to the waveguide and pedestal that addressed additional OSHA issues. Phase 1B consists of modifications to the ASR-9 transmitter to improve reliability and maintainability. Phase 1B is due for a successful completion of all installations and goals by September 2010. 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 2012 funding will result in increased risk to the ability to award contracts for:

- Antenna arrays for test and evaluation,
- BVR Replacement units for test and evaluation, and
- Development of prototype units for receiver processor and interrogator replacement units

Detailed Justification for – 2B17 ASR-8 Service Life Extension Program

What Do I Need To Know Before Reading This Justification?

- In FY 2008, FAA received a Congressional mandate of $980,000 to relocate the Bismarck, ND radar system (ASR-8/Mode-S).

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

FY 2012 – ASR-8 Relocation Bismarck, ND
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
ASR-8 Relocation Bismarck, ND	$0	$2,700	$0	$2,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Construct Site	---	$1,750.0
2. RE/TOR Support	---	300.0
3. Install System and Antenna	---	435.0
4. Flight Check	---	40.0
5. Demolition and Disposal	---	175.0
Total	1	$2,700.0

For FY 2012, $2,700,000 is requested to construct the new ASR-8 site/building on airport property, establish airport surveillance service and remove the existing radar system.

2. What Is This Program?

The Bismarck, ND Airport Authority scheduled the existing ASR-8/Mode-S property to undergo redevelopment. The FAA's original plan was to install a new ASR-11 radar system at a new site on airport property. However the FAA cancelled the ASR-11 installation effort, consequently canceling the ASR-8/Mode-S removal, preventing the redevelopment work desired by the Airport Authority. In FY 2008, Congress directed the FAA to relocate the existing ASR-8/ Mode-S radar to a new site on airport property to mitigate the situation and Congress appropriated $980,000 for the effort. This plan includes the construction of the facility and tower.

To accomplish the ASR-8/Mode-S relocation, the FAA will construct a building and tower at the new Bismarck, ND site, refurbish and install a decommissioned system, establish airport surveillance service at this location, and afterwards remove the existing radar system. This approach will minimize loss of Air Traffic services during the relocation.

DOT Strategic Goal – Economic Competitiveness

- Maximum returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

In FY 2008 Congress mandated $980,000 to move the current ASR-8/Mode-S radar to a new location on Bismarck, ND airport property. $2,700,000 is requested to complete the construction of a new building and place the refurbish ASR-8/Mode-S radar in service.

4. How Do You Know The Program Works?

The ASR-8/Mode-S radar is the existing technology used at Bismarck and other airports in the NAS. The Central Service Area (CSA) conducted a site analysis to verify radar coverage at the new location. The existing radar will remain in operation until the new refurbish system is tested and commissioned.

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

$2,700,000 is requested to complete the Bismarck, ND ASR-8/Mode-S relocation. The FY 2008 funding was used to procure and refurbish the required electronic equipment, perform site planning and initiate the utility infrastructure construction at the new site. If the entire $2,700,000 is appropriated in FY 2012, the project will be completed that fiscal year.

A reduction from the FY 2012 baseline funding will delay the project another year until the remaining funds are available.

Detailed Justification for - 2C01 Automated Surface Observing System (ASOS)

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

FY 2012 – Automated Surface Observing System (ASOS)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Automated Surface Observing System (ASOS)	$5,500	$2,500	$0	$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management and Technical Support	---	$1,800.0
2. National Weather Service (NWS) Sustainment Support	---	700.0
Total	Various	$2,500.0

For FY 2012, $2,500,000 is requested for the ASOS P3I program to complete installation of the Ceilometer Replacement and continue installation of the Enhanced Precipitation Identification (EPI) sensor at the 571 FAA-sponsored ASOS locations. Procurement of the Ceilometer Replacement sensor hardware began in FY 2009 and all units will be received by the end of FY 2011. Installation of the hardware began in FY 2009 and completion is planned for FY 2012. Procurement of the EPI sensor is planned to occur in FY 2011. EPI sensor installation activities will begin in FY 2011, continue into FY 2012, and complete in FY 2013.

2. What Is The Program?

The ASOS P3I program will upgrade/sustain the performance of 571 FAA-sponsored ASOS already part of the NAS. The ASOS P3I program consists of five upgrades/enhancements to the ASOS – three efforts are complete (Processor Upgrade, Dewpoint Sensor Replacement, and Ice-Free Wind Sensor) and two are active (Ceilometer Replacement and Enhanced Precipitation Identification (EPI) sensor. The Ceilometer Replacement will replace an obsolete sensor to measure the height and amount of cloud coverage and ensure that sensor outages do not affect aviation operations. The EPI sensors will expand precipitation measurement capabilities from the current ASOS ability to identify rain or snow to also include the identification of drizzle, hail, and ice pellet occurrence. Enhanced precipitation identification capabilities are expected to increase the safety of aviation operations. ASOS is a joint FAA/NWS/DoD program.

The ASOS is located at airports and measures and reports surface weather conditions such as temperature, dew point, barometric pressure, visibility, precipitation type and amount, cloud height and coverage, and wind speed and direction. The weather observations are used to support all facets of aviation operations.

DOT Strategic Goals - Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

The principal benefits from implementing ASWON/ASOS are the continued and expanded capability for Instrument Flight Rule (IFR) flight operations; improved continuous observation capability at a significantly reduced cost from manual observations; high quality, real-time weather data communication networks and one minute updates to weather parameters to provide for rapid observation of changing conditions and awareness of conditions impacting the efficient flow of air traffic.

More specifically, the ASOS provides departure/destination weather observations to maintain and increase capacity of Part 121 commercial aircraft and Part 135 Commuter/air taxi operations, as well as cloud ceiling information for towered and non-towered airports. Aircraft operations would be significantly affected by ASOS failures that cause missing weather observation data. The current ceilometer has been out of production since 1997 and the manufacturer is currently providing repair services on a "best effort" basis. The ASOS P3I Ceilometer Replacement effort will allow the ASOS to continue producing cloud ceiling reports through at least 2025.

The ASOS P3I program will provide $631.7 million estimated benefits from year 2007 through 2020 – Source: MCR Business Case Analysis (July 12, 2007) for ASWON JRC Review. The benefits identified in the analysis were the costs avoided by commercial aviation operations that would be caused by ASOS ceilometer failures or the lack of precipitation data if the ASOS EPI sensor was not available. The benefits are estimated to start in FY 2012. The ASOS equipment must continue to provide surface weather observations at least until 2020 when NextGen alternatives may begin to offer new services to a majority of the 571 FAA field sites.

4. How Do You Know The Program Works?

The 571 FAA-sponsored ASOS were deployed between 1992 and 1999 to provide timely and accurate surface weather observations to pilots, air traffic controllers, other aviation users, and the national weather data network. The ASOS P3I program consists of five upgrades/enhancements to extend the life, reduce the maintenance costs, and increase the capabilities of ASOS. Three of the ASOS P3I efforts are complete (Processor Upgrade, Dewpoint Sensor Replacement, and Ice-Free Wind Sensor) and two are currently active (Ceilometer Replacement and Enhanced Precipitation Identification (EPI) sensor. The ASOS continues to provide surface weather observation data in support of the NAS.
ASOS data is used by other FAA programs, including Integrated Terminal Weather System (ITWS), Corridor Integrated Weather System (CIWS), Weather Systems Processor (WSP), and Weather and Radar Processor (WARP).

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

$2,500,000 is requested to fund the installation activities for the Ceilometer Replacement and EPI Sensor at the 571 FAA sponsored ASOS locations. A reduction from the FY 2012 funding will delay the installation of the Ceilometer Replacement and EPI sensor.

Detailed Justification for - 2C02 Flight Service Station (FSS) Modernization

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

FY 2012 – Flight Service Station (FSS) Modernization
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Flight Service Station (FSS) Modernization	$20,100	$4,500	0	$4,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Flight Service Automation Modernization (FSAM)	---	$2,000.0
2. Alaska Flight Service Facility Modernization (AFSFM) (formerly: Facility Sustainment)	---	2,000.0
3. In-Service Engineering (ISE)	---	500.0
Total	Various	$4,500.0

For FY 2012, $4,500,000 of discretionary funding will provide for the following:

- $2,000,000 is requested to conduct Flight Service Automation Modernization (FSAM) investment analysis activities.
- $2,000,000 is also requested for Alaska Flight Service Facility Modernization (AFSFM) activities. The majority of these AFSFM funds are planned for the upgrade/renovation of the Dillingham, Alaska flight service station facility.
- $500,000 is requested for In-Service Management, to conduct an Alaskan Service Delivery Study. This study will be an independent examination of Alaska Flight Service Station operations, to determine if the current facilities are in the best locations to serve Alaska's aviation users and to consider future needs that may affect location of these facilities. The FSAM project will provide a common FS automation platform for both Alaskan (i.e., FAA operated) and non-Alaskan (i.e., contractor operated) flight service stations, and will replace and improve on the functionality currently provided by the Flight Service for the 21st Century (FS21) system, the Direct User Access Terminal service (DUAT/S), and the Operational and Supportability Implementation System (OASIS).

2. What Is This Program?

Flight Service Automation Modernization (FSAM) program is developing alternatives for the automation platform for all FSS facilities. Options include integrating graphical and text-based weather products and other aeronautical information for use in pilot briefings; integrating aeronautical data updates with NOTAM and flight plan data into FSAM; and the development of a web portal that will provide both FAA users and aviation community users with access to the same data, improving access to consistent and accurate flight service information. In addition, there will be consideration of an automatic capability to provide pilots with critical updates that occur after having received preflight briefings, and to monitor VFR aircraft in order to be more proactive in search and rescue efforts.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

Alaska Flight Service Facility Modernization (AFSFM) will address the decline of existing FSS facilities in Alaska, which are old and have numerous infrastructure, structural and safety deficiencies. The program office is evaluating flight services modernization needs to identify an acquistion strategy In general, these facilities do not comply with Americans with Disabilities Act (ADA) standards as defined and imposed by FAA Order 9550.8 and FAA human factors policy. Existing heating, ventilation, and air conditioning (HVAC) systems fail to provide the proper environmental controls in operations, equipment, and administrative areas. In some cases, the existing HVAC systems re-circulate exhaust fumes from outside. Leaking roofs create water soaked areas – radically increasing the building mold spore count. Fire alarm systems require updating and evacuation routes/exits need to be modified to ensure safe egress. These conditions endanger personnel health and safety. Electrical upgrades and lightning protection are necessary to minimize the damage and frequency of power failures. As part of AFSFM, facilities in Alaska will be updated to meet OSHA and ADA requirements and building power, electrical, and safety systems will be updated to meet current standards.

In addition, the voice switches at all of the Alaskan flight service facilities do not have the capability to support additional frequencies which could provide operational flexibility. As a result, it is not possible for all flight service facilities to assume responsibility for frequencies of other facilities in case of a catastrophic outage or to increase operational efficiency in providing services.

4. How Do You Know The Program Works?

Flight Service Stations are a network of facilities across the United States and are the responsibility of the Department of Transportation, Federal Aviation Administration (FAA) and are an integral part of the FAA's national airspace system. The primary role of FSSs is to provide weather briefings and flight planning services to pilots. Flight service also coordinates VFR search and rescue services, provides orientation service to lost aircraft, maintains continuous weather broadcasts on selected Navigational Aids (NAVAIDs), and issues and cancels Notices to Airmen (NOTAMs).

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

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
- Increase operational efficiency
- Reduced operational costs
- Elimination of facility deficiencies

A funding reduction will delay realization of these benefits.

Detailed Justification for - 2C03 Weather Camera Program

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

FY 2012 – Weather Camera Program
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Weather Camera Program	$3,800	$4,800	$0	$4,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Install Weather Cameras	24	$4,800.0

For FY 2012, $4,800,000 is requested to fund the continued installation of weather camera sites in Alaska. Equipment for 24 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 in the form of near real-time camera images to aviation users. Low cost, commercially available, off-the-shelf cameras are installed at airports and en route locations. Camera images, updated every 10 minutes, are provided to the pilot and flight service station specialist for enhanced situational awareness, preflight planning and en route 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 their flight.

As of September 2009, 119 weather camera sites have been installed across the state of Alaska.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

The Weather Camera Program will contribute to this performance target by reducing a subset of Alaska accidents from a 2007 baseline of .28 accidents per 100,000 operations to:

FY 2008 - .24 accidents per 100,000 operations	Actual results .21 accidents per 100,000 ops
FY 2009 - .22 accidents per 100,000 operations	Actual results not yet available
FY 2010 - .20 accidents per 100,000 operations	
FY 2011 - .18 accidents per 100,000 operations	
FY 2012 - .17 accidents per 100,000 operations	
FY 2013 - .16 accidents per 100,000 operations	

3. Why Is This Particular Program Necessary?

In the state of Alaska, flying is equivalent to driving in the continental US (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?

A final analysis of the fiscal year 2008 safety metric has indicated better than targeted improvement. Results are an actual weather camera relevant accident rate of 0.21 accidents per 100,000 operations against a target of .24 accidents per 100,000 operations.

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 24 additional weather camera sites in 2012 will continue to reduce aircraft accidents at a rate of .17 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 2012 – VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME) ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$5,000	$5,000	$0	$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Equipment Procurement	---	$2,285.0
2. Final Funding for On-Going Project/Incremental funding for new Projects	---	2,625.0
3. Logistics/Engineering Support Services	---	90.0
Total	Various	$5,000.0

For FY 2012, $5,000,000 is requested for engineering and technical services support; procurement of five VOR/DME electronics kits; procurement of six VOR Doppler Antenna Kits; final incremental funding for on-going projects to install VOR/DME electronics kits and VOR Doppler antenna kits facilities projects; and initial funding for six 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?

$5,000,000 is requested for the following:

- continue engineering and technical services support
- procure five VOR/DME electronics kits
- procure six 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 six new projects

A reduction would only allow for procurement of four VOR/DME electronics kits.

Detailed Justification for - 2D02 Instrument Landing System (ILS) – Establish

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

FY 2012 – Instrument Landing System (ILS) – Establish
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Instrument Landing System (ILS) – Establish/Expand	$12,575	$5,000	$0	$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. ILS Equipment	---	$1,610.0
2. Final incremental funding for on-going ILS projects and initial incremental funding for nine new replacement projects	---	3,225.0
3. Logistics/Engineering Support Service	---	165.0
Total	Various	$5,000.0

For FY 2012, $5,000,000 is requested for fund engineering and technical services support; procurement of five ILS systems, final incremental funding for on-going ILS replacement projects and initial funding for nine 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?

$5,000,000 is requested to fund engineering and technical services support; procure five ILS systems, for final incremental funding for on-going ILS replacement projects and for initial funding for nine new projects.

A reduction would defer engineering and technical support.

Detailed Justification for - 2D03 Wide Area Augmentation System (WAAS) for GPS

What Do I Need To Know Before Reading This Justification?

- The Wide Area Augmentation System (WAAS) program office was notified by Intelsat on April 12, 2010 that the telemetry, tracking, and control system on the Galaxy XV satellite had failed. Galaxy XV is currently operational but is slowly drifting out of position, ultimately resulting in the need to be shut down in the near future. At that time, only one satellite will be providing WAAS service over the entire national airspace. Service disruptions will occur in NW Alaska as well as intermittently across the entire system. Multiple attempts by Intelsat as recently as May 3, 2010 to revive the satellite have failed. Due to this imminent failure, FAA needs to acquire a replacement geostationary satellite as soon as possible to restore full WAAS service.

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

FY 2012 – Wide Area Augmentation System (WAAS) for GPS
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Electrical Power System – Sustain/Support	$91,000	$125,500	$0	$125,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. GEO Satellite Acquisition	---	$41,041.0
2. Technology Refresh	---	29,400.0
3. NAS Implementation	---	32,009.0
4. Technology Evolution	---	4,650.0
5. Technical Engineering Program Support	---	14,400.0
6. Surveys and Procedures	---	4,000.0
Total	Various	$125,500.0

For FY 2012, $41,041,000 is requested to fund satellite leases for GEO #4, Gap Filler GEO, replacement (stopgap) GEO as well as the development of the 5th GEO payload. $29,400,000 is requested for the development efforts in the transition to a second civil frequency L5, completion of GIII receiver development, and communication upgrades. $10,000,000 listed for Activity 6 is for Survey Development. $32,009,000 is requested to fund the development of 500 approach procedures (FAA Flight Plan Goal), additional survey costs due to modifications in survey development criteria, as well as associated flight inspections. Additionally, this $32,009,000 of funding would fund data collection by operators, benefits analysis, and development of WAAS-specific procedures within the NAS. $4,650,000 is requested to fund threat model assessments, conduct ionospeheric analysis, safety analysis, and support GNSS evolutionary architecture studies in cooperation with DOD GPS Modernization efforts. $14,400,000 is requested to fund technical assistance contracts to support 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 (HF), earned-value management (EVM), security, safety engineering, and specialty engineering.

Planned Milestones:
- GIII Receiver Acceptance/Delivery
- Release 4 (L5 Development Phase I) deployment
- Publish 500 WAAS Approaches

- 5th GEO Contract Award
- Replacement GEO Integrated in WAAS

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 are expected to begin 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

Failure to fully fund the GEO satellite acquisition would delay the implementation of the replacement (stopgap) GEO as well as the development of the 5th GEO payload. A slip to the stopgap GEO implementation will result in a delay in restoring WAAS coverage to northwest Alaska. Any failure to pay for the existing GEO leases will result in termination liability costs for the FAA.

Reductions to the technology refresh effort will delay WAAS's ability to transition to the second civil frequency L5 which will impact performance if WAAS isn't ready to transition when DOD sunsets one of the existing frequencies used by WAAS (L2). Funding reductions will also negatively affect the completion of the G-III receiver development; this delay will also impact WAAS's capability to transition to dual frequency operations.

In 2012, WAAS is continuing to fund the development of 500 procedures as well as the associated surveys and flight inspections necessary to complete this goal. Reductions in funding will impact completion of annual FAA flight plan goals, a delay to the overall goal of providing a WAAS approach to all qualified runways by 2016, and a lesser accrual of program benefits. It will also impact safety in the NAS by reducing the number of vertical guidance procedures provided to the flying public.

A reduction to the program technology evolution efforts will impact the work 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.
A loss of funds to support the technical engineering/program support budget would impact 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.

4. How Do You Know The Program Works?

WAAS was approved by the Joint Resources Council (JRC) to rebaseline on May 20, 2009, and provided FAA management with detailed insight into the program's technical and operational benefits and financial and technical plan for Phase III (2009-2013). The replanned effort will cost approximately $477 million less than the 2004 baseline.

WAAS Performance Measures:

- OMB IT Dashboard: Green rating
- Spire Program Assessment Metrics
  - Financial: Green
  - Schedule: Green
  - Technical: Green
  - Resources: Green
  - External Interest: Green
  - Program Manager: Green

WAAS Accomplishments:

- Published 2034 LPV Procedures
- 790 LPVs published at 495 airports without an ILS
- Fedex equipped with WAAS
- WAAS achieved LPV-200 in 2006 which is equivalent to Category I ILS Approach

WAAS Accomplishments in last year:

- Completed 3 Aircraft Supplemental Type Certificates (STC's)
  - Horizon
  - AAG
  - Careflite
- Published 501 LPV's in FY 2009
- Release 1 completed April 2010
  - Completes Refresh of WRS Processors
- Met 2009 Flight Plan Goal to implement GNSS routes in Alaska
  - Alaska T and Q Route NOTAMs prohibiting flight were cancelled. Consequently, users can now fly T and Q routes in Alaska.
- Met and exceeded 2009 Flight Plan Goal for 5 LPV approaches in Alaska
  - Total of 52 LPVs by January 2010.
- Three Northern Air Cargo (NAC) Boeing 737-200 aircraft are WAAS equipped with Supplemental Type Certificate (STC) completed.
  - The last aircraft entered service in October 2009.
  - Data collection in process.

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

The WAAS Program has various program goals. The loss of the Galaxy XV GEO; its WAAS payload, and the sunset of the L2P GPS signal has accelerated/modified WAAS goals The program requirement is the proliferation of WAAS LPV approach procedures to enable the WAAS benefit of improved access to airports.

The WAAS program office was notified by Intelsat on April 12, 2010 that the telemetry, tracking, and control system on the Galaxy XV satellite had failed. Service disruptions will occur in NW Alaska as well as intermittently across the entire system. A failure to fully fund the GEO satellite acquisition would delay the implementation of the replacement (stopgap) GEO as well as the development of the 5th GEO payload. A slip to the stopgap GEO implementation will result in a commiserate delay in restoring WAAS coverage to northwest Alaska. Any failure to pay for the existing GEO leases will result in termination liability costs for the FAA.

The Department of Defense has notified users that the L2P signal will no longer be available to users beyond 2020. The L2P signal is essential to the operation of WAAS, and an operational replacement capability must be in-place by 2018. FY 2012 is a pivotal year for this effort in terms of long-lead items such as development, test, and prototype delivery of the next generation G-III receiver, the development of a Safety Computer essential to handle the expanded data requirements for the transition from L2P, the new

GEO and GIII receiver. FY 2012 will also be critical year in the recomplete for the WAAS prime contract, which must be in-place to support GEO replacement and L2P transition.

The GEO and L2P transition activities are essential to ensuring the existing WAAS capability is provided to users and therefore takes precedence over the development of new procedures. Any reduction in funding to WAAS will jeopardize the program's ability to achieve the FAA Flight Plan goal of publishing 500 procedures per year.

The beauty of WAAS is that a large incremental benefit can be accrued through a relatively small incremental investment. The one-time investment of about $35,000 in upfront survey and procedure development costs can accrue about $100,000 on average of benefit per year every year thereafter. The source of the estimate is the WAAS Cost-Benefits baseline. The number was derived by taking the maximum benefit and factoring in the total number of procedures planned for the end-state assuming 100% aircraft equipage. Both the FY 04 and FY 09 Baseline yielded the same result when the calculations were done.

A reduction from the FY 2012 WAAS baseline funding will result in 83 fewer airport surveys being procured resulting in 188 procedures not being developed.

Detailed Justification for - 2D04 Runway Visual Range (RVR)

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

FY 2012 – Runway Visual Range (RVR)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Runway Visual Range (RVR)	$5,000	$5,000	$0	$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. RVR Equipment	---	$2,530.0
2. Final incremental funding for on-going RVR replacement projects and initial incremental funding for eight new replacement projects	---	2,400.0
3. Logistics/Engineering Support Service	---	70.0
Total	Various	$5,000.0

For FY 2012, $5,000,000 is requested for engineering and technical services/support; procurement of eight RVR systems, final incremental funding for on-going RVR projects and initial funding for eight 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 better 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?

$5,000,000 is requested for engineering and technical services/support; procurement of ten RVR systems, final incremental funding for on-going RVR projects and initial funding for eight new RVR replacement projects.

A reduction would delay one RVR system.

Detailed Justification for - 2D05 Approach Lighting System Improvement Program (ALSIP)

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

FY 2012 – Approach Lighting System Improvement Program (ALSIP)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Approach Lighting System Improvement Program (ALSIP)	$10,337	$5,000	$0	$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. ALSIP Equipment	---	$960.0
2. Final incremental funding for on-going ALSIP replacement projects and initial incremental funding for four new replacement projects	---	3,900.0
3. Logistics/Engineering Support Service	---	140.0
Total	Various	$5,000.0

For FY 2012, $5,000,000 is requested for engineering and technical services/support; procurement of 10 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 four 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. A 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 he 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?

$5,000,000 is requested for engineering and technical services/support; procurement of ten MALSR systems, final incremental funding for on-going MALSR and ALSF-2 projects and initial funding for four new MALSR replacement projects.

A reduction would delay one MALSR systems.

Detailed Justification for - 2D06 Distance Measuring Equipment (DME)

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

FY 2012 – Distance Measuring Equipment (DME)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Distance Measuring Equipment (DME)	$6,000	$5,000	$0	$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Distance Measuring Equipment (DME) Procurement	---	$315.0
2. DME Replacement Projects	---	4,375.0
3. Logistics/Engineering Support Services	---	310.0
Total	Various	$5,000.0

For FY 2012, $5,000,000 is requested for engineering and technical services/support; procurement of four DME systems, final incremental funding for on-going DME projects, and initial funding for 34 new Low-Power DME (LPDME) 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. 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?

The $5,000,000 requested to procure of four DME systems, final incremental funding for on-going DME projects and initial funding for 34 new LPDME projects, and for engineering and technical services/support.

A reduction would only begin the replacement of 33 new LPDME projects at various airport runways within the NAS.

Detailed Justification for - 2D07 Visual Navaids – Establish/Expand

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

FY 2012 – Visual Navaids – Establish/Expand
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Visual Navaids – Establish / Expand	$3,700	$3,400	$0	$3,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Precision Approach Path Indicator (PAPI) Equipment	---	$1,380.0
2. Final incremental funding for on-going PAPI replacement projects and initial incremental funding for 20 new replacement projects	---	1,875.0
3. Logistics/Engineering Support Service	---	145.0
Total	Various	$3,400.0

For FY 2012, $3,400,000 is requested for engineering and technical services/support; procurement of 45 PAPI systems, final incremental funding for on-going PAPI projects and initial funding for 20 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?

$3,400,000 is requested for engineering and technical services/support; procurement of 45 PAPI systems, final incremental funding for on-going PAPI projects and initial funding for 20 new replacement projects.

With a reduction, the FAA will only be able to begin 19 PAPI projects at various airport runways within the NAS. .

Detailed Justification for - 2D08 Instrument Flight Procedures Automation (IFPA)

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

FY 2012 – Instrument Flight Procedures Automation (IFPA)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Instrument Flight Procedures Automation (IFPA)	$7,900	$2,000	$0	$2,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Technology Refresh/Computer/Servers	---	$2,200.0

For FY 2012, $2,200,000 is requested to begin IFPA technology refresh activities to include purchase of Commercial Off-The-Shelf (COTS) workstations and 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 begin in FY 2010 and 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 19,000 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 and local area augmentation system
- 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 and FY 2009, and are on track for FY 2010 and 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 FY 2012.

A reduction from the FY 2012 IFPA baseline funding would result in the program not being able to complete the purchase of COTS computers planned for FY 2012.

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 2012 – Navigation and Landing Aids – Service Life Extension Program (SLEP)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Navigation and Landing Aids – Service Life Extension Program (SLEP)	$9,000	$6,000	$0	$6,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Ancillary Equipment Procurement	---	$3,070.0
2. Final incremental funding for on-going replacement projects and initial incremental funding for 36 new replacement projects	---	2,880.0
3. Logistics/Engineering Support Services	---	50.0
Total	Various	$6,000.0

For FY 2012, $6,000,000 is requested for engineering and technical services/support; procurement of ancillary equipment, final incremental funding for on-going projects and initial funding for 36 new replacement projects.

2. What Is The Program?

On average of 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 and
- 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?

$6,000,000 is requested for engineering and technical services/support; procurement of ancillary equipment; final incremental funding for on-going projects; and initial funding for 36 new replacement projects.

If reduced, we would only be able to begin 35 new replacement projects at various airport runways within the NAS.

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 2012 – VASI Replacement – Replace with Precision Approach Indicator ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
VASI Replacement – Replace with Precision Approach Indicator	$4,500	$7,000	$0	$7,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Precision Approach Path Indicator (PAPI) Equipment	---	$1,405.0
2. Final incremental funding for on-going replace VASI projects and initial incremental funding for 20 new replace VASI projects.	---	5,466.0
3. Logistics/Engineering Support Services	---	129.0
Total	Various	$7,000.0

For FY 2012, $7,000,000 is requested for engineering and technical services/support; procurement of 45 PAPI systems, final incremental funding for on-going visual approach slope indicator (VASI) replace PAPI projects and initial funding for 20 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 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?

$7,000,000 is requested for engineering and technical services/support; procurement of 45 PAPI systems, final incremental funding for on-going VASI replace PAPI projects and initial funding for 20 new replacement projects.

With a reduction the FAA will only be able to begin the replacement of 19 VASI with PAPI at various airport runways within the NAS.

Detailed Justification for - 2D11 Global Positioning System (GPS) Civil Requirements

What Do I Need to Know Before Reading This Justification?

- The Global Positioning System (GPS) is a satellite-based system that provides position, navigation, and timing (PNT) service for use by the U.S. government and world-wide users with no direct user charges. GPS provides the Standard Positioning Service (SPS), using the single L1-C/A signal and is available for worldwide use by the civil community. Currently, GPS consists of second generation satellites (GPS-II) and the Operational Control Segment (OCS). The GPS program is entering into a period of modernization from GPS-II to the third generation (GPS-III) and the modernized operational control segment (OCX).

- The National Space-based PNT policy (NSPD-39) requires any new civil unique GPS capabilities to be funded by the agencies requiring those capabilities and specifically identifies the new L1C signal and civil signal monitoring as capabilities that are to be funded by civil agencies. DOT is the lead for all civil agencies and has directed FAA to serve as the implementing agency to budget for and implement L1C and civil signal monitoring, perform technical oversight, and fund DOT's share of the National Coordination Office (NCO) support costs. As the implementing agency for DOT, the FAA does not have a specific requirement for L1C or civil signal monitoring.

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

FY 2012 – Global Positioning System (GPS) Civil Requirements
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Global Positioning System (GPS) Civil Requirements	$43,400	$50,300	$0	$50,300

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	---	12,000.0
3. OCX Civil Signal Monitoring	---	33,300.0
4. Civil Studies	---	2,000.0
Total	Various	$50,300.0

For FY 2012, $50,300,000 is requested to accomplish the following activities:

- Develop 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.

- Design, procure, integrate, test, and factory acceptance of GPS monitor station and the processing facility equipment. The design and prototyping of the signal monitoring software algorithms will also be started.

- 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 Wing 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 Wing. 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 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 service 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. That the program works is demonstrable once 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.

National Positioning Navigation and Timing Policy (NSPD-39) requires civil agencies to fund GPS L1C and Civil Monitoring. DOT directed FAA to fund a portion of the NSPD-39 requirement. DoD has awarded a contract for the GPS work jointly funded by DoD and FAA. A reduction may require DoD to delay or stop work on the Civil unique items.

Detailed Justification for - 2D12 Runway Safety Areas – Navigational Mitigation

What Do I Need To Know Before Reading This Justification?

- PL-109-115 (2006 Agency Appropriation Act) 119 STAT.2401 states "not later than 12/31/2015, the owner or operator of an airport certificated under 49 U.S.C. 44706 shall improve the airport's runway safety areas to comply with the Federal Aviation Administration design standards required by 14 CFR part 139" and an annual report to Congress on progress is required.
- The Office of the Inspector General publish a report (March 2009) recommending the FAA to develop and implement a program to remove or modify non-standard navigational aids located in the RSA.
- The FAA has identified 2,384 RSA violations requiring sterilization. Failure to sanitize the RSA puts FAA in jeopardy of violating Federal Law PL-109-115, which requires the FAA to complete RSA compliance with 14 CFR 139 not later than 12/31/2015.
- The FAA request's additional funding to accelerate the completion of NAVAID improvements by December 31, 2015.

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

FY 2012 – Runway Safety Areas (RSA) – Navigational Mitigation
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Runway Safety Areas (RSA) – Navigational Mitigation	$0	$25,000	$0	$25,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$100.0
2. Procurement of NAVAIDs	---	5,000.0
3. Installation of NAVAIDs	---	19,900.0
Total	Various	$25,000.0

For FY 2012, $25,000,000 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 CY 2015.

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

$25,000,000 is requested to address 1,349 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 - **2D13 NAVAID Control, Interlock, and Monitoring Equipment (NCIME)**

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

FY 2012 – NAVAID Control, Interlock, and Monitoring Equipment (NCIME)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
NAVAID Control, Interlock, and Monitoring Equipment (NCIME)	$0	$0	$1,000	$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Program Management Support Services	---	$ 610.0
2. Second Level Engineering Support Services	---	390.0
Total	Various	$1,000.0

For FY 2012, $1,000,000 of mandatory funding is requested for engineering and technical services and support.

2. What Is The Program?

Currently, multiple display and control systems occupy valuable Air Traffic Control Tower (ATCT) cab console space. Individual control/display devices are required for nearly every navigation and visual aid. ATCT control and display space requirements can be reduced significantly through the acquisition of an NCIME integrated display and control unit. A single Navigational Aid (NAVAID) Control, Interlock, and Monitoring Equipment (NCIME) control/display unit will replace the segregated displays and control systems required to monitor and control all of the navigation and visual aids at an airport.

NCIME can provide simultaneous control of all approach aids by selecting a pre-determined airport runway configuration. NCIME can provide control of individual NAVAIDs, approach lighting, and engine generator equipment and includes a standardized ILS interlock controller.

The NCIME can provide rapid access to information, procedures, communications, and common situational awareness among the air traffic controllers. By providing all this information displayed in an easily understood common format, the NCIME can help air traffic controllers maintain heightened situational awareness that promotes early recognition and resolution of potentially hazardous circumstances. The intended objectives of the proposed system would provide the status of all NAVAID facilities associated with an approach – Instrument Landing System (ILS), approach lighting, Runway Visual Range (RVR), Distance Measuring Equipment (DME), etc. in one display.

NCIME will provide integrated status and control for ground based NAVAID, approach lighting systems and runway visual range (RVR) based on FAA requirements. It will establish a standardized ILS interlock function and provide an automated status and control display. A single NCIME control/display unit will replace multiple units located in air traffic control towers (ATCT) and Terminal Radar Approach Control (TRACONs) and provide Air Traffic with NAVAID/Visual NAVAID status and control information.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

The NCIME will reduce the quantity of control/display units in the tower cab to a single display and control system and be capable of monitoring and controlling all of the navigation aids and visual aids for approach and landing. The NCIME can provide simultaneous control of all approach aids by selecting a pre-determined airport runway configuration. NCIME can provide control of individual NAVAIDs, approach lighting, and engine generator equipment and includes a standardized ILS interlock controller.

NCIME will conform to FAA memorandum Policy Statements:

Display of Operational Data in Terminal Air Traffic Control (ATC) Facilities, dated February 13, 2003 states,

> "In order to avoid equipment clutter and inconsistent user-interface designs, it is Air Traffic Service (ATS) policy that new requirements for display or control equipment in the terminal environment shall be satisfied in a way that does not increase the net number of displays in a facility."

Controlling the Proliferation of Nonstandard Systems within the NAS, dated September 25, 2003 states,

> "It is the ATS policy to prohibit the introduction of non-standard, non-supported, locally initiated or developed systems into the NAS without proper authorization."

4. How Do You Know The Program Works?

A vendor, New Bedford Panoramex, (NBP) developed an Integrated Control and Monitoring System (ICMS™) for providing integrated control and monitoring of airport ground based and approach lighting systems. The ICMS™ display panel is located in the air traffic control tower and is used by Air Traffic Controllers and Supervisors. The ICMS™ is currently installed at 16 FAA airport facilities. The NCIME system will perform all of the functions of the ICMS™ and will be designed to FAA safety, reliability and maintainability requirements.

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

$1,000,000 is requested for engineering and technical services/support to conduct an Investment Analysis and prepare for Investment Analysis Readiness Decision (IARD).

A reduction from the FY 2012 NCIME baseline funding will limit the planning, research and development, and the analysis, or prototypes would be further deferred.

Detailed Justification for - 2E01 Fuel Storage Tank Replacement and Monitoring

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

FY 2012 – Fuel Storage Tank Replacement and Monitoring
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Fuel Storage Tank Replacement and Monitoring	$6,200	$6,400	$0	$6,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Technical Refresh Analysis and Implementation	---	$5,679.0
2. Optimization/Enhancement/Engineering Services	---	721.0
Total	Various	$6,400.0

For FY 2012, $6,400,000 is requested to fund:

- $4,924,660 for two ARTCC fuel storage system upgrades
- $1,361,000 for two Prime Power (PX)/Redundant Power Distribution System (RPDS) fuel storage system upgrades
- $100,000 for for GNAS fuel system replacements
- $14,340 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 /Terminal Radar Approach Control Tower (TRACON) modernizations are primary program initiatives. Solutions will be implemented to increase operational readiness and lifecycle sustainment.

For FY 2012, the FST Program has scheduled two ARTCC FST System upgrades and two PX/TRACON deficit solution projects.

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 3,600 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).

DOT Strategic Goal – Environmental Sustainability

- Reduced transportation related pollution and impacts on ecosystems.

3. Why Is This Particular Program Necessary?

Implementation of the FST Program is a cost avoidance strategy that reduces potential FAA liabilities. The FST lifecycle sustainment program initiatives support the FAA goal of greater capacity by avoiding delays due to NAS equipment outages.

Executing an FST lifecycle sustainment program achieves the cost benefits 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.

4. How Do You Know The Program Works?

Monthly reporting indicates fuel systems continually achieve minimum goal of 99.7% 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

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

FY 2012 – Unstaffed Infrastructure Sustainment
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Unstaffed Infrastructure Sustainment	$18,200	$18,000	$4,600	$22,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Structural Improvement	---	$14,400.0
2. In Service Engineering	---	2,600.0
3. Seismic Requirements	---	1,000.0
Total	Various	$18,000.0
Activity Tasks – Mandatory		
4. Terminal Aerodrome Forecast (TAF) 100 NEXCOM Infrastructure Upgrades	---	4,600.0
Total	Various	$22,600.0

For FY 2012, $18,000,000 of discretionary funding is requested to repair 266 unstaffed infrastructure projects located in all three service areas for Communication, Navigation, Surveillance, and Support Services.

The sustainment projects includes repair, 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. In addition to the 266 unstaffed sustainment projects, the UIS program office plans to conduct 10 seismic evaluations of FAA facilities located in high seismic areas.

For FY 2012, $4,600,000 of mandatory funding is requested to upgrade unstaffed infrastructure (buildings, shelters, HVAC, broadcast towers and security) at Terminal Aerodrome Forecast (TAF) 100 Airports to support Next Generation Air Traffic System (NextGen) Communications (NEXCOM) systems being deployed. The NEXCOM Program is currently upgrading communications system at 100 Remote Transmitter Receivers (RTR) and Remote Communications Air Ground (RCAG) facilities per year. These infrastructure upgrades will properly support NEXCOM equipment and enable it to meet it design service life.

2. What Is This Program?

The FAA has established several long-term strategic objectives that depend upon the safe and reliable functioning of infrastructure including: increased capacity in the National Airspace System (NAS); improved worker safety; alignment with Next Generation Air Transportation System (NextGen) transformation; and enhanced operational excellence. In order to comply with Executive Order 13327, Federal Real Property Asset Management, and support the FAA Flight Plan's goals for greater capacity, the UIS Program is striving to ensure that the life-cycle sustainment costs associated with the FAA's unstaffed facility inventory of 35,439 assets is planned and accounted for in the FAA's Capital Investment Plan.

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.

Seismic: The FAA is required by Public Law (42 USC 7701), Executive Order (12699 and 12941) and DOT Policy (SS-98-01) to fund and execute a cost effective, long term earthquake risk mitigation program. The Seismic Safety Risk Mitigation program is the FAA's effort to comply with these mandates, protect the safety of FAA employees, protect the buildings and equipment in earthquake prone regions, control the cost of mitigation and reduce the cost of avoidable repairs following an earthquake. Significant and unacceptable life safety risks have been identified at FAA staffed facilities (ARTCC and ATCT). These risks place the safety of FAA employees and the flying public in jeopardy. The potential for injury, loss of life, loss of buildings and equipment, and loss of hundreds of millions of dollars in Trust Fund revenue from NAS disruptions are entirely avoidable.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policy and investments.

3. Why Is This Particular Program Necessary?

The FAA owns and maintains thousands of unstaffed facilities that enable the NAS ability to provide communication, surveillance, weather and navigation services. The unstaffed infrastructure necessary to sustain these services includes buildings or shelters, broadcast towers, roads and walkways to access the facilities, security fencing, interior electrical distribution systems, and heating ventilation and cooling (HVAC) systems and is all managed by the Unstaffed Infrastructure Sustainment (UIS) Program.

The majority of unstaffed facilities enable surveillance, communications, weather, and air traffic services in a very efficient and cost saving manner. Investments in the portfolio of NAS UIS facilities is an economical way of ensuring Air Traffic Services are being supported consistent with the goals of the Flight Plan. 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.

The FAA has experienced a damaging earthquake on average every 5-8 years; resulting in tens of millions of dollars in repair costs to dozens of NAS facilities, hundreds of millions of lost Trust Fund revenue and the economic impact to the affected regions of thousands of cancelled flights, lost time employee injuries, one destroyed ATCT and one employee death. The key to preventing a catastrophe is not the magnitude of the earthquake, but the quality of the prior planning and preparation. The Seismic Safety Risk Mitigation Program provides guidance for the FAA's earthquake planning and preparation. Effective air traffic control service is essential for adequate emergency support to an earthquake damaged area. 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, to train FAA employees to respond effectively to an earthquake, 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?

The program executes limited funding resources to ensure that communication, navigation, weather and support systems are environmentally protected, housed and function according to their performance standards. The UIS Program is striving to achieve compliance with OMB FCI reportable metrics on each facility that is considered critical to Air Traffic. UIS plans, funds and executes required refurbishment to ensure the NAS is operational.

Neglecting to fund and perform these ongoing sustainment activities leads to deferred maintenance and can increase risk of unplanned equipment failures and generate unscheduled outages.

As a result of the continued seismic safety risk mitigation practices applied to the NAS staffed facilities located within seismic hazard areas, risk of FAA employee injury and NAS service disruption costs have been minimized at OEP airports. Neglecting to fund this program will result in safety risk to employees that occupy FAA facilities within high seismic zones.

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

In FY 2012, the UIS Program will sustain the following

Category	Communications	Navigation	Support	Surveillance	weather	Grand Total
Fence	5	7		2		14
HVAC	2	7	4	5		18
Other	7	21	6	8	1	43
Road	5	2		1		8
Roof	10	15	3			28
Shelter	4	68	1	3	1	77
Structure	7	15	1			23
Tower	12	18		1		31
Electrical	6	13	4		1	24
Grand Total	58	166	19	20	3	266

For FY 2012, $17,000,000 of discretionary funding is requested to reduce the number of NAS outages and repair facilities in poor condition and $1,000,000 is requested to perform structural safety investigations of FAA owned buildings in seismic hazard areas, provide technical training for FAA engineers involved in building and maintaining facilities, and provide personal safety guidance training for all occupants of FAA buildings. Also, $4,600,000 of mandatory funding is requested to upgrade communication infrastructure to ensure NEXCOM equipment being deployed is safe and secure in an optimum environment to achieve maximum operational availability.

A reduction would decrease the 266 planned repairs of unstaffed infrastructure facilities to 258 repairs in FY 2012.

Detailed Justification for - 2E03 Aircraft Related Equipment Program

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

FY 2012 – Aircraft Related Equipment Program
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Aircraft Related Equipment Program	$10,000	$11,700	$0	$11,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Flight Inspection	---	$10,000.0
2. Advanced Fly-by-Wire Simulator Technical Refresh	---	1,700.0
Total	Various	$11,700.0

Flight Inspection: For FY 2012, $10,000,000 is requested for ongoing modifications/upgrades to FAA's flight inspection aircraft, avionics, and mission equipment. Of the total, $1,000,000 will be used to complete Next Generation Flight Inspection System (NAFIS) Phase I installation on two aircraft; $8,000,000 will be used to begin acquisition and upgrade of aircraft avionics in the Challenger and Lear aircraft; and $1,000,000 will be used to accelerate the completion schedule of the Beech 300 aircraft modifications by one year. The aircraft modification schedule must be accelerated in order to provide NextGen support to ADS-B, WAM and ASDE-X upon request without negatively impacting the flight inspection support required by non-NextGen facilities, systems, and equipment across the NAS.

Advanced Fly-By-Wire Simulator Technical Refresh: For FY 2012, $1,700,000 is requested to begin a technology refresh of the FBW simulator. The request is for a technology refresh to upgrade the Flight Management System, the Head-Up-Display, and the avionics displays with synthetic vision. These upgrades 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 to 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: digital HUD, synthetic vision, ADS-B update, ADS-B autopilot, and Airbus 380/350 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 28 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 local area augmentation system (LAAS) and wide area augmentation system (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, RNP, LAAS, and WAAS 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 ARE program has overcome numerous challenges, engineering, manufacturing, developing new technologies to provide the necessary support required by the Flight Inspection Operations Group. This program is key in allowing Operations to successfully meet both the legacy and NextGen flight inspection workload demands with minimal or no impact to the NAS or international commitments.

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, Synthetic Vision System, ADS-B, and Electronic Flight Bag.

Since the certification of the A330/340 simulator in February 2009, it has been used in Closely Spaced Parallel Operation safety studies, Flight Management System evaluations, runway closer mitigation strategies, and National Transportation Safety Board studies to collect aircraft performance data and evaluate human-in-the-loop factors.

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

Flight Inspection: The program baseline of $10,000,000 is required to continue ongoing initiatives from prior years and to implement new starts as planned. Of the total, $1,000,000 is for acceleration of the Beech aircraft modification project. The Beech modification schedule must be accelerated in order to provide NextGen support to ADS-B, WAM and ASDE-X upon request without negatively impacting the flight inspection support required by non-NextGen facilities, systems, and equipment across the NAS.

A reduction from the FY 2012 baseline funding, would impact FI's ability to provide services to NextGen programs upon request.

A further reduction from the FY 2012 baseline funding, would impact FI's ability to provide services to NextGen programs upon request.

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 digital HUD and synthetic vision. Low visibility testing of ground operations and terminal approaches would be delayed impacting future approvals of low visibility operating requirements.

A reduction would delay installation of the digital HUD. Research would have to be conducted using older technology analog HUDs possibly impacting crew performance levels.

Detailed Justification for - 2E04 Airport Cable Loop Systems – Sustained Support

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

FY 2012 – Airport Cable Loop Systems – Sustained Support
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Airport Cable Loop Systems – Sustained Support	$6,000	$5,000	$0	$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Site Engineering and Fiber Optic Installation	---	$4,245.0
2. Program Management	---	565.0
3. Engineering Support/Design/Documentation	---	190.0
Total	Various	$5,000.0

For FY 2012, $5,000,000 is requested to continue site engineering and fiber optic installation airport projects at: John F Kennedy, Newark, Baltimore, Cleveland, Ft. Lauderdale, Denver, Oakland, Ontario and Van Nuys airports. In addition, this funding will cover new site engineering work at: Tampa, San Diego, Honolulu airports.

2. What Is This Program?

This program replaces existing on-airport, copper-based, signal/control cable lines that have deteriorated. The program's primary focus is airports with high traffic counts and enplanements (e.g. OEP airports). The obsolete on-airport telecommunications (copper-based) infrastructure systems are vulnerable to failure and could cause flight delays related to outages. Where cost-effective, the airport cable loop program installs fiber-optic cable in a ring configuration to provide redundancy and communications diversity. The ring configuration allows information to flow in diverse paths. The airport cable loop program takes advantage of opportunities to save cost by coordinating projects with major construction projects (e.g. Air Traffic Control Towers (ATCT), Radar, and runway projects).

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

All Air Traffic Control Towers (ATCT), on-airport Surveillance, Navigation, Landing, and A/G Communication services send and receive their information via on-airport telecommunications infrastructure. Much of the on-airport telecommunications infrastructure within the NAS is comprised of aged/deteriorated copper cable which has been spliced numerous times. This has further reduced the cables service life and capacity, as well as, increased the maintainability requirements to keep the services that are utilizing the cable operationally available for ATC.

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 measure cable related delays on airports and analyzes them from previous years to determine success in reducing delays by two percent a year on average. The impact of one project may not be seen immediately as a typical project takes 2-3 years to complete. The Airport Cable Loop program is presently reducing cable related delays for OEP airports by 3.3 percent on average annually.

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

Failure to fund the Airport Cable Program at the FY 2012 $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

Detailed Justification for - 2E05 Alaskan Satellite Telecommunications Infrastructure (ASTI)

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

FY 2012 – Alaskan Satellite Telecommunications Infrastructure (ASTI)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Alaskan Satellite Telecommunications Infrastructure (ASTI)	$9,000	$16,000	$3,000	$19,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Replace/Upgrade Modems, Switches and Radio Equipment	---	$3,300.0
2. Replace/Upgrade Multiplexers and Switches	---	1,500.0
3. Install Network Management Hardware and Software	---	2,300.0
4. Engineering, Technical and Program Management	---	7,000.0
5. Transportation and Shipping	---	1,900.0
Total	Various	$16,000.0

Activity Tasks – Mandatory		
6. Replace/Upgrade Modems, Switches and Radio Equipment	---	$800.0
7. Replace/Upgrade Multiplexers and Switches	---	400.0
8. Install Network Management Hardware and Software	---	500.0
9. Engineering, Technical and Program Management	---	1,300.0
Total	Various	$3,000.0

For FY 2012, $16,000,000 of discretionary funding is requested to begin the ASTI Technology Modernization and complete key site testing activities including engineering and integration work efforts. Goals include establishment of the Network Monitoring Control System (NMCS), multiplexer upgrades, and satellite modem replacement at various locations. 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 is due February 2011. This funding is necessary to complete modernization efforts in allotted five-year implementation schedule and achieve improved availability.

For FY 2012, $3,000,000 of mandatory funding is requested to continue the modernization of the Network Monitoring Control System (NMCS), multiplexers, and satellite modems at various locations. 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 is due February 2011. This funding 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 1) 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 is due September 30, 2010.

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 $18.8 million 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"). Site construction began in 1994 and the last sites were completed in 1999. Modernization is required to ensure future system availability to meet critical air traffic requirements.

Currently, the ASTI program has met FY 2009 activity targets/milestones and is on track to meet upcoming 2010 targets including the Cape Newenham radome replacement (scheduled to be completed in September 2010), Final Investment Decision (September 2010) and ASTI contract award (September 2010).

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

$19,000,000 is requested for the 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 from the FY 2012 baseline funding would delay the implementation of modem and switch replacement 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 2012 – Facilities Decommissioning
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Facilities Decommissioning	$5,000	$5,000	$0	$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Facility Disposition	---	$4,800.0
2. Program Management	---	200.0
Total	Various	$5,000.0

For FY 2012, $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.

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.

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 level would support is approximately 300 projects therefore, if we have a budget shortfall of:

A reduction would delay decommissioning of 10 projects. A further reduction would delay decommissioning of 15 projects.

Detailed Justification for - 2E07 Electrical Power System – Sustain/Support

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

FY 2012 – Electrical Power System – Sustain/Support
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Electrical Power System – Sustain/Support	$87,750	$85,600	$10,000	$95,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Battery Set Replacement	66	$5,850.0
2. Power Conditioning System (UPS)	15	2,858.0
3. DC BUS Systems	20	4,050.0
4. ACEPS EnRoute Critical Power Systems	3	22,500.0
5. Lightning Ground Bonding Protection System	4	2,700.0
6. Airport Power Cable Replacement	7	19,800.0
7. Engine Generator Replacement	102	15,592.0
8. Critical Power Distribution Systems	2	1,800.0
9. Power System Sustain Support (PS3)	5	10,450.0
Total	224	$85,600.0

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Battery Set Replacement	4	$ 650.0
2. Power Conditioning System (UPS)	1	300.0
3. DC BUS Systems	3	450.0
4. ACEPS EnRoute Critical Power Systems	0.5	2,500.0
5. Lightning Ground Bonding Protection System	0.5	300.0
6. Airport Power Cable Replacement	1	2,200.0
7. Engine Generator Replacement	8	3,237.0
8. Critical Power Distribution Systems	4	200.0
9. Power System Sustain Support (PS3)	5	163.0
Total	27	$10,000.0

For FY 2012, $85,600,000 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).

For FY 2012, $10,000,000 of mandatory funding is requested to accomplish the following:

- 27 more units as shown above.

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. Further, 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.

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 2012 – Aircraft Fleet Modernization
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Aircraft Fleet Modernization	$5,969	$9,000	$0	$9,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aircraft Purchase	---	$9,000.0

For FY 2012 $9,000,000 is requested to procure three aircraft. New aircraft are required to ensure that Aviation Safety Inspectors (ASIs) are fully qualified and are sustaining the highest levels of currency and proficiency to check commercial and general flight aviation operations and to 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 the necessary level of performance and proficiency in their role of regulatory requirements.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

The three new aircraft will replace older aircraft which, due to rapid changes in National Airspace System (NAS) technology, navigational aids, avionics and cockpit displays in the last five years, are nearing the end of their useful life as effective ASI training aids while the cost of maintain the older aircraft increases. Currently, the aged aircraft are not impeding routine or safety of flight operations; however, the ever-advancing 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.

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 as training aids. Suitable replacement aircraft will provide a significant and urgently required benefit to the FAA Flight Standards Program and 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 to the same level as their peers in the commercial aviation industry. This modern equipment will 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 NAS .

Presently the FAA uses four main tracks to provide ASI currency and proficiency training: rental aircraft, rental simulators, flight time in conjunction with out-of-agency flight courses and the Flight Standards aircraft. Unlike rental aircraft and simulators tracks which provide specific flying experience or qualifications, the purpose of the Flight Standards aircraft is to provide 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. 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. 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, whose maintenance costs greatly increase with age, will soon be 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 the modern avionics suites and will allow the ASIs the ability to gain proficiency needed in their regulatory duties in the NextGen NAS. The new aircraft will have a high reliability and dispatch rate that will ensure fewer cancellations, and, based on past experience and research, will support 910 hours per year of support. As a result of these new aircraft's capabilities, ASIs can receive initial and recurrent training requirements that mirror modern technology, avionics equipment, and flight procedures. This superior level of training will be key to the ASI program's success in meeting mission requirements.

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

$9,000,000 is requested to procure the three aircraft needed for its Flight Standards program,. Modern avionics platforms are vital for the effective instruction and evaluation of ASI flight proficiency levels and to ensure that ASI standards are maintained to the same level as their commercial aviation industry peers. A reduction in funding would impact the new aircraft procurement and delay proficiency and training needs of the ASIs, while the maintenance costs for the aging aircraft increase.

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 2012 – FAA Employee Housing and Life Safety Shelter System Service
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
FAA Employee Housing and Life Safety Shelter System Service	$0	$2,500	$0	$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Baseline Program and Asset Management Tools	---	$125.0
2. Logistics and Contracting	---	900.0
3. Construction and Materials	---	1,175.0
4. Inspection	---	300.0
Total	Various	$2,500.0

For FY 2012, $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?

Establish a program for FAA Employee Housing and Life-Safety Shelter Services to 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 requested 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 2012 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 $182,400,000 for FY 2012, an increase of $50,484,000 (28 percent) over our FY 2010 request. 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 $12 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.

A key outcome expected to be achieved in 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, detected over 12 million cyber alerts/attacks generated against DOT infrastructure in FY 2009, with a little over 9.9 million generated to-date in 2010.

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 2012 – Hazardous Materials Management
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Hazardous Materials Management	$20,000	$20,000	$0	$20,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Superfund Sites Remediation (WJHTC)	---	$6,676.0
2. Investigation and Remediation (Alaska)	---	5,261.0
3. Investigation Other Sites and Program Management	---	8,063.0
Total	Various	$20,000.0

For FY 2012, $20,000,000 is needed to continue the management and remediation of approximately 100 of the 800 contaminated areas of concern (AOCs) that require investigation, remediation, and closure activities.

- $6,676,000 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.
- $5,261,000 for investigation and remediation at 33 AOCs in the former legacy Alaskan Region.
- $8,063,000 for investigation and remediation of 51 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 nine sites in FY 2009 and fully anticipates meeting its goal of closing 10 sites in FY 2010.

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 requested 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 requested 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?

FY 2012 – Aviation Safety Analysis System (ASAS)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Aviation Safety Analysis System (ASAS)	$10,500	$30,100	$0	$30,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Hardware/Software Systems/Services	---	$30,100.0

For FY 2012, $30,100,000 is requested to support the Aviation Safety Analysis System (ASAS) Registration and Certification Infrastructure for System Safety (RCISS). ASAS will provide technical refresh of equipment for the existing infrastructure as it continues to develop and implement IT services. The RCISS program will continue to deploy these IT new services in the following areas:

- Mobile Technologies
- Remote Connectivity Telecommunications
- Consolidated Server/Storage Area Network (SAN) system
- Enterprise Software
- Disaster Recovery

FY 2012 budget request increase is a result of the following:

- Growth in the Safety Workforce Over Initial Segment 1 Baseline Levels
- Growth of Enterprise Data Center (EDC), including Registry Data Center (RDC) and AVS Data Center (ADC), resources to accommodate an increase in processing, storage and backup capacities required to support legacy AVS Safety applications.
- Growth of EDC resources to accommodate new business applications being brought online to respond to new business needs.
- Implementation of Service Oriented Architecture (SOA) infrastructure within Disaster Recovery environment

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 Information Technology (IT) infrastructure programs that supported the Associate Administrator for Aviation Safety's (AVS) safety workforce. It also expands and enhances the current AVS infrastructure while leveraging components across the AVS services. 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 needs 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. RCISS' enterprise infrastructure provides the access methods to all AVS national safety applications developed by Safety Approach for Safety Oversight (SASO), Aviation Safety Knowledge Management Environment (ASKME), and all other national safety programs developed or currently deployed within AVS.

- **Description of Activity:**

Over the course of the next several years, RCISS Segment 2 will be performing technology refreshes on new enterprise infrastructure that was established during RCISS Segment 1.
RCISS encompasses the following six key components:

Devices for AVS' 6,000+ Safety Workforce (including new mobile devices) – Activities include lifecycle replacement and procurement of new devices:
- Provides new 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

Communications (LAN, WAN, and VPN) - Activities include lifecycle replacement and procurement of new equipment and services:
- Improves accessibility and speed in utilizing national safety systems and supports centralized server infrastructure
- Provides new 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 and procurement of new devices and software:
- Improves management and operation of the infrastructure through enhanced monitoring, consolidation of equipment and data collection
- Improves infrastructure reliability
- Establishes SOA infrastructure (hardware, software and services) within Disaster Recovery environment.

Application Data Servers (Hosting of national AVS safety applications) - Activities include lifecycle replacement and procurement of new servers as well as preparing for physical consolidation of Registry and ADCs:
- 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 RDC 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 software licenses:
- Ensures continued vendor support for software.
- Maintains ability to efficiently inter-operate with external infrastructures, e.g., other FAA organizations and the airline industry.
- 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 RCISS enterprise infrastructure:
- Provides specialized technical expertise in the enhancement of select component areas, such as, wireless and mobility technologies.
- Provides specialized training to support in the implementation of new infrastructure components.

The RCISS infrastructure directly contributes to the success of AVS in meeting its mission goals when 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.

3. Why Is This Particular Program Necessary?

The Registration and Certification Infrastructure for System Safety (RCISS) program addresses the FAA Office of Aviation Safety's (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. 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 legacy IT infrastructure has become inadequate and increasingly inflexible. It lacks the ability to be enhanced to support AVS' increase in volume of business and safety related information . The annual number of commercial travelers in the U.S. airspace is at nearly 800 million and is growing significantly along with an increase in diversity in the aviation industry. The growth of the aviation industry and advancements in the information technology industry have made an overhaul of the information technology infrastructure necessary. Implementing an updated infrastructure aligns with all Flight Plan goals, but particularly with Increased Safety and Organizational Excellence. The next generation information technology 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 new IT Infrastructure. It also enables AVS to modify its information technology 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 RCISS program provides detailed reports to the FAA, the Office of Information Technology (AIO), and makes reports publicly available on the OMB IT Dashboard. The 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 a master schedule that provides an integrated view of the program and the components. RCISS uses Earned Value Management techniques and metrics to assess the results against appropriate measures of effectiveness. As variances occur, 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 tablet and mobile toolkit air card met or exceeded their expectations.
Of the respondents who utilized the mobile toolkit tablet, 84 percent approved of its unique user interface and 79 percent were fully satisfied with its handwriting recognition feature.
74 percent of respondents indicated they would not change any toolkit components.
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. Those who chose to utilize support services beyond required training indicated that the services met or exceeded their expectations as well.

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 5 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?

RCISS benefits support DOT's strategic goals of Increased Safety and Organizational Excellence. 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 RCISS IT infrastructure. Without the RCISS infrastructure, SASO and ASKME will not be able to realize their full capabilities.

Reducing funding for 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 RCISS infrastructure to deliver the benefits shown on the OMB IT Dashboard. In FY 2012, the RCISS component, Service Oriented Architecture (SOA), will be implemented in another RCISS component, the Disaster Recovery Center (DRC).

The SOA component enables the following benefits that ASKME and SASO depend on:

- Sharing of commonly used compute 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.
- Enablement of quicker COTS software integration and integration of legacy software applications with new software applications

The FAA is required to provide for disaster recovery capability for mission critical systems. The RCISS component DRC is implementing this capability as required by the following Acts and Directives:

- The Computer Security Act of 1987
- Office of Management and Budget (OMB) Circular A-130, Management of Federal Information Resources, Appendix III, November 2000
- Federal Information Processing Standards Publication (FIPS PUB) 87, Guidelines for Automated Data Processing (ADP) Contingency Planning, March 1981 (superseded by this publication)
- Federal Preparedness Circular (FPC) 65, Federal Executive Branch Continuity of Operations, July 1999
- Presidential Decision Directive (PDD) 67, Enduring Constitutional Government and Continuity of Government Operations, October 1998
- PDD 63, Critical Infrastructure Protection, May 1998
- Federal Emergency Management Agency (FEMA) Federal Response Plan (FRP), April 1999

A reduction would directly impact RCISS's ability to fully implement its SOA and DRC components. Delaying implementation of these components beyond FY 2012 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. It will also cause the DRC to not meet requirements from Congressional Acts and Presidential Decision Directives.

Detailed Justification for - 3A03 Logistics Support System and Facilities (LSSF)

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

FY 2012 – Logistics Support System and Facilities (LSSF)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Logistics Support System and Facilities (LSSF)	$9,300	$10,000	$0	$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Implementation	---	$2,952.2
2. Training and Documentation	---	2,952.2
3. Program support contracts and labor	---	3,849.6
4. Information Security	---	246.0
Total	Various	$10,000.0

For FY 2012, $10,000,000 is requested for program management, training, implementation, and information security.

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 - Organizational Excellence

- Diverse and collaborative DOT workforce.

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 (APS)
- ✓ Enterprise Resource Planning (ERP)

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. So far the program has met all its objectives on time and provides a high probability to deliver the baselined benefits. The program achieved Final Investment Decision in April 2010 and has only recently awarded the system integration contract to Lockheed Martin.

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

Funding at the requested 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 2012 – National Air Space Recovery Communications (RCOM)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
National Air Space Recovery Communications (RCOM)	$10,230	$12,000	$0	$12,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. VHF/FM Radio Equipment	---	$6,070.0
2. Emergency Operations Network (EON)	---	1,658.0
3. Washington Operations Center Complex (WOCC)	---	1,692.0
4. Crisis Support Team (CST) Van	---	148.0
5. Other C^3 Tasks	---	2,432.0
Total	Various	$12,000.0

For FY 2012, $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.

- $6,070,000 to continue procurement of Very High Frequency (VHF)/ Frequency Modulated (FM) radio equipment supporting the modernization of the current VHF/FM network. 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.

- $1,658,000 to continue funding EON. Support includes the continued development of Google Earth layers, Secure Instant Messenger, EON Dashboard, EON Off-line, and the EON Data Discovery platform.

- $1,692,000 to continue funding WOCC activities which includes support to the C3 LAN, 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.

- $148,000 for support of the Crisis Support Team (CST) emergency response van and related communication equipment.

- $2,432,000 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

A reduction to the C3/NAS RCOM program would delay the replacement schedule for the VHF/FM radio project. The C3 program is scheduled to replace 2 districts per year. The average number of sites per district is 30 and the average cost per site is $60,000. This average cost includes system purchase and installation. This reduction would cause a delay of 3 sites per year.

Detailed Justification for - 3A05 Facility Security Risk Management

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

FY 2012 – Facility Security Risk Management
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Facility Security Risk Management	$18,000	$18,000	$0	$18,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Construction/Installation for Security Upgrades	---	$8,000.0
2. Equipment Design/Installation	---	10,000.0
Total	Various	$18,000.0

For FY 2012, $18,000,000 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 Atlanta TRACON (A80)
- 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 reduced security vulnerabilities at 965 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?

$18,000,000 is requested 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 A80
- Security equipment installation at MMAC and
- 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 2012 – Information Security
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Information Security	$12,276	$17,000	$2,000	$19,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Information Security System	---	$11,500.0
2. Logical Access Control	---	4,500.0
3. NAS Enterprise Information Security System (NEISS)	---	1,000.0
Total	Various	$17,000.0

Activity Tasks – Mandatory		
1. Cyber Security Management Center (CSMC)	---	2,000.0
Total		$19,000.0

For FY 2012, $16,000,000 of discretionary funding is requested to provide funds for Information Security Services and the Logical Access and Authorization Control Service (LAACS). Security Services include:

- Cyber Security Management Center (CSMC)
- National Airspace (NAS) Information Systems Security Transformation
- Trusted Internet Connections (TIC)
- Enterprise Architecture and Interoperability
- Academia and National Science Foundation Technology
- William J. Hughes Technical center (WJHTC) Prototyping Laboratory
- Advanced Concept Technology Demonstrations

These projects and services allow FAA to meet the following outcomes:

- Zero cyber security events that disable or degrade FAA services
- More efficient access mechanisms that meet current federal security guidelines
- Provide available and accurate critical information systems, networks, and administrative systems
- Information architecture that can seamlessly share information between agencies participating in the NextGen architecture
- New and innovative technology solutions through collaborative work with the National Science Foundation (NSF), Universities and other Government Agencies and a rapid prototyping laboratory established at the William J. Hughes Technical center (WJHTC
- Leverage existing technology and demonstrate its applicability to meet ongoing operational requirements through partnerships with DoD and other Federal, state agencies using Advanced Concept Technology Demonstrations (ACTD).

Also $1,000,000 of discretionary funding is requested to support prototype development of the Identity and Key Management (IK&M) and External Boundary Protection (EBP); two (2) of the lynchpin NAS Enterprise Information System Security (NEISS) program capabilities. This addresses the existing shortfalls in the current FAA technical capabilities regarding these two areas. This funding provides the requisite technical expertise.

For FY 2012, $2,000,000 of mandatory funding will provide additional Information Security Services as listed above.

2. What is the Program?

The CSMC is the cyber security service provider and incident response center for the Department of Transportation, the secretarial offices and affiliated Operating Administrations (OAs) and Bureaus. The CSMC reports all cyber incidents to U.S. Computer Emergency Readiness Team (US Cert) within the Department of Homeland Security (DHS). The CSMC ensures Departmental compliance with the National Institute of Standards and Technology (NIST) Special Publication (SP) 800-61, Computer Security Incident Handling Guide. The CSMC also supports the Federal E-Government and Federal Transition Framework by being one of OMB Task Force's Lines of Business (LOBs) for information systems security. The other Security Services are described below in Question 5.

LAACS is the first enterprise-wide access control implementation within FAA using a Commercial-Off-The-Shelf (COTS) Identity Management System (IDMS) solution. The goal of this investment is to address the need to manage access mechanisms more efficiently and to meet current federal security guidelines such as the Federal Identity, Credential, and Access Management (FICAM) Roadmap and Implementation Guidance. LAACS will protect the confidentiality, integrity, and availability of FAA: data; privacy information; information systems; and information technology applications. LAACS provides automated work flow provisioning processes designed to manage account setup, modifications, and de-activations and will improve the efficiency and effectiveness of security and access controls. With the implementation of efficient access control and identity management capabilities, FAA will be able to expand interfaces among FAA operations while protecting internal and external entity's intellectual property and privacy. LAACS will provide advanced automated security mechanisms for authenticating, authorizing, and auditing access to logical resources.

The NAS Enterprise Information System Security (NEISS) program is a Next General Air Transportation System (NextGen) initiative designed to close the current ISS security gaps and to plan and implement the NAS Enterprise level ISS addressing the emerging risks resultant from both the NextGen modernization efforts and the threats posed NAS by state sanctioned and non-state adversaries. The NEISS is proposing five enterprise level ISS capabilities which in conjunction with existent individual system level ISS capabilities will protect the NAS from external and internal threats. The five NEISS capabilities are:

DOT Strategic Goal – Organizational Excellence

- Enhance cyber security and privacy and improve governance of IT resources.

3. Why is this particular program necessary?

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.

The program also ensures compliance with the following additional mandates.

MANDATES:

- 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) 37
- Federal Information Security Management Act, OMB M-03-19
- OMB Circular A-130

In 2009 the CSMC detected over 12 million alerts/attacks generated against DOT infrastructure with a little over 9.9 million generated thus far in 2010. From these alerts the CSMC generated over 2,500 incidents for DOT infrastructure in fiscal year 2009 and thus far over 1,700 for DOT Infrastructure in fiscal year 2010.

4. How do you know the program works?

- Information Security has allowed the discovery and remediation of multiple critical system compromises
    - The immediate discovery of the exfiltration of FAA employee data 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 vulnerability scanning and assessment of FAA systems 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.

- A key driver in FAA's efforts and mission requirements to develop and implement a logical access and identity management solution proceeds from the FICAM Roadmap and Implementation Guidance that was issued on November 10, 2009 under the auspices/sponsorship of the Federal Chief Information Officers Council and the Federal Enterprise Architecture. FICAM compels Federal Agencies to achieve in one of ten (10) Near-Term Actions of the Cyberspace Policy Review: "Build a cyber security-based identity management vision and strategy that addresses privacy and civil liberties interests, leveraging privacy-enhancing technologies for the Nation, provide a strong rationale and level of urgency for the implementation of the FICAM document".[1] The value proposition of LAACS:
    - Increases information technology system security achieved through the implementation of LAACS functional components of access control and identity management. This capability defines and limits roles and responsibilities for system administrators, account managers, and end users providing appropriate 'checks and balances' through automated workflow processes. The FICAM increased security derived from access control and identity management, "correlates directly to reduction in identity theft, data breaches, and trust violations. Specifically, FICAM closes security gaps in the areas of user identification and authentication, encryption of sensitive data, and logging and auditing."

[1] Section 1.0 Introduction, 1.1 Background, FICAM Roadmap and Implementation Guidance, Version 1.0, November 10, 2009, Page 1.

5. Why do we want/need to fund the program at the requested level?

The FAA must ensure the integrity and availability of all critical information systems, networks, and administrative systems due to the increased 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.

The FAA Cyber Security 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; and system certification and compliance. .

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.

As stated earlier, the goal of the investment in the LAACS functionality is to address the gap or need to manage users' identity and access mechanisms more efficiently and to meet current federal security guidelines.

Information 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); conducting systemic monitoring at the CSMC, and addressing the challenge of providing cyber protection while maintaining reliability, availability and 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. The mandate 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, 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.

MANDATES:

- 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) 37
- Federal Information Security Management Act, OMB M-03-19
- OMB Circular A-130

LAACS will protect the confidentiality, integrity, and availability of FAA: data; privacy information; information systems; and information technology applications. A critical component of LAACS is user authentication based on pre-authorized roles and attribute based privileges. LAACS provides automated work flow provisioning processes designed to manage account setup, modifications, and de-activations and will improve the efficiency and effectiveness of security and access controls. With the implementation of advanced access control and identity management capabilities, the government will be able to expand interface among FAA operations while protecting internal and external entity's intellectual property and privacy. LAACS will provide efficient automated security mechanisms for authenticating, authorizing, and auditing access to logical resources.

REMEDIATION

NAS Information Systems Security Transformation
The 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. 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 would 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.

Essentially, securing automated resources through two factor authentication is an imperative for the FAA to reliably and securely provide Air Traffic Management (ATM) services to: (1) collect, process, store, and exchange sensitive and critical administrative, support, and operational data without unauthorized access, disclosure, or corruption and (2) protect, from service disruption, the information systems and technology that accomplish those tasks. If logical resources cannot be adequately and efficiently secured, the mission and objectives of the FAA are at risk.

Logical Access and Authorization Control Service (LAACS)
Again, the FAA's LAACS Project will provide direct line-of-sight support for FAA' s regulatory, mission and information security mandates. The FAA LAACS solution resolves several of the negative IT management and security findings identified in agency GAO Audits as well as FAA's need to develop a flexible information security architecture that can meet the new federal Identity, Credential and Access Management requirements.

The implementation of LAACS supports Federal Government efforts designed to: modernize and improve upon internal business policies, processes, procedures, and workflows; implement and adopt a cross-agency application and capability available to all Federal employees for identity management; create a common, trusted basis for authenticating the identity of individuals within the Federal sector (both Federal employees and contractors), and grant controlled access to critical Federal Government and FAA specific resources (both physical and logical). FAA's LAACS Solution further propagates the President's vision of creating a more responsive and cost-effective government through the implementation of digital technologies.

Trusted Internet Connections (TIC)
The TIC initiative requires a reduction in external connections, including internet points of presence. Agencies must comply with critical TIC technical capabilities, continue reduction and consolidation of external connections to identified TIC access points, execute a MOA and SLA between DHS and agency CIO. The TIC load sharing strategy, plan and design must be developed and managed to meet OMB guidance. Einstein II deployment at each of the consolidated IAPs must be planned, coordinated and installed. Agency progress on this activity is assessed annually by DHS under OMB direction.

<u>MANDATES:</u>

- OMB MEMORANDUM-08-05 Implementation of Trusted Internet Connections (TIC)

- OMB MEMORANDUM-08-16 Guidance for Trusted Internet Connection Statement of Capability Form (SOC)
- OMB MEMORANDUM-08-27 Guidance for Trusted Internet Connection (TIC) Compliance
- Planning Guidance for Trusted Internet Connections (TIC)
- OMB MEMORANDUM-09- 32 Update on the Trusted Internet Connections Initiative

Enterprise Architecture and Interoperability OMB Circular A-130 and OMB Circular A-11 mandate the EA to be annually baselined by the Investment Decision Authorities. FAA AMS enforces compliance with these federal mandates. The FAA EA has been approved by the Joint Resource Council, Information Technology Evaluation Board 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.

Enterprise Architecture: Continue to enhance the FAA's enterprise architecture and solutions architecture ensuring the Administrative, NAS-Support and the NAS architecture, defined by the Next Generation Transportation System (NextGen)) program, "to be" [future] states are compatible and meet the agency's future requirements. Opportunities to leverage architectural products to reduce costs and improve efficiency will be pursued including the development and enhancement of investment roadmaps.

Information Architecture: 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. Support the System Wide Information Management (SWIM) program and other NAS program's data architecture efforts.

<u>MANDATES:</u>

- OMB Circular A-130
- OMB Circular A-11
- GAO-09-271 Report

Academia and NSF Technology
Continue to collaborate with the National Science Foundation (NSF), Universities and other Government Agencies to sponsor research on promising IT and IT Security technologies that meet FAA requirements and FAA can transition into operational networks to increase capabilities, mitigate risks, and/or reduce operating costs.

Prototyping Lab at Tech Center
Provide continuing support for a rapid prototyping laboratory established at the William J. Hughes Technical center (WJHTC) or other facility for the purpose of developing secure mobile solutions for aircraft and administrative uses. The lab supports rapid configuration changes for the purposes of vendor evaluation, system architecture development, security architecture development and general research.

Advanced Concept Technology Demonstrations
Partner with DoD and other Federal, state agencies to participate in Advanced Concept Technology Demonstrations (ACTD). These demonstrations and experiments are designed to leverage existing technology and demonstrate its applicability to meet ongoing operational requirements. Artifacts from the demonstrations will be transitioned into FAA networks and facilities.

Detailed Justification for - 3A07 System Approach for Safety Oversight (SASO)

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

FY 2012 – System Approach for Safety Oversight (SASO)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
System Approach for Safety Oversight (SASO)	$20,000	$23,600	$0	$23,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Software Development	---	$21,000.0
2. Program Management	---	2,600.0
Total	Various	$23,600.0

For FY 2012 $23,600,000 is requested to successfully complete the SASO Program in FY 2022. By the end of FY 2022 SASO expects to reduce the fatal air carrier accident rate by 80 percent to 0.010 per 100,000 departures (i.e. 1 fatal accident per 10 million departures) and reduce the average number of fatal general aviation accidents to 327 per year. By so doing, SASO will save the FAA an estimated $373.8 million in labor and IT; and save the aviation industry an estimated $715.2 million.

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.

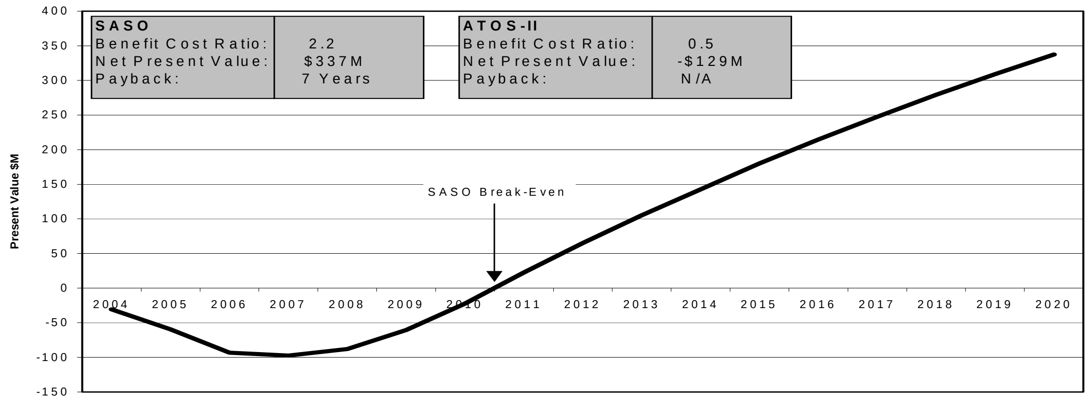
DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

The SASO program is necessary because if the current rate of civil aviation accident/fatalities (1551/534 in 2009) is not controlled, forecasted aviation growth by 2030 (84 percent) will result in 2,854 accidents and 983 fatalities per year. In addition, the International Civil Aviation Organization has mandated that all State Safety Programs incorporate Safety Management System (SMS) principles. The SASO program fulfills that mandate for the FAA Flight Standards Service. In addition, the SASO program is responding to anticipated Federal budget pressure in the out-years by automating many of the oversight functions currently performed manually by inspectors. By so doing, the SASO program estimates a saving of $373.8 million in labor and IT costs which will control the need for additional manpower in the out-years.

Intended Benefits to Beneficiaries:



What will happen if SASO is not funded in FY 2012?

Performance: Failure to continue funding at the requested level will limit the automation of oversight capabilities achieved through business process reengineering and require significant additional manpower (inspectors) to compensate for that lack of automation.

Cost: The cost of executing the software development contract in out-years will increase due to inflation and personnel turnover costs. The unit price per line of code on the software development contract will increase. The scope of the software development contract will have to be narrowed by limiting benefits. It will impact training and implementation cost because training and implementation depend upon the successful completion of software development.

Schedule: The SASO Integrated Program Schedule will be delayed two years. The additional year delay would be due to the loss of key contractor personnel resulting in a one-year re-training delay and lower productivity.

4. How Do You Know The Program Works?

Annual reviews of the SASO program by the Office of Management and Budget have resulted in passing scores every year since the Program's inception. The actual scores are listed by fiscal year in the table below.

The SASO program has consistently met the majority of its OMB Exhibit 300 Section I.D performance measures every year since the Program's inception. The actual ratios of performance measures Achieved vs. Missed are listed by fiscal year in the table below.

The SASO program Earned Value Management (EVM) results demonstrate a well-run, well-managed program. Actual EVM measures are listed by fiscal year in the table below.

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.

The SASO program has consistently met all EVM performance targets within or below budget. Actual EVM efficiency measures are listed by fiscal year in the table below.

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 2016 to achieve and sustain full benefits.

Detailed Justification for - 3A08 Aviation Safety Knowledge Management Environment (ASKME)

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

FY 2012 – Aviation Safety Knowledge Management Environment (ASKME)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Aviation Safety Knowledge Management Environment (ASKME)	$8,100	$17,200	$0	$17,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$4,787.0
2. Application/Solution Requirements	---	1,676.0
3. Application/Solution Design and Development	---	8,941.0
4. Application/Solution Testing	---	559.0
5. Electronic File Service	---	1,237.0
Total	Various	$17,200.0

For FY 2012, $17,200,000 is requested to fund the following ASKME requirements:

- Electronic Filing Service - (EFS) – Historical scanning activities - third year.
- Monitor Safety Related Data - Oversee System Performance - External - (MSRD- OSPe) - Complete documentation of detailed system requirements; begin design and development activities for the OSPe Sub-Function; deploy and evaluate detailed system requirements; finish design and development activities for the OSPe sub-function
- Designee Supervision / Past Performance Sub-Function - (DS/PP) – Complete design and development activities and deploy solution for the DS/PP sub-function
- Work Tracking Software - Work Activity Tracking - (WTS-WAT) – Complete system design activities start development of detailed system requirement
- DDS Technical Evaluations (DTE)-Complete design activities
- Engineer Design Approval (EDA) - Complete design activities

2. What Is This Program?

The ASKME is a suite of information technology (IT) tools designed to support and enable the **FAA Aircraft Certification (AIR)** to more efficiently certify new aircraft and modifications to existing aircraft. The ASKME program supports the DOT strategic goal of Safety: http://www.dot.gov/stratplan/dot_strategic_plan_10-15.pdf.

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 Fiscal Year 2008 and 2016. Phase 1 covers Fiscal Years 2008 - 2012, and Phase 2 covers Fiscal Years 2013 to 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

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 to safety for further refinement of the risk management model. ASKME safety benefits are calculated at $495 million, as determined using concept that if ASKME automation was in place at the time of the accident could causal factors associated with AIR business processes have been eliminated.

3. Why Is This Particular Program Necessary?

Within the FAA AVS organization, AIR is responsible for developing, administering, and ensuring compliance to safety standards governing the design, production, airworthiness, and continued operational safety of civil aircraft and related components. Essentially, 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. Between FY 1992 and FY 2000, the AIR workload increased 40 percent while the number of engineers, inspectors, and support staff grew by only 24 percent. 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. The lack of a comprehensive system with new processes and automation would mean AIR would be unable to use IT to modernize its business practices and maximize the productivity of its workforce. Delays to certification programs, release of new policies and guidance, designee approval or renewal, and response to inquiries will have a long-term detrimental effect on the vitality, safety, and efficiency of the aviation industry.

Without a comprehensive automated system to provide a corporate view of resource utilization, AIR and industry personnel will continue to be dependent on time-consuming, labor-intensive manual processes to store and retrieve required paper documents. Because current paper-based filing systems are local, IT will remain difficult for AIR to have single-source information shared among geographically dispersed organizations to ensure consistency of policy application.

Without automated process assistance tools and the ability to provide current and accessible information, designee program effectiveness will be minimized, designees underutilized, and AIR designee oversight and evaluation will be deficient.

Without the ability to capture and manipulate its knowledge base, AIR will continue to lose the corporate history of past decisions and be unable to provide reliable substantiation of previous decisions when requested to identify inconsistent or contradictory information.

Without integrated and automated tracking and work measure tools, AIR will not gain the ability to conduct long-term strategic analysis for better decision making on resource allocation and direction.

The FAA will develop ASKME to 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.

The mission of AVS is to promote aviation safety in the interest of the America public by regulating and overseeing the civil aviation industry. AIR is specifically responsible for establishing safety standards governing the design, production quality, airworthiness of civil aircraft products, and the continuing airworthiness of aircraft. AIR issues and maintains certificates for design and manufacture of aircraft, aircraft engines and propeller, materials, parts, and appliances. AIR uses industry-paid staff called designees to assist aviation industry companies to prepare for and maintain their certifications. AIR manages designee qualifications, appointment and monitoring. AIR monitors safety performance by conducting reviews of aviation products and reviewing safety data for trends; conducts safety inspections and surveillance; investigates possible violations and initiating enforcement actions; and participates in accident and incident investigations. Critical to the safety of the nation's airspace, AIR is responsible for ensuring that civil aircraft are designed and built to operate safely within the NAS.

While AIR has approximately 1,300 staff and 5,000 designees, the business challenges associated with meeting the agency goals of Safety, Organizational Excellence, and International Leadership require AIR to adopt and implement innovations in IT, hence the requirement for ASKME.

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 & 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 only through the end of FY 2012.

Table 1. ASKME Performance Baseline as Reported in SPIRE System

Performance Baseline	
Performance Parameter	**Values (Units)**
Number of AIR business processes integrated into AVS enterprise architecture and ASKME	8 of 25 processes integrated by 2012
Percentage of AIR work to which risk based resource targeting is applied to determine planned work	Increase to 71 percent by 2012
Cycle time (in months) replaced with knowledge management	Reduce training development cycle to 6-9 months by 2010
Percentage of e-learning/blended learning assets using FAA metadata tags	Increase to 50 percent of all AIR learning assets by 2012
Percentage of functionality included into the ASKME environment	Increase to 55 percent by 2012

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 2010 and FY 2011:

- Electronic Filing Service - (EFS) – Historical scanning activities - first and second year
- Work Tracking Software-Risk Based Resource Targeting - (WTS-RBRT) – Complete documentation of detailed system requirements. Begin Design and Development activities for the WTS-RBRT Sub-Function. Evaluate detailed system requirements; Finish Design and Development activities for the WTS-RBRT Sub-Function Deploy WTS-RBRT Sub Function to production
- Monitor Safety Related Data - Oversee System Performance - Internal - (MSRD-OSPi) - Complete documentation of detailed system requirements. Begin Design and Development activities for the OSPi Sub-Function. Evaluate detailed system requirements. Finish Design and Development activities for the OSPi Sub-Function
- Assimilate Lessons Learned - (ALL) – Complete development activities and deploy solution for the ALL Sub-Function based on requirements gathered. Finish development activities and deploy solution for the ALL Sub-Function based on requirements gathered
- Work Tracking Software - Work Activity Tracking - (WTS-WAT) – Document detailed system requirements and start development of detailed system requirement
- DDS Technical Evaluations (DTE)-Document detailed system requirements
- Engineer Design Approval (EDA) - Document detailed system requirements

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.

Detailed Justification for - 3A09 Data Center Optimization

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

FY 2012 – Data Center Optimization
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Data Center Optimization	$0	$1,000	$0	$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Data Center Reductions	---	$1,000.0

1. What is the request and what will we get for the funds?

The Data Center Consolidation Initiative (DCCI) program addresses FAA business needs to consolidate data center infrastructure and increase data center efficiency. The DCCI program also ensures that FAA includes data center consolidation plans in fiscal year budget submissions to OMB and integrates them into agency capital plans. The DCCI program incorporates the FY 2011 initiative to address ongoing requirements for space, power, and cooling capacity across the Lines of Business and Staff Offices (LOBs/SOs) (Data Center Optimization Strategy, or DCOS.

For FY 2012 $1,000,000 is requested for the DCCI program to achieve the following results:

- Reduce total number of data centers by five percent. For example, if the current DCCI inventory (in progress) identifies 50 data center spaces that FAA manages each year, then the following numbers will be accurate. (This excludes Flight Standards District Offices (FSDOs) which are not candidates for site consolidation.) A five-percent reduction means that, by the end of FY 2012, FAA will manage 48 data center spaces each year. This also ensures that individual programs or Lines of Business/Staff Offices (LOB/SOs) do not provision any new data center spaces to support new applications and systems. If none of the legacy data center spaces have sufficient capacity to support a new application or system, the system owner would need to consider outsourced data center capacity or cloud computing alternatives.

- Reduction in aggregate gross floor area (square feet) by five percent. For example, the current inventory of 50 spaces consumes roughly 45,000 sq.ft. aggregate gross floor space. A five-percent reduction means that, by the end of FY 2012, the aggregate gross floor space will drop to 42,750 sq.ft. (This also produces a net gain of 2,250 sq.ft. for other FAA use).

- Reduce total number of server racks by three percent. For example, the current DCCI inventory identifies 638 server racks across 149 data center spaces (including FSDOs). A three-percent reduction means that, by the end of FY 2012, FAA will manage 619 server racks across 144 data center spaces. This also controls the rate at which individual programs or LOB/SOs provision new server racks to support new applications and systems. The rate at which FAA decommissions server racks would need to exceed the rate at which it provisions new racks, in order to meet the five percent reduction target. If data center spaces do not have sufficient rack capacity to support a new application or system, the system owner would need to consider outsourced data center capacity or cloud computing alternatives.

- Reduce total number of servers by seven percent. For example, the current DCCI inventory identifies 2,860 servers across 149 data center spaces (including FSDOs). A seven-percent reduction means that, by the end of FY 2012, FAA will manage 200 less servers, or 2,660 servers. These reductions would be achieved primarily through server virtualization, although reduction targets for data centers, aggregate floor space, and server racks will also provide incentive for outsourcing. For example, an FAA application owner might consider paying a vendor to host the application on the vendor's server, within the vendor's own data center, rather than provisioning a new server or a new Operating System within an FAA data center.

- Reduce aggregate data center energy usage (kilowatt hours/year) by seven percent. The DCCI program will establish baseline data center energy usage during FY 2011, at which time it can estimate actual reductions in kWh/year based on the seven-percent target. However, given the server reduction target of three percent, we can estimate potential energy usage reductions just for servers, using conservative figures below:

  Average continuous power usage per server, including Uninterrupted Power Supply (UPS) = 225 kW
  Average power usage per year, per server = 2000 kWh/year
  2000 kWh/year @ 2,860 servers = 5,720,000 kWh/year
  200 server reduction (FY 2012) = 2,660 servers
  2000 kWh/year @ 2,660 servers = 5,320,000 kWh/year___________
  = **400,000 kWh/year** reduction in aggregate data center energy usage – servers only

- Reduce aggregate data center energy costs by three percent. The DCCI program will establish baseline data center energy costs during FY 2011, at which time it can estimate actual reductions in energy costs/year based on the three-percent target. The conservative estimates below illustrate potential energy cost reductions:

  400,000 kWh/year reduction in aggregate data center energy usage
  Average cost per kWh = $0.10= **$40,000** per year reduction in aggregate data center energy costs – servers only

The energy usage formulas do not include other power loads that would be factored into total data center energy usage, such as :

- power distribution units (PDUs)
- computer room air conditioning units (CRACs)
- air handling units (AHUs)
- chillers
- environmental control equipment
- network equipment
- lighting
- physical security control equipment

2. What is the program?

The Data Center Consolidation Initiative (DCCI) program addresses FAA business needs to consolidate data center infrastructure and increase data center efficiency. The DCCI program will achieve these objectives:

- reduce the cost to FAA of maintaining data center infrastructure
- promote the use of Green IT
- shift IT investments to more efficient cloud computing platforms and technologies, and
- increase FAA's overall IT security posture

The DCCI program also ensures that FAA includes data center consolidation plans in fiscal year budget submissions to OMB and integrates them into agency capital plans.

DOT Strategic Goal – Organizational Excellence

- Enhance cyber security and privacy and improve governance of IT resources.

3. Why is this particular program necessary?

The Data Center Consolidation Initiative (DCCI) program addresses FAA business needs to consolidate and optimize data center efficiency. This will achieve these objectives:

- reduce the cost to FAA of maintaining data center infrastructure,
- promote the use of Green IT,
- shift IT investments to more efficient cloud computing platforms and technologies, and
- increase FAA's overall IT security posture.

The DCCI program also ensures that FAA includes data center consolidation plans in fiscal year budget submissions to OMB and integrates them into agency capital plans.

4. How Do You Know The Program Works?

The DCCI program will measure success against the performance targets cited above. The DCCI program will use engineering contract support to maintain the DCCI inventory of data center infrastructure and to perform measurements. The DCCI program will implement a standard model for measuring energy usage and total cost of ownership of data center infrastructure. This will ensure that FAA is obtaining accurate measurements for the performance targets, regardless of which LOB/SO actually manages the data center spaces.

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

We will need additional operational funding to implement consolidation plans, beginning in FY 2012. As these plans are implemented, FAA will begin to realize DCCI program goals described above. The implementation requires substantial contract support for engineering services and will require three to four years to complete. Engineering services will support server virtualization; decommissioning underutilized hardware and software assets; consolidating smaller data centers into Enterprise Data Centers (EDCs); and moving systems to cloud computing services.

Detailed Justification for - 3A10 Aerospace Medical Equipment Needs (AMEN)

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

FY 2012 – Aerospace Medical Equipment Needs (AMEN)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Aerospace Medical Equipment Needs (AMEN)	$0	$12,000	$0	$12,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aeromedical Laboratory Equipment	---	$12,000.0

For FY 2012 $12,000,000 is requested to begin a 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 121 equipment items, with Commercial-Of-The-Shelf (COTS) products over the FY 2012 – FY 2014 timeframe.

This equipment is 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, tonometer, 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.
- Evacuation and Impact Testing Systems – e.g., Horizontal Accelerator/Sled and Aircraft Cabin Environment Facility.

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 (FAA's) Office of Aviation Safety (AVS). The AMEN program supports the DOT's strategic goals of Safety, State of Good Repair, Organizational Excellence, Environmental Sustainability, and Economic Competitiveness. http://www.dot.gov/stratplan/dot_strategic_plan_10-15.pdf.

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. The key outcomes to be achieved with the use of this equipment address the FAA strategic goals described under question 1 of this document. 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 the aging and obsolete 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: Bioaeronautical Sciences and 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 is 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, conduct 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.

DOT Strategic Goal – Organizational Excellence

- Diverse and collaborative DOT workforce.

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 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.

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 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 assure 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 & 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. In terms of a particular study a piece of equipment provided by the AMEN effort may support, 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 prepared in accordance to 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 varies 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; and it does not allow the FAA to keep up with science and technology advances currently available in the market.

The AMEN investment will allow 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. $12,000,000 in FY 2012 is requested to address the most critical items to be replaced. 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 reduction in FY 2012 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 transferred to subsequent years (FY 2013 - FY 2014, the baseline period of the AMEN program) or future technology refresh efforts.

Detailed Justification for - 3B01 Aeronautical Center Infrastructure Modernization

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

FY 2012 – Aeronautical Center Infrastructure Modernization
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Aeronautical Center Infrastructure Modernization	$13,810	$18,000	$0	$18,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Thomas Stafford Building Exterior Panels Replace	---	$4,900.0
2. Systems Training Building (STB) Renovation – Phase 4	---	7,300.0
3. Heating, air, ventilation, electrical, seismic remediation plumbing, other system upgrades	---	2,800.0
4. Telecommunications upgrades to infrastructure	---	3,000.0
Total	1	$18,000.0

For FY 2012, $18,000,000 is requested for the following:

- $4,900,000 to replace exterior panels on the Thomas Stafford Building that are separating from the building and fail to provide a weather-tight seal. In high winds, the panels will most likely blow off the building.
- $7,300,000 for the Systems Training Building renovation. Funding will provide for relocating NAS systems, replacing interior building partition walls; replacing ceilings, lighting and electrical systems, boilers/chillers, electrical wiring, plumbing and insulation, installing fire systems and proper egress.
- $2,800,000 to improve heating, air conditioning, ventilation, electrical, plumbing, and other systems at the Aeronautical Center. A significant backlog of building system replacements was identified in FY 2009 that should be addressed to prevent further deterioration of FAA buildings. The backlog will be addressed to assure the aging infrastructure is viable for many additional years, but whose costs will increase if unaddressed.
- $3,000,000 to upgrade the telecommunications infrastructure. Funding will support implementation of the Cisco network for redundancy, reliability, security and availability. Router backplanes will be replaced to support increased bandwidth required by FAA data centers and personnel. Funding will provide for hardware/software upgrades to support newer model telephones and replace old hardware with current and single mode fiber for increased redundancy of core routers on the network.

2. What Is This Program?

The Mike Monroney Aeronautical Center in Oklahoma City serves as the FAA's centralized location for training, system testing, logistics, aeronautical information, flight checks, engineering support, and aeromedical and transportation safety research. The Aeronautical Center Infrastructure Modernization program funds renovation and replacement of major building systems at the Center that are not provided for by any other funding source or lease agreement. Funds will be used for renovations that will sustain and ensure facilities remain usable for over 7,100 FAA employees, students, and contractors.

Many of the facilities are 50 years old and in need of structural upgrade and/or renovation. The facilities support FAA National Airspace Systems (NAS) in the areas of Air Operations, Engineering, Training (Radar/Navaids), NAS Logistics, and business services. Many NAS support functions are conducted in outdated structures, and in some cases, in buildings that do not meet current building codes. Deferring renovation and modernization has serious and costly consequences that include leaking roofs, deteriorating plumbing, malfunctioning heating, ventilation, air conditioning systems and non-compliance with life safety codes that can disrupt work, cause NAS automation and technology failures, risk occupants' health and safety, require emergency repairs, and loss of productivity.

DOT Strategic Goal - Organization Excellence

- Diverse and collaborative DOT workforce.

Funding for this program will assure the facility infrastructure remains in good condition at the Aeronautical Center for current and future generations of FAA employees. Four real property performance metrics the Aeronautical Center reports to the FAA for OMB include facility utilization, facility condition index, mission criticality, and operating costs.

All Aeronautical Center real property assets are fully utilized. Facility condition indices and mission critical status have been established for the Aeronautical Center. Funding for this program provides for the replacement of obsolete building systems with modern, energy efficient systems to reduce operating costs.

3. Why Is This Particular Program Necessary?

The Aeronautical Center campus is comprised of approximately 1,100 acres of land, 3.3 million square feet of space under roof at the Aeronautical Center that supports 7,100 employees, contractors, and students and 50,000 visitors annually.

This program supports facilities that provide Navigation and Landing, Surveillance, Automation, Weather, Communications and Aeromedical Research functions to the operational NAS. The Aeronautical Center has at least one of every system in the NAS that are used for training, logistics, and engineering test beds and include User Request Evaluation Tool (URET), Traffic Management System (TMS), Surface Movement Advisor (SMA), Safety Management System (SMS), Area Navigation (RNAV), Wide Area Augmentation System (WAAS), Very High Omnidirectional Range collocated with Tactical Air Navigation (VORTAC), Instrument Landing System (ILS), Airport Surface Detection System (ASDE-X), Airport Surveillance Radar (ASR-11), Standard Terminal Automation Replacement System (STARS), En Route Automation Modernization (ERAM), Terminal Doppler Weather Radar (TDWR), and others. Constant growth and improvement to the NAS affects Aeronautical Center personnel and facility requirements in which they work.

4. How Do You Know The Program Works?

Renovation of 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.

Renovation of Center facilities extends the useful life of renovated buildings by 25 years, ensuring a viable future for FAA at these facilities. In FY 2012, renovation improves facility space and energy utilization, reduces maintenance costs of major systems within renovated buildings, provides for incremental upgrades of telecommunications infrastructure, and improves productivity of personnel using renovated facilities through space efficiencies and improved environmental controls.

This program benefits the FAA and avoids $66 million in costs from FY 2008-2010 through:

- Lower 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 requirements
- Supporting NAS operations/maintenance, current and future ATO initiatives
- Decreasing energy and repair operations costs

- Enables ATO initiatives by providing infrastructure that supports new NAS facilities funded from other sources that include 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 FAA buildings. The backlog can be addressed with incremental funding increases to improve facility conditions and assure the aging infrastructure is viable for many additional years. In FY 2012, an additional $3 million is requested to address deferred building system replacements whose costs will increase if unaddressed.

Detailed Justification for - 3B02 Distance Learning

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

FY 2012 – Distance Learning
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Distance Learning	$1,500	$1,500	$0	$1,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Computer Based Instruction (CBI) Hardware Replacement	---	$800.0
2. CBI Compatibility Testing and Design	---	180.0
3. Software Development/Network Upgrades	---	70.0
4. ATN Hardware Replacement	---	450.0
Total	Various	$1,500.0

For FY 2012, $1,500,000 is requested to replace approximately 330 CBI platforms and 130 Aviation Training Network (ATN) One Touch Viewer Response Systems (VRS) at downlink satellite sites that have become obsolete and/or unsupportable.

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.

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 CBI, 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 and ATN Viewer Response Systems equipment that have reached the end of its 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 requested 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 Viewer Response System and 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.

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 $254,500,000 for FY 2012, an increase of $22,200,000 (9 percent) above our FY 2010 budget request. Of this funding, $9,400,000 is requested for a new system 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; and
- 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, we revalidate 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 our 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 the 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 us to flexibly procure the additional resources needed to meet current demand while not substantially increasing our fixed operating costs. As in the case of Activity 3 funding, we 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 and Development Support

What Do I Need to Know Before Reading This Justification?

- System Engineering and Technical Assistance (SETA) -II 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 2012 – System Engineering and Development Support
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
System Engineering and Development Support	$31,700	$32,900	$0	$32,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. System Engineering (SE2020) Contract	---	$25,600.0
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	$32,900.0

For FY 2012, $32,900,000 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 our 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 the 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 excellent 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 2012 – Program Support Leases
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Program Support Leases	$37,500	$41,700	$0	$41,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Operational Leases	---	$41,700.0

For FY 2012, $41,700,000 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, and to combine or consolidate multiple offices when these actions are technically feasible and economically advantageous.
- Funds for developing 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.
- 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 - Organizational Excellence

- Diverse and collaborative DOT workforce.

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. Additionally, the total funding for the lease portfolio has been reduced from $45,000,000 in FY 2006 to $37,500,000 for FY 2010. This reduction has occurred despite the addition of leases for new facilities and the renegotiation of expired leases, nearly always at increased rental rates. 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?

$41,700,000 is requested 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 with high rents.

Detailed Justification for - 4A03 Logistics Support Services (LSS)

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

FY 2012 – Logistics Support Services (LSS)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Logistics Support Services (LSS)	$11,000	$11,700	$0	$11,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Real Estate Acquisition, Materiel Management, Contract	Various	$11,700.0

For FY 2012, $11,700,000 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 LSS program supports the Department's Organization Excellence objectives associated with improving the accuracy and integrity of agency financial statements and achieving a clean audit report in compliance with GAO standards. The performance goal of safety is addressed in FAA contracts in support of the FSRM program, which is designed to improve physical protection of employees and facilities in critical infrastructure as required by Presidential Decision Directive 63, "Protecting America's Critical Infrastructure."

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 2008 and 2009 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 would have most likely been unable to meet the specified processing metric of 80 percent of the assets within 65 days, which subsequently may have negatively impacted 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 2012 – Mike Monroney Aeronautical Center Leases
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Mike Monroney Aeronautical Center Leases	$16,200	$17,000	$0	$17,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aeronautical Center Lease Payments	1	$17,000.0

For FY 2012, $17,000,000 is requested for the continuation of Aeronautical Center Leases.

2. What Is This Program?

The Aeronautical Center lease provides critical facilities to support the missions of air traffic training, aviation research, engineering support of NAS equipment, NAS supply chain operations, aviation medical research, and other important aviation regulation, registration, certification, safety, and business services in Oklahoma City.

The lease provides all the land and 80 percent of the facility space comprising the Aeronautical Center, including maintenance of leased structures and building exteriors and replacement of major building systems within leased buildings: 1100 acres of land, 2.8 million square feet of facility space.

The lease is comprised of the following components:

- Master Lease Land, base rent, maintenance, and insurance
- Airmen and Aircraft Registry Lease Land, base rent, maintenance, and insurance
- Thomas Road warehouse lease
- Tower space for Terminal Doppler Weather Radar (TDWR) target generators
- Grounds Maintenance

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 that support the mission of 7,100 employees, contractors, and students; training of 90,000 students annually.

The Center supports air traffic training, aviation research, engineering support of NAS equipment, logistics supply and repair, aviation medical research, and other important aviation regulation, registration, certification, safety, and business functions. It contains invested security infrastructure and 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 - Organizational Excellence
- Diverse and collaborative DOT workforce.

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?

The Aeronautical Center serves as the FAAs centralized location for training, system testing, logistics, aeronautical information, flight checks, engineering support, aeromedical and transportation safety research. Leasing Aeronautical Center facilities provides for support of critical infrastructure that includes:

- Aviation training for over 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 including cost accounting and payroll for the FAA and other DOT organizations.

The Aeronautical Center lease allows the FAA to sustain critical and economical leased facilities to ensure they remain available for present and future FAA employees, students, and contractors.

4. How Do You Know The Program Works?

This program, combined with the Aeronautical Center Infrastructure Modernization, benefits the NAS and avoids $66 million in FAA costs during FY 2008-2010 through the following:

- Lower 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
- Enables ATO initiatives by providing infrastructure that supports new NAS facilities funded from other sources that include 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 45 years.

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

There is a significant backlog of building system replacements identified in FY 2009 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 2012 – Transition Engineering Support
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Transition Engineering Support	$14,300	$13,000	$0	$13,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Centrally Procured Services	---	$13,000.0

For FY 2012, $13,000,000 is requested for National Airspace System (NAS) Integration Support Contract (NISC) to support the modernization schedules for NAS programs. The break down of these costs follows:

Administrative Support Services	$ 1,000,000
Information Technology Support Services	$ 2,000,000
NISC Contract Management	$10,000,000

2. What Is This Program?

NAS Integration Support Contract (NISC) provides engineering and technical resources to Federal Aviation Administration (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 successive contracts, this program has supplied from 500 to the current level of 1200 technical FTEs to various programs throughout the FAA in support of NAS modernization, transition planning, implementation, and integration. Additionally, the contractors supplying these services consistently received award fees in the 90 percent and above range. This support integrated 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?

$13,000,000 is requested 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 Transition Engineering Services (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.

Until the contract for NISC III is awarded (fourth quarter 2010) it is difficult to fully gage the significance of any reduction. For out years, however, if the NISC contract continues to grow at the past/current growth rates, the Program Office will need to procure additional oversight support.

Detailed Justification for - 4A06 Technical Support Services Contract (TSSC)

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

FY 2012 – Technical Support Services Contract (TSSC)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Technical Support Services Contract (TSSC)	$22,000	$22,000	$0	$22,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Contractor Program Management	---	$10,200.0
2. Planning, Quality Control, Security, Safety	---	4,900.0
3. Award Fee	---	4,000.0
4. Program Management Support Contracts	---	2,900.0
Total	Various	$22,000.0

For FY 2012, $22,000,000 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 supplemental work force to install equipment and to support the myriad of Capital Budget improvements to the National Airspace System (NAS) in a timely, cost-effective manner. This is accomplished utilizing Facilities and Equipment (F&E) funding from this BLI to fund the cost of TSSC contractor infrastructure. 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 BLI is also used to fund for 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?

- The amount of skilled work necessary to modernize the National Airspace System (NAS) far exceeds available in-house resources of the FAA.
- The TSSC Program provides national contract vehicles that enable the FAA to augment its engineering and technical workforce for skills it does not posses and for surge requirements to achieve project implementation schedule demands.

- The TSSC program maps to Organizational Excellence by providing a highly skilled and experienced workforce at cost effective rates.
- 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 issued 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 90 percent. Direct FAA customer award fee feedback rated contractor performance 93.2 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 July 2010.
- 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 BLI of $22 million and $100 million invoiced for work performed, the TSSC Program provides a leveraging multiplier of 4.5. In other words, the funding provided for TSSC infrastructure enables FAA to accomplish more than $95 million in NAS project efforts.

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

$22,000,000 is requested to continue and transition the TSSC Program vehicle infrastructure costs.

- Many of the workers performing infrastructure support are subject to the Service Contract Act. Subcontract work for public works is subject to DOL Davis Bacon Act wage rate determinations. When DOL issues a wage rate determination FAA is legally required to change the contract, and increase the price or cost to cover that wage determination.
- FY 2012 is a transition year for TSSC vehicles. The prior contract will end and work will be transitioned to a new competitively awarded contract vehicle. The TSSC Program requires funds to support contract start up activities on the new contract award while sustaining performance and delivery of work on the existing contract vehicle.
- 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.
- The FAA must conduct a full and open competition for the new follow on contract to be awarded. The present contract ends in December, 2011 and the next contract must be in place to accept the transition of project support from the prior contract. The new contract is scheduled to start in the first quarter 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 first quarter of FY 2012.

A funds reduction would

- Significantly impact the ability of the contractor to implement its employee safety program as well as impeding its security, quality control, and its subcontract administration activities for work performed at FAA NAS facilities.
- Safety, security and quality control reductions will lead to worker's compensation claims and increased insurance costs passed on to the FAA, and increased costs to the FAA for rework that will be required to correct defects that occur when quality control efforts fail due to a lack of adequate funding.
- Elimination of the contractor's subcontractor administration capability will cause unacceptable delays in award of construction subcontracts for public works projects issued under the contract.
- Delaying subcontracts will cause schedule delays for NAS project implementation which will adversely impact approximately $30 million of effort that is accomplished through TSSC subcontracts.

- Every delayed project equates to delays in its capacity or safety enhancements and cost benefits.
- Delay in the completion of approved NAS Capital Project results in delays in the implementation of capacity and safety in enhancements and has negative cost benefits.

Detailed Justification for - 4A07 Resource Tracking Program (RTP)

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

FY 2012 – Resource Tracking Program (RTP)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Resource Tracking Program (RTP)	$4,000	$4,000	$0	$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Programming Planning/Management	---	$2,200.0
2. System Security	---	200.0
3. Hardware/Software Design and Development	---	1,500.0
4. Training	---	100.0
Total	Various	$4,000.0

For FY 2012, $4,000,000 is requested to continue keeping hardware and software licenses current, program/project management support in the National Airspace System (NAS), maintain TSSC contract and NISC support, 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 Technical Center, and the Aeronautical Center for identifying requirements, internal budget preparation, implementation planning, resource estimating, project tracking, and measuring performance of projects. The Corporate Work Plan (CWP), which is part of the RTP, enables users to share FAA's project data during the various stages of implementation (i.e., planning, scheduling, budgeting, execution, and closeout). The CWP system 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 currently operate in a distributed environment. The final steps in centralizing the system are underway. The centralized system will 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 Resource Tracking Program (RTP), which is the key tool that makes up the Corporate Work Plan (CWP) Toolset, 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 RTP 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. RTP 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 Technical Support Services Contract (TSSC). It interfaces with DELPHI and the Budget Execution Module (BXM). RTP is a centralized system with load-balanced servers residing in Headquarters.

4. How Do You Know The Program Works?

The RTP 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 RTP.
- 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 requested to keep current the RTP software and hardware. This will continue to be modified to support the changing processes and the other systems such as the CWP Toolset with which RTP interfaces. 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 both the Headquarters and Boston 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.

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 2012 – Center for Advanced Aviation System Development (CAASD)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Center for Advanced Aviation System Development (CAASD)	$82,000	$80,800	$0	$80,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. CAASD (Air Traffic Organization)	---	$65,950.0
2. CAASD (Non-Air Traffic Organization)	---	14,850.0
Total	Various	$80,800.0.

For FY 2012, $80,800,000 is requested to fund technical, engineering, as well as research and development support for the CAASD program. The FY 2012 funding will support approximately 263 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 fifth edition of the FAA CAASD Long Range Plan (FYs 2010 – 2014).

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 2010 – 2014), 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:

<u>NAS and NextGen System Integration and Evolution</u>. 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 support over the past decade has proven to be an invaluable strategic asset to the Department of Transportation, Federal Aviation Administration, and the U.S. Government as a whole. The establishment of a stable source of funding, along with a long-term contractual relationship, is in the best interest of the public and the FAA because it permits economies that can only be supported with an established work force and provides continuity of services for an efficient and effective use of an experienced professional staff. 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 2012 – Aeronautical Information Management Program
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Aeronautical Information Management Program	$10,000	$26,300	$2,600	$28,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$3,100.0
2. System Engineering	---	6,900.0
3. Software Design and Development	---	11,000.0
4. Telecommunications	---	500.0
5. System Development and Analysis	---	6,200.0
6. Investment Analysis	---	1,500.0
Total	Various	$26,300.0

Activity Tasks – Mandatory		
1. Modernization/NextGen CSSD, Segment 2	---	$ 1,400.0
2. Management/Integration, Segment 3	---	_1,200.0
Total	Various	$2,600.0

For FY 2012, $26,300,000 of discretionary funding is requested for the following:

- Segment 1, $18,300,000 is requested to improve the delivery of National Airspace System (NAS) status information including Notices to Airmen (NOTAMs), Special Use Airspace (SUA) status, weather information and flight planning services.
- Segment 2, $8,000,000 is requested is requested to build on AIM Modernization Segment 1 and 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.

For FY 2012, $2,600,000 of mandatory funding is requested for:

- Segment 2, $1,400,000 is requested to continue 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.
- Segment 3, $1,200,000 is requested to modernize management and full integration of static aeronautical information within the Air Traffic Organization (ATO). This work will build on AIM Modernization Segment 1 and 2.

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. Digital aeronautical data enables the real-time, or near real-time, processing of data to improve mapping, flight planning, and the timeliness and accuracy of air traffic control instructions. The program will replace the existing Notice to Airmen (NOTAM) and Central Altitude Reservation Function (CARF) systems 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.

The AIM Modernization Segment 1 will:

- Provide a modern information management system for NAS status information including NOTAM, SUA status, weather products and flight planning.
- Provide mission essential, secure support to the NAS operational environment.
- Improve the quality and consistency of aeronautical information by improving information integrity.
- Support current and future customer needs by providing information in computer readable formats.
- Ensure FAA aeronautical information systems are consistent with International Civil Aviation Organization (ICAO) standards and recommended practices.

To accomplish this mission, AIM Modernization 1 has formulated a two segment solution development strategy:

- Segment 1a - NOTAM Modernization: Provides the foundation for a modern AIM information management infrastructure, provide enhanced Notices to Airmen (NOTAM) services and make critical improvements to the FAA's Central Altitude Reservation Facility (CARF).
- Segment 1b - Digital Integrated Briefing: Incrementally adds aeronautical status information capability in the areas of special use airspace management, performance metrics, flight planning support and weather product support.

AIM Modernization Segment 2 will:

- Provide services and systems for pilot briefing using digital technologies
- Provide services and systems for reporting equipment status, and
- Provide airport mapping and status

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.

- Aeronautical Common Services (ACS) will improve capturing, maintaining, and sharing operational information and constraint data from Air Traffic Control Standard Operating Procedures and Letters of Agreement through web services
- 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 support increased shared tactical and strategic awareness of the status of the National Airspace System (NAS) by providing information on actual and predictive facility equipment status and its impact on air traffic.
- ACS will provide a central resource called Airports Geographic Information System (GIS) for critical information about airports including airport mapping and status and a variety of applications for using this data.

Segment 3 will develop and implement the management and full integration of static aeronautical information within the Air Traffic Organization (ATO). Because aeronautical information is created, managed, distributed and used by multiple administrative and operational organizations, careful data management is needed. This segment will provide a centralized, consistent approach to managing aeronautical information by designing NAS Resource (NASR) to be compliant with the Next Generation Air Transportation System (NextGen) data model (AIXM) and System Wide Information Management (SWIM) standards (Web Services) and employing common adaptation and SWIM standards for the National Airspace System (NAS) Adaptation Services Environment (NASE). Segment 3 program planning through solution implementation will take place from FY 2012 – 2017 and relies on the work accomplished under the Aeronautical Information Process Improvement (AIPI), which takes place in FY 2010 and FY 2011.

Results obtained in FY 2009 include:

- Initiate development of NOTAM policy and systems to support International Civil Aeronautical Organization (ICAO) standards. Provide initial digital NOTAM capability to 5 airports
- Incorporate 100 percent of new NOTAM policy guidelines into NOTAM Entry Systems
- Accomplish Initial Investment Decision and commence Final Investment Decision for AIM Modernization - Segment 1a
- Integrate "AS IS" AIM enterprise architecture into the NAS enterprise architecture
- Improve FAA / DOD compliance with Military Operations (MILOPS) systems
- Ensure compliance of Special Use Airspace (SUA) notifications with NOTAM and Airspace policy
- Continue to promote use of AIM data standards by development and delivery Aeronautical Information Exchange Model (AIXM) Release 5.1
- Begin development of an automated Altitude Reservation (ALTRV) system to address critical system failures of the legacy CARF system
- Complete results of Airport field user benefits study

Based on the projected work plan, products that will be developed in FY 2010 include:
- Deploy new operational sites and deliver NOTAM system disaster recovery site
- Provide NOTAM origination access to all US airports
- Identify transition plans from legacy AIM systems to AIM Modernization – Segment 1a
- Continue Solution Development for AIM Modernization – Segment 1a
- Complete Final Investment Decision (FID) for AIM Modernization – Segment 1a
- Integrate "TO BE" AIM enterprise architecture into NAS Enterprise Architecture
- Ensure 100 percent of new AIM projects are captured by Enterprise Architecture
- Deliver initial Altitude Reservation (ALTRV) automation capability

Based on the projected work plan, products that will be developed in FY 2011 include:

- Continue implementing AIM Modernization - Segment 1a
- Continue transitioning from legacy AIM systems to AIM Modernization - Segment 1a
- Begin phased AIM Modernization Segment 1a deployment
- Achieve final AMS decisions supporting AIM Modernization - Segment 1b

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

3. Why Is This Particular Program Necessary?

Segment 1

- Legacy operations and maintenance cost savings. The existing systems are at end of service life and using an out-modeled architecture. Obsolete or legacy interfaces will be replace with current technology providing improved performance, availability, and better operations. New architecture approaches using virtualization and consolidated servers will result in lower operation, maintenance and recovery costs.

- Airline labor cost savings. Airlines have dedicated personal to process, interpret and investigate legacy text NOTAMS. Digital NOTAM will reduce confusion and increase the ability to directly integrate NOTAM information into pilot briefings. A survey of major airlines indicates an average savings of 7 hours daily.

- General Aviation and Air Taxi labor cost savings. Pilots who request NOTAMs spend considerable time obtaining, reviewing, and interpreting the data. Digital NOTAMs will allow pilots to obtain relevant NOTAMs that are relevant to them and will provide information that is easier to understand. A survey of pilots as well as discussions with FSS personnel indicates an average of 1 to 3 minutes saved per departure depending on the pilot's current method of obtaining the data. This estimate is applicable to the subset of flights where NOTAMs are obtained by the pilot.

- Airport Authority labor cost savings. Airport authorities manually prepare and transmit NOTAMs for entry. These communications are by phone or some other manual method. A survey of airport authorities indicate that up to three minutes could be saved per NOTAM entry. This estimate is applied to a little over half the NOTAMs initiated by airport authorities as not all survey respondents believed they would achieve the savings.

- FS21 labor cost savings. The FAA currently contracts with Lockheed Martin to provide flight service station functions across the CONUS. One function of FS21 personnel is to receive NOTAM information and to enter into the system. With the Digital NOTAM system, the NOTAM originator will enter the data directly into the system rather than first manually communicating to FS21. As a result, it was estimated that FS21 can save 3 minutes for each new NOTAM that is created.

- NOTAM related safety benefits. An investigation of the National Transportation Safety Board (NTSB) database found 38 accidents between 1990 and 2005 where improving the NOTAM system could potentially have avoided the event. A review of these events by subject matter experts concluded that a 40 percent reduction in relevant events could occur as a result of this investment.

4. How Do You Know The Program Works?

On April 20, 2010, at 11:14 AM the first digital NOTAM was issued in Atlantic City at ACY. This milestone demonstrates the AIM Modernization program has momentum to develop and deploy the aeronautical common service. In addition to ACY, 11 additional airports with 24 hour operations will deploy this technology during FY 2010 for field testing.

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

$29,200,000 is requested for AIM Modernization to improve the delivery of NAS status information including Notices to Airmen, Special Use Airspace status, weather information and flight planning services. This includes Continuation of Segment 1 solution development, implementation and deployment of completed, tested and operational system modules and subsystems, Segment 2 to build on AIM Modernization Segment 1 and 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 and Segment 3 to modernize management and full integration of static aeronautical information within the ATO. This work will build on AIM Modernization Segment 1 and 2.

A reduction will delay provision of the system described as AIM Modernization Segment 1 and impact the interdependencies and timing of Segments 2 and 3 functionality.

Detailed Justification for - 4A10 Permanent Change of Station (PCS) Moves

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

FY 2012 – Permanent Change of Station (PCS) Moves
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Permanent Change of Station (PCS) Moves	$0	$2,500	$0	$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
PCS Moves	---	$2,500.0

For FY 2012, $2,500,000 is requested for one-time, terminal PCS moves to support consolidation, collocation, and/or transfer of air traffic control (ATC) function from existing Terminal Radar Approach Control's (TRACONs) to others ranging from 75 miles to almost 200 miles. Moving these employees to the new facilities along with the closure of original facilities will result in a long-term operational cost savings for the FAA.

2. What Is This Program?

The Terminal PCS Moves program contributes to the FAA goal of improving financial performance through the realignments of facilities and services whenever cost effective and beneficial.

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

TRACONs must be properly staffed to ensure the efficient and timely provision of air traffic control (ATC) services, and sometimes require permanent change of station (PCS) moves for air traffic controllers. FAA business strategy is to consider a TRACON relocation when construction of a new airport traffic control tower (ATCT) is being planned. FAA faces a significant backlog of ATCT replacement projects, and realigning or transferring the ATC functions to other TRACONs where it makes sense may serve to accelerate the process, and reduce the need for additional construction or other related funding. For example, instead of installing a new terminal automation system in two different locations, two or more facilities can be consolidated, collocated and/or ATC functions transferred from one facility to another to optimize the investment at one location. In order to achieve such investments and reduce the number of aging infrastructures, the PCS funding will be used to relocate air traffic controllers and maintenance technicians consistent with demand as appropriate.

4. How Do You Know The Program Works?

Terminal PCS Moves are a necessary component of Tower/TRACON realignments. Providing TRACON services from remote locations is a common and proven concept. For instance, all aircraft flying in the New York City metropolitan area receive TRACON services from one facility, which is located on Long Island. The Potomac TRACON handles traffic flying in the Baltimore/Washington metropolitan area and Richmond. We operate TRACONs in both Northern and Southern California that serve several airports.

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

$2,500,000 is requested for a one-time, Terminal PCS Moves to support realignments and/or transfer of air traffic control (ATC) function from existing TRACONs to others ranging from 75 miles to almost 200 miles. Moving these employees to the new facilities along with the closure of original facilities will result in a long-term operational cost savings for the FAA.

A reduction from the FY 2012 Baseline Funding will impact the planned Terminal PCS Moves which support the realignment initiative scheduled to occur in FY 2012.

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 2012 – Personnel and Related Expenses
($000)

Activity/Component	FY 2010 Enacted	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 President's Budget Total
Personnel and Related Expenses	$470,000	$480,000	$0	$480,000

$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).

2. What Is This Program?

This program sustains the current Facilities and Equipment (F&E) workforce.

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 2012, the agency is requesting an increase of $10,000,000 to sustain the current workforce. The increase includes no pay raise. The requested increase covers inflation in travel of $352,000, and an increase of $4,550,000 to cover increased travel requirements driven by NextGen. This increase will fund needed site visits, simulations (human-in-the-loop modeling, etc.), and essential on-site supervision of F&E construction work. The agency also is requesting an additional $98,000 for inflation in other objects, which covers contractual services, supplies, and common use equipment.

RESEARCH, ENGINEERING, AND DEVELOPMENT APPROPRIATION

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, $190,000,000, to be derived from the Airport and Airway Trust Fund and to remain available until September 30, 2014: *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.

Note.--A full-year 2011 appropriation for this account was not enacted at the time the budget was prepared; therefore, this account is operating under a continuing resolution (P.L. 111-242, as amended). The amounts included for 2011 reflect the annualized level provided by the continuing resolution.

PROGRAM AND FINANCING
($ in Millions)

Identification code: 69-1334-0-7-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by pro gram activity			
	Direct program			
0011	Improve aviation safety	93	96	102
0012	Improve efficiency of the air traffic control system	47	67	56
0013	Reduce environmental impact of aviation	53	34	40
0014	Improve the efficiency of mission support	8	8	6
0801	Reimbursable program	8	16	16
0900	Total new obligations	209	221	220
	Budgetary resources available for obligation			
1000	Unobligated balance carried forward, end of year	61	50	37
1021	Recoveries of prior year unpaid obligations	1	1	1
1050	Unobligated balance (total)	62	51	38
	New budget authority (gross), detail			
	Discretionary:			
1102	Appropriation	191	191	190
	Spending authority from offsetting collections			
1750	Offsetting collections (cash)	7	16	16
1900	Total new budget authority (gross)	198	207	206
	Change in unobligated balances			
3000	Total new obligations	147	197	190
3040	Total outlays (gross)	-156	-225	-235
3100	Obligated balance, end of year	187	180	164
	Outlays (gross), detail			
4010	Outlays from new discretionary authority	68	100	100
	Offsets			
	Against gross budget authority and outlays			
4030	Offsetting collections (cash) from: Federal sources	-9	-16	-16
	Net budget authority and outlays			
4180	Budget authority	191	191	190
4190	Outlays	147	209	219

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 2012, the proposed funding is allocated to the following performance goal areas of the FAA: improve safety, capacity, 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 effort to develop NextGen.

OBJECT CLASSIFICATION
($ in Millions)

Identification code: 69-1334-0-7-402		FY 2010 Actual	FY 2011 CR	FY 2012 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	7	7	8
1210	Travel and transportation of persons	2	2	2
1255	Research and development contracts	135	137	137
1260	Supplies and materials	2	2	2
1310	Equipment	2	2	1
1410	Grants, subsidies, and contributions	24	24	23
1990	Subtotal, obligations, Direct obligations	201	205	204
	Reimbursable obligations:			
2255	Research and development contracts	8	16	16
2990	Subtotal, obligations, Reimbursable obligations	8	16	16
9999	Total obligations	209	221	220

Employment Summary

Identification code: 69-8108-0-7-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Direct:			
1001	Civilian full-time equivalent employment	268	276	279

EXHIBIT III-1

RESEARCH, ENGINEERING & DEVELOPMENT
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	FY 2010 ACTUAL	FY 2011 CR (ANNUALIZED)	FY 2012 REQUEST	CHANGE FY 2010-2012
Safety	93,572	93,572	94,249	677
Economic Competitiveness	48,543	48,543	54,406	5,863
Environmental Sustainability	42,031	42,031	35,850	-6181
Mission Support	6,354	6,354	5,495	-859
TOTAL	**190,500**	**190,500**	**190,000**	**-500**
FTEs				
Direct Funded	268	276	279	3
Reimbursable, allocated, other	0	0	0	0

EXHIBIT III-1a

RESEARCH, ENGINEERING & DEVELOPMENT
SUMMARY ANALYSIS OF CHANGE FROM FY 2010 TO FY 2012
Appropriations, Obligations, Limitations, and Exempt Obligations
($000)

Item	Change from FY 2010 to FY 2012	FY 2012 PC&B by Program	FY 2012 FTEs by Program	FY 2012 Contract Expenses	Total
FY 2010 Base		Note Columns are Non-Add			
Research, Engineering and Development Appropriations, Obligations, Limitations, and Exempt Obligations		**$38,236**	**276**	**$121,365**	**$ 190,500**
Adjustments to Base					
Annualization of FY 2010 Pay Raise	260	260			
FY 2011 Pay Raise - OSI					
FY 2011 Pay Raise - SCI					
Less One Compensable Day	-142	-142			
Non-pay Inflation	734			424	
Subtotal, Adjustments to Base	**852**	**118**		**424**	**852**
New or Expanded Programs					
Safety	200				
Economic Competitiveness	5,708	69	1		
Environmental Sustainability	-6,351	139	2	-253	
Mission Support	-909				
Subtotal, New or Expanded Programs	**-1,352**	**208**	**3**	**-253**	**-1,352**
Total FY 2012 Request	**-500**	**38,562**	**279**	**121,536**	**190,000**

Detailed Justification for – A11.a Fire Research and Safety

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

FY 2012 – Fire Research and Safety

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.a Fire Research and Safety	$7,799,000	$8,157,000	+$358,000

For FY 2012, $8,157,000 is requested for Fire Research and Safety. Major activities and accomplishments planned with the requested funding include:

Fire Safety Improvements:

- Complete tests in engine fire simulator to determine the fire extinguishing effectiveness and performance criteria for novel, environmentally friendly dry powder agent.
- Develop a cost-effective halon (an ozone depleting and global warming chemical) replacement system for hand-held extinguishers.
- Evaluate the effectiveness and safety (toxicity) of hand-held extinguishers discharging contaminated halon.
- Determine the capability of existing airline hazardous materials (HazMat) containers for preventing the hazards of a lithium battery fire from spreading outside of the containers.
- Study novel agents and systems for the suppression of cargo fires in freighter aircraft.
- Develop improved next generation burner test method for the fire worthiness of power plant components.

Fire Safety Research:

- Extend the FAA ThermaKin burning model to two-dimensions to predict flame spread on cabin materials and composite fuselage structure.
- Conduct reduced-scale fire tests to calibrate cabin fire model.
- Test and evaluate developmental environmentally-friendly, ultra-fire resistant materials.

For FY 2012, 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 transport of lithium batteries will be emphasized by the evaluation of available agents/systems to extinguish lithium battery fires and the development of a fire-hardened container to ship lithium batteries. This work supports 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 passenger carrying aircraft, FAA will continue work on extinguishment or suppression of in-flight fires in fire-prone areas. Because of deadlines proposed by the International Civil Aviation Organization (ICAO), more full and large-scale tests will be 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, recent discovery of contamination in recycled halon will require testing to determine the effect on extinguishment effectiveness and safety (toxicity).

The FAA will also continue 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 will be adapted for power plant component fire tests because the existing antiquated burner produces variable results, and a replacement propane burner has been shown to produce conditions that are less severe than required. Proper fire tests and performance criteria are needed for structural composite fuselages, such as the new Boeing 787, and for the novel application of fire resistant magnesium alloys in seat structure and possibly other cabin applications.

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 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. Fire safety focuses on near-term improvements in fire test methods and materials performance criteria, fire detection and suppression systems, and aircraft fuel tank explosion protection. 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.

Fire Research and Safety Program R&D partners include:

- FAA-sponsored International Systems Fire Protection Working Group – R&D involves fuel tank protection, hidden fire safety, fire/smoke detectors, halon replacement, and lithium battery fire hazards.
- FAA-sponsored International Aircraft Materials Fire Test Working Group – R&D involves development and standardization of improved material fire tests.
- Interagency working group on fire and materials – promotes technology exchange among U.S. Government agencies and prevents unwarranted duplication of work.
- Interagency agreement with the National Institute of Standards and Technology – develops fire-retardant mechanisms and rapid screening tools for flammability.
- 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.
- Consortia with Fortune 100 companies to share research and development costs for new fire-resistant materials.

Major activities and accomplishment planned include:

Fire Safety Improvements:

- Determined the effectiveness of cost-effective available fire suppression agents/systems against cargo container fires in freighter aircraft.
- Evaluated the effectiveness of current fire extinguishing agents against lithium battery fires.
- Provided comprehensive guidance on lithium battery fire safety in passenger items and aircraft systems.
- Determined the effectiveness and safety of approved and developmental halon replacement agents for the extinguishment of cabin fires with hand-held extinguishers.
- Standardized the new composite flammability test method for in-flight fire resistance.
- Developed a flammability test method for seat structure (e.g., magnesium alloy), if warranted.
- Determined and compared the fuel tank flammability envelope for candidate alternative fuels and Jet A fuel.

Fire Safety Research:

- Evaluated the combustion characteristics of adhesives used in the construction of aircraft cabins in support of FAA/industry effort to obtain regulatory relief by demonstrating similarity of fire performance.
- Extended the FAA thermal-kinetic burning model (ThermaKin) to one-dimensional burning of layered and structural composite materials.

<u>Performance Linkages</u>

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 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 2012, define composite fuselage fire safety design criteria.
- 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.

FAA fire safety research 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 800 incidents of odor and smoke in 2006); 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.

4. How Do You Know The Program Works?

Over the past 25 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. Over that time period 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. The most 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) burnthrough 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.

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.

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 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 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?

Modest reductions would delay plans to build burners for six laboratories and conduct round robin tests to establish the reproducibility of the burners

Detailed Justification for – A11.b Propulsion and Fuel Systems

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

FY 2012 – A11.b Propulsion and Fuel Systems

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.b Propulsion and Fuel Systems	$3,105,000	$3,611,000	+$506,000

For FY 2012, $3,611,000 is requested for Propulsion and Fuel Systems. Major activities and accomplishments planned with the requested funding include:

- The probabilistic design for rotor integrity (PDRI) program will continue to address material and manufacturing anomalies that can increase the risk of failure of critical rotating turbine engine parts by advancing the probabilistically-based turbine engine rotor design and life management code found in the Design Assessment of reliability with Inspection (DARWIN™) 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 will also continue 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 cold dwell fatigue program will continue to develop a design methodology for use by industry to prevent cold dwell fatigue in turbine rotor disks and will continue to develop a technique to assess the risk of cold dwell fatigue in the current aircraft fleet.
- Continue the enhancement of the DARWIN™ probabilistic rotor design code.
- Develop a plan with stakeholders for propulsion malfunction detection and reporting requirements in NextGen and also propulsion malfunctions on unmanned aircraft systems (UAS) to assess safety risks.

2. What Is This Program?

FAA issues certification standards and ACs and reviews the specifications and practices recommended by recognized technical societies (American Society for Testing and Materials (ASTM) International, Society of Automotive Engineers (SAE) International) to maintain the 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. 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 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.

Propulsion malfunction events in the NextGen environment with decreased aircraft separation may result in aircraft trajectory deviations. Propulsion system monitoring and possibly adaptive controls will be investigated to mitigate potential incursions. Also, unmanned aircraft systems (UAS) will be assessed for safety risks associated with engine malfunctions.

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 – 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:

- Turbine Rotor Material Design Program – Southwest Research Institute (SwRI) has teamed with Pratt and Whitney, General Electric, Honeywell, and Rolls Royce to provide DARWIN™, a probabilistic-based rotor life and risk management certification tool.
- The AIA working subcommittees on rotor integrity and rotor manufacturing.

Major activities and accomplishments planning include:

Turbine Engine Research

- Release an enhanced version of the DARWIN™ probabilistic rotor design code with capabilities for high temperature crack growth and the ability to introduce anomalies that occur at shop visits and during service.

<u>Performance Linkages</u>

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. Research is also being conducted to establish an improved understanding of other material factors and manufacturing anomalies that can shorten the fatigue life of rotor disks. The goals of the focused research endeavors are:

- By FY 2013, develop a design methodology for use by industry to prevent cold dwell fatigue in turbine engine rotor disks and define a technique to assess the risk of the current aircraft fleet for cold dwell fatigue.
- By FY 2014, develop a certification tool that will predict the risk of failure of rotor disks containing material and manufacturing anomalies.
- By FY 2014, perform analysis of propulsion malfunctions in the NextGen environment and on UAS to assess safety risks.

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 the Delta Airlines 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 lifting standards. The research has yielded a probabilistically-based damage tolerance design code (DARWIN™) to determine the risk of fracture of turbine engine rotor disks containing undetected material anomalies which is used by all 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 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?

A reduction would result in a delay of several months in the start of development of a new fleet risk assessment module for the DARWIN™ code.

A further reduction would delay development of a new fleet risk assessment module for the DARWIN™ code until FY 2013.

Detailed Justification for – A11.c Advanced Materials/Structural Safety

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

FY 2012 – Advanced Materials/Structural Safety

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.c Advanced Materials/Structural Safety	$4,935,000	$2,605,000	-$2,330,000

For FY 2012, $2,605,000 is requested for Advanced Materials/Structural Safety. Major activities and accomplishments planned with the requested funding include:

Advanced Materials

- Continue work to expand developments in composite training with the initial emphasis on levels of safety awareness for structural engineering and manufacturing.
- Study for the types of threats to composite aircraft structures while at the service gate and on the flight line.
- Documenting of accepted certification methodology for damage tolerance and fatigue, including full-scale test and analysis protocols for repeated loads and damage threats.
- Development of training and conduct workshops to review progress in damage tolerance, adhesive joints, and maintenance.
- Evaluation of safety of new material forms (e.g., discontinuous fiber composites) that have found application in primary aircraft structures.

Structural Safety

- Continue development of analytical modeling protocols and methodologies of aircraft structures crash conditions for certification use.
- Continue development of standards and methods to characterize dynamic properties of composite material systems.
- Continue support of new rulemaking and guidance development for Part 25 composite and metallic aircraft crashworthiness for structural substantiation certification.

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 training in structural engineering for advanced composite materials has been developed and provided to related workforce. Work will continue supporting the composite safety awareness training development for a manufacturing course.

Structural Safety

Research will continue to develop analytical models of aircraft crash events. This will focus on the development of criteria and methodologies to validate analysis techniques and assess the effectiveness of the analysis to properly describe the crash event.

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.

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 published, advances in technologies and materials require periodic updates and expansion of the AC. 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. The goal of this data exchange is to allow regulatory processes to keep pace with industry advances and benefit from state-of-the-art technology and design. This provides the most efficient safety and certification information to the FAA certification service and industry.

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 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. The program also develops advanced methodologies for assessing aircraft crashworthiness. 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:

- Public Law 100-591, the Aviation Safety Research Act of 1988, and House of Representatives Report 100-894 – set priorities to: develop technologies, conduct data analysis for current aircraft, and anticipate problems related to future aircraft.
- 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 – 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 Advanced Materials/Structural Safety Program benefits from a close working relationship with the Joint Center of Excellence for Advanced Materials and Structures led by Wichita State University and the University of Washington. The research performed under this program is leveraged by the monetary and intellectual contributions of its partners including many major commercial aviation companies.

Advanced Materials

- 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 and the Commercial Aircraft Composite Repair Committee (CACRC), ASTM, and Society for the Advancement of Material & Process Engineering (SAMPE).)
- Interagency Advanced Structures Working Group (IAASWG), which consists of FAA, NASA and the DoD agency, 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.

Structural Safety

The program maintains cooperative interagency agreements in the structural safety area with the U.S. Army and Navy in the analytical modeling area.

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.

Major activities and accomplishments planning include:

Advanced Materials

- Generate composite material dynamic properties important to crashworthiness.
- Provide next level of support data and guidelines to the FAA Office of Aviation Safety for AC 20-107B.
- Work with industry to develop consensus for a damage tolerance and fatigue certification protocol.
- Continue work to expand developments in composite training with the initial emphasis on levels of safety awareness for structural engineering and manufacturing.
- Continue studies for the types of 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.
- Develop training and conducted workshop to review progress in damage tolerance, adhesive joints, and maintenance.
- Continue to evaluate safety of new material forms (e.g., discontinuous fiber composites) that have found application in primary aircraft structures.

Structural Safety

- Develop analytical modeling techniques of aircraft crash conditions.
- Reviewthe need for off-axis analysis capabilities to assist in certification of structures for crashworthiness.
- Continue developing analytical modeling protocols and methodologies of aircraft structures crash conditions for certification use.
- Develope standards and methods to characterize dynamic properties of composite material systems.

- Initiate benchmarking industry analysis and test practices to support new rulemaking and guidance development activity for Part 25 composite and metallic aircraft crashworthiness structural substantiation certification.

<u>Performance Linkages</u>

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 2012, assess the risks and technical issues associated with severe blunt impact (e.g., ground service vehicle collisions).
- By FY 2012, establish design criteria for restraint systems that protect occupants at the highest impact levels that the aircraft structure can sustain.
- By FY 2012, quantify critical sandwich panel degradation mechanisms (e.g., disbonding, fluid ingression, freeze/thaw).
- 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 2014, evaluate the ability of models to predict off-axis and multiple terrain impacts.
- By FY 2015, evaluate existing and emerging bonded airframe technology to update guidelines and standards.
- By FY 2016, develop standards and methods to characterize dynamic properties of composite material systems.
- By FY 2016, generate background documentation on acceptable industry practices in structural analysis and testing to substantiate aircraft crashworthiness of primary composite structures supporting new rules and guidance.

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 and provides safe aircraft for civilian applications. This has been accelerated in the last decade due to the rapid expansion of the use of them 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 and 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 (ACOs) 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; aging and environmental effects; dynamic component damage tolerance and fatigue of composite structures; and the structural response in dynamic crash conditions.

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?

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 result in an extension of the schedule of approximately four months.

Detailed Justification for – A11.d Aircraft Icing - Atmospheric Hazards/Digital System Safety

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

FY 2012 – Aircraft Icing - Atmospheric Hazards/Digital System Safety

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.d Aircraft Icing - Atmospheric Hazards/Digital System Safety	$4,482,000	$5,404,000	+$922,000

For FY 2012, $5,404,000 is requested for Aircraft Icing - Atmospheric Hazards/Digital System Safety. Major activities and accomplishments planned with the requested funding include:

Aircraft Icing – Atmospheric Hazards

- Reduce Accidents During Flight In Glaciated, Mixed-phase and Supercooled Large Drop (SLD) Icing Conditions
  - Continue experimental work on the physics of engine icing in high ice water content (HIWC) environments.
  - Continue development of methods to test engines in simulated HIWC environments.
- Reduce Accidents During Flight In 14 CFR Part 25, Appendix C Icing Conditions
  - Continue research on aerodynamic effects of ice on 3-D lifting surfaces.
- Reduce Accidents During Takeoffs In Icing Conditions
  - Continue the development of improved methods for simulation of ice pellet and mixed conditions for determination of fluid failure and holdover times and allowance times.
  - Continue 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

- Continue Software Development Techniques and Tools, such as verification of adaptive systems.
- Complete development process technology and criteria task on data integrity.
- Continue to evaluate systems considerations for complex intensive systems.
- Continue Onboard Network Security and Integrity, such as Phase 6 onboard network security and integrity effort for insuring consistency with aircraft safety and certification.
- Continue airborne electronic hardware (AEH) Techniques and Tools, such as AEH design assurance.
- Continue COTS Technology in Complex and Safety-Critical Systems, such as obsolescence and life cycle maintenance of avionics.

Researchers will continue to refine laboratory methods to determine anti-icing fluid holdover times and allowance in a variety of environmental conditions, including new mixed conditions. Investigation of the enhancement and validation of icing simulation methods, with an emphasis on engine testing in HIWC conditions, will continue. Researchers will continue to evaluate software development techniques and tools, onboard network security and integrity, AEH techniques and tools, and COTS technology in Complex and Safety-Critical Systems.

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 - Atmospheric Hazards/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 - Atmospheric Hazards/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 - Atmospheric Hazards/Digital System Safety Program.
- The Aerospace Industries Association Ice Crystal Consortium (ICC) – 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.

Major activities and accomplishments planning include:

Aircraft Icing – Atmospheric Hazards

- Reduced Accidents During Flight In Glaciated, Mixed-phase and SLD Icing Conditions
  - Continue experimental work on the physics of engine icing in HIWC environments.
  - Develop data and methods supporting the evaluation of aircraft engines for operation in HIWC environments.
  - Continue development of methods to test engines in simulated HIWC environments.
- Reduce Accidents During Flight In 14 CFR Part 25, Appendix C Icing Conditions
  - Continue research on aerodynamic effects of ice on 3-D lifting surfaces.
- Reduce Accidents During Takeoffs In Icing Conditions
  - Continue the development of improved methods for simulation of ice pellet and mixed conditions for determination of fluid failure and holdover times and allowance times.
  - Continue evaluation of ROGIDS for pre-takeoff contamination check and other applications, including data package for SAE spec and advisory material.

Digital System Safety

- Software Development Techniques and Tools
  - Continue to determine alternative software assurance approaches and completed the investigation into reverse engineering.
  - Evaluate development process technologies and criteria, such as data integrity.
  - Continue to evaluate systems considerations for complex software intensive systems, such as System Architecture Virtual Integration.
- Onboard Network Security and Integrity: Completed Phase 5 onboard network security and integrity effort for insuring consistency with aircraft safety and certification.
- AEH Techniques and Tools: Continued to evaluate AEH techniques and tools, such as AEH design assurance.
- COTS Technology in Complex and Safety-Critical Systems: Continued to evaluate COTS technology, such as obsolescence and life cycle maintenance of avionics.

<u>Performance Linkages</u>

Aircraft Icing - Atmospheric Hazards/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 while using digital systems. The goals of the focused research endeavors are:

Aircraft Icing - Atmospheric Hazards

- By FY 2012, complete fundamental research work on ice crystal accretion studies to determine physical parameters of importance and modeling schemes for ice accretion formation mechanisms inside engine compressors.
- By FY 2013, complete analysis of the ice crystal cloud properties from field campaign 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 2014, 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 2012, identify certification issues, including security vulnerabilities introduced by network connectivity to multiple aircraft systems, and potential mitigation techniques.
- By FY 2012, develop COTS electronic hardware reliability prediction tools and techniques for the latest generation of the COTS electronic components.
- 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.

3. Why Is This Particular Program Necessary?

Aircraft Icing-Atmospheric Hazards

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 Program 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 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?

A reduction in Aircraft Icing-Atmospheric Hazards would slow preparations for testing in the ONERA F1 Tunnel anticipated in FY 2013. In Digital Systems Safety, this reduction would remove the FAA funding contribution to the Systems Architecture Virtual Integration research and cause the FAA to be an observer only.

Detailed Justification for – A11.e Continued Airworthiness

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

FY 2012 – Continued Airworthiness

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.e Continued Airworthiness	$10,944,000	$12,589,000	+1,645,000

For FY 2012, $12,589,000 is requested for Continued Airworthiness. Major activities and accomplishments planned with the requested funding include:

- Complete 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.
- Continue to lead the Metallic Materials Properties Development and Standardization (MMPDS) steering group in updating the metallic materials properties handbook.
- Continue damage tolerance and durability research for emerging structural technologies to ensure safety, support maintenance, and support future FAA policies and guidance.
- Enhance FAA's Full-scale Aircraft Structural Test and Evaluation (FASTER) facility capabilities and demonstrate residual strength of panels fabricated from advanced materials.
- Develop Health and Usage Monitoring Systems (HUMS) database for commercial rotorcraft operations in order to assess its application in usage credit determinations.
- Continue to develop technical data on regulatory issues for ongoing fly-by-wire and fly-by-light working groups.
- Continue to develop data to support a specification for industrial ultrasonic forging inspection.
- Complete the evaluation of thermal acoustic technology as an inspection technique for engine disks.
- Complete an assessment of the performance of infrared inspection spectrometry to identify and quantify environmental damage of composite structures.
- Complete research on basic envelope protection. Technical data will support development of FAA guidance and policies for general aviation autopilot systems.
- Continue research to assess the performance of prognostic and health monitoring systems that are in use or under development for transport airplanes.
- Continue research to develop enhanced models of full stall departure characteristics for transports.

The FY 2012 funding request will support Continued Airworthiness Program research requirements that contribute to FAA's aviation safety goal. The program will continue to focus on providing data and analysis on developing technologies, technical information, procedures, and practices that help ensure the safety of aircraft systems and structures in the civil aviation fleet. Research will continue on:

- Development of certification processes for HUMS systems for rotorcraft, with emphasis on the processes related to validation of usage credits.
- Tracking the development of prognostic and health monitoring methods for complex flight critical systems and structures of commercial aircraft.
- Development and evaluation of risk assessment and risk management methods for the continued operational safety of small airplanes, with the methods extended to transport aircraft structures.

- Flight controls and mechanical systems, focusing on assisting pilots with advanced displays and systems to avoid hazards in both transport category and general aviation airplanes.
- Investigation of nondestructive inspection techniques for critical engine components.
- Nondestructive inspection of structures will continue to develop methods and technologies to assure the long term safety of metallic, composite, and bonded structures. In light of the increased use of composites in the latest transport models, the focus will be on composite structures for both in-production and in-service aircraft.

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, FAA also works with industry 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:

- Aircraft Safety Subcommittee of the Research, Engineering and Development Advisory Committee (REDAC) – representatives from industry, academia, and other government agencies annually review program activity, progress, and plans.
- Technical Community Representative Groups – FAA representatives apply formal guidelines to ensure the program's research projects support rulemaking and the development of guidance for means of compliance with rules.
- 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 12 joint Aircraft Airworthiness and Sustainment Conferences with FAA (formerly known as Aging Aircraft Conference).

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.

Major activities and accomplishments planning include:

- Complete a study of safe life and risk-based fleet management for small airplane continued operational safety.

- Continue damage tolerance and durability research for emerging structural technologies to ensure safety, support maintenance, and support future certification policies and guidance.
- Continue to lead the MMPDS steering group in updating metallic materials properties handbook.
- Continue research to develop rotorcraft data that provide guidance for the certification of HUMS for usage credits.
- Develop technical data on regulatory issues for ongoing fly-by-wire and fly-by-light working groups.
- Continue research to develop the potential of advanced or emerging nondestructive inspection (NDI) techniques for critical engine components.
- Assess advanced inspection systems to perform large-area inspection of composite airplane components.
- Provide technical guidance on pilot rudder usage, design, and training issues.
- Develop enhanced models of full stall departure characteristics for transport airplanes.
- Assess damage detection technologies for inspecting remote or inaccessible aircraft areas.
- Develop monitoring of machining processes to prevent manufacturing-induced surface anomalies on critical engine components.
- Develop functional, safety, and certification information for advanced flight displays to meet the Next Generation Air Transportation System (NextGen) trajectory management needs.
- Continue research on minimum performance criteria and certification requirements for automatic envelope protection and automation systems for general aviation.
- Conduct research to develop technical data to evaluate and assess commercial aircraft health monitoring systems for certification and continued airworthiness requirements.
- Develop technical data for standards on NextGen electrical power systems and components.

Performance Linkages

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 in order 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 2012, assess performance of an advanced inspection system for identifying environmental damage of composite structures, such as by chemical, ultraviolet, and water ingress.
- By FY 2013, assess performance of traditional and advanced inspection systems necessary for evaluating the strength of bonded aircraft structures. The continued airworthiness of bonded aircraft structures, whose use is increasing, will require technologies to detect defective bonds as well as determine the actual strength of the bond.
- By FY 2013, develop technical data on rotorcraft that provide guidance for certification of HUMS for usage credits.

- By FY 2013, develop a predictive methodology 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 (SHM) in commercial transport category airplanes

3. Why Is This Particular Program Necessary?

The Continued Airworthiness Research Program came into existence as a direct result of an 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 was 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. The 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 Standards. 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?

A reduction in funds to the Continued Airworthiness program would slow down 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 2012 – Aircraft Catastrophic Failure Prevention Research

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.f Aircraft Catastrophic Failure Prevention Research	$1,545,000	$1,502,000	-$43,000

For FY 2012, $1,502,000 is requested for Aircraft Catastrophic Failure Prevention Research. Major activities and accomplishments planned with the requested funding include:

Engine Uncontainment Research

- Continue FAA/NASA/industry sponsored quality control program for modeling aircraft problems in manufacturers-supported finite-element code (referred to as LS-DYNA).
- Continue development of new material model for titanium in LS-DYNA.
- Continue collaboration with the Naval Aviation Weapons Center (NAWC) China Lake to maintain the Uncontained Engine Debris Assessment Damage Model (UEDDAM) code.

Research will continue on the NASA/FAA/industry program for modeling aircraft engine failures in LS-DYNA. The FAA, NASA, and academia will continue to evaluate improved material models and incorporate them into LS-DYNA upon acceptance by the Aerospace Users Group. Users' guidelines and training will continue to be developed and made available through George Washington University.

Additional research will continue on developing a generalized damage and failure model with regularization for titanium materials impacted during engine failure events. Also, research will continue on material characterization tests to support development of damage and failure models for aircraft materials.

2. What Is This Program?

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 Aircraft Catastrophic Failure Prevention Program supports FAA's strategic goal of increasing aviation safety by reducing the number of fatal accidents from uncontained engine failures and engine malfunctions. The program develops technologies and methods to assess risk and prevent occurrence of potentially catastrophic defects, failures, and malfunctions in aircraft, aircraft components, and aircraft systems. 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 program collaborates with a broad cross section of the aviation community, including:

- 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 alternate means of compliance with existing rules.
- 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 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 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.

Major activities and accomplishments planning include:

Engine Uncontainment/Containment Research

- Continue FAA/NASA/industry-sponsored quality control program for modeling aircraft problems in LS-DYNA – a primary output of this work on impact analysis supports Fan Blade Certification to improve safety by developing and implementing better analytical technology into the certification process.
- Complete testing of titanium necessary to populate the material failure map of LS-DYNA material model MAT224.
- Continue collaboration with NAWC China Lake to maintain the Uncontained Engine Debris Damage Assessment Model (UEDDAM) code.

<u>Performance Linkages</u>

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 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. The goal of the focused research endeavors is:

- 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.

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 related to uncontained engine failure, 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 second focus area historically has been propulsion system malfunction plus inappropriate crew response which the program has supported since the original Aerospace Industries Association (AIA) group started meeting in 1996. (Note: beginning in FY 2012, propulsion malfunction research is being shifted into Propulsion and Fuel Systems Program (Congressional budget line a11.b.)) These two areas are top drivers of propulsion system initiated accidents today. 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 and titanium material characterization testing was completed and by 2014, Inconel 718 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 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 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 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?

A reduction will cause the program to reduce their staff and delay completion of the material model validation by one to three months.

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 2012 – Flightdeck/Maintenance/System Integration Human Factors

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.g Flightdeck/Maintenance/System Integration Human Factors	$7,128,000	$6,162,000	-$966,000

For FY 2012, $6,162,000 is requested for Flightdeck/Maintenance/System Integration Human Factors Program. Major activities and accomplishments planned with the requested funding include:

- Report on literature review to assess the state of the art in scenario modeling and execution for jet upset prevention, detection and recovery.
- Complete 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.
- Provide 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.
- Provide analyses and human factors recommendations for unmanned aircraft system control station vision systems to ensure safe and effective operator performance.
- Analyze 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.

Research will continue in the following areas:

- Develop human factors input for Flight Standards and Aircraft Certification to develop design, evaluation and operational approval guidance for ADS-B enabled implementations.
- Assist Aircraft Certification in identifying, assessing, and remediating human performance issues involving electronic flight bags, moving map displays and multi-function displays.
- Support the Unmanned Aircraft Program Office by providing human factors recommendations for the design and operation of unmanned aircraft systems control stations.
- 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 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.

The Flightdeck/Maintenance/System Integration Human Factors Program helps achieve increased safety and greater capacity by:

- Developing more effective methods for pilot, inspector, and maintenance technician training.

- Enhancing the understanding and application of risk and error management strategies in flight and maintenance operations.
- Increasing human factors considerations in approving new aircraft and new aircraft systems.
- Improving pilot, inspector, and maintenance technician task performance.
- Developing requirements, knowledge, guidance, and standards for design, certification, and use of automation-based technologies, tools, and support systems.
- Addressing human and human-system task/performance requirements associated with transitioning to new technologies and National Airspace System (NAS) operations.

Program researchers work directly with colleagues in FAA, other government agencies, academia, and industry to support the following research and development (R&D) programs and initiatives:

- The National Aeronautics and Space Administration's (NASA) Aviation Safety Program.
- The FAA's Voluntary Safety Program Office initiatives including Advanced Qualification Program, Flight Operations Quality Assurance, and Aviation Safety Action Program.
- The FAA/Industry Safer Skies initiative – analyzes U.S. and global data to find the root causes of accidents and proposes the means to prevent their occurrence.
- The FAA's 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 Flightdeck/Maintenance/System Integration Human Factors Program collaborates with industry and other government programs through:

- Joint Safety Analysis Teams and Joint Safety Implementation Teams within the Safer Skies Agenda – coordinated with NASA and industry, these efforts stress human factors issues in developing intervention strategies for the reduction of air carrier and general aviation accidents.
- 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.
- 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.

Major activities and accomplishments planning include:

Information Management and Display

- Complete instrument procedures design research project addressing charting and depiction of performance-based navigation procedures and produce draft report.
- Complete usability assessment of surface moving maps that display ownship position in surface operation report.
- Update human factors guidance for electronic flight bag certification, operational approval, and training based on performance data.
- Develop guidance to address human factors issues associated with using synthetic and enhanced vision to support equivalent visual operations.

Human-Centered Automation

- Develop human factors guidance for ADS-B equipment certification and operational approval.

- Develop human factors guidance for the evaluation and approval of electronic flight bags, multi-function displays, and surface moving maps.
- Compile and analyzed human factors issues with advanced autopilots and related automation technologies in GA airplanes.
- Develop report reflecting results of an industry study on automation issues with Transport Category Airplanes as part of a Performance Based Operations Aviation Rule-Making Committee (PARC) team activity.

Human Performance Assessment

- Test and fielded the Maintenance Line Operations Safety Audit (LOSA) safety audit tool for maintenance and ramp operations that will evaluate a maintenance organization's effectiveness.
- Deliver and implemented guidance materials, tools, and administrative process to manage and/or regulate aircraft maintainer fatigue.
- Provide human factors guidance for the operation of unmanned aerial systems (UAS) within the NAS.
- Complete research study to identify human factors issues that are contributing to very light jet incidents.

Selection and Training

- Validate training for visual approaches for low-time pilots to improve flight path and energy management.
- Develop guidance and training material to improve consistency of safety team decisions.
- Continue development of international standards for simulator fidelity.

Performance Linkages

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.

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.

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 of project delivery within the FY 2012 new start to conduct research that will support the development of certification requirements and operational approval criteria for head-up and head-mounted displays.

Detailed Justification for – A11.h System Safety Management

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

FY 2012 – System Safety Management

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.h System Safety Management	$12,698,000	$10,027,000	-$2,671,000

For FY 2012, $10,027,000 is requested for System Safety Management. Major activities and accomplishments planned with the requested funding include:

Risk Management Decision Support

- Continue to demonstrate a two-third reduction in the rate of fatalities and injuries through the development of an analytical method and associated metrics.
- Initiate development of transport airplane risk analysis evaluative metrics.

Aviation Safety Information Analysis and Sharing (ASIAS)

- Demonstrate a working prototype of network-based integration of information extracted from diverse, distributed sources.
- Continue to develop an advanced infrastructure and laboratory for conducting and sharing analysis tools and aggregated safety information.
- Continue development of automated tools to monitor databases for potential safety issues.
- Conduct safety analytical studies and safety assessments using ASIAS and other safety aviation data.
- Expand ASIAS to other domains (e.g., general aviation, rotorcraft, corporate, and military).

Operational Safety Oversight of the National Airspace System (NAS) through ASIAS

- Continue development of a user interface and trend analysis capability for equipment performance.
- Test the equipment module for facility performance.
- Develop user guide to facilitate use by air traffic safety inspectors.
- Initiate development, integration of function points, and testing of an Air Traffic Control (ATC) module, which integrates air traffic databases and permits prognostic trend analysis of air traffic safety performance for operational oversight.

Terminal Area Safety

- Investigate issues concerning the connection of required navigation performance (RNP)/performance based navigation (PBN) paths with global position landing system indicators for terminal area operations using human-in-the-loop simulations.
- Complete analysis of contributing factors and develop models for operational landing performance of selected aircraft make/model/series to improve the safety and capacity in terminal areas.
- Enhance advance simulator software models for stalls based on actual and/or wind tunnel-derived aircraft performance data. This research is performed within the context of developing models of unusual attitude encounters outside the normal operating envelope.
- Conduct research to investigate the operational procedures and the technical limitations of using enhanced vision system/synthetic vision system, and to establish the level of credit allowed by the

FAA for the equipment availability on an aircraft. This research is performed within the context of cockpit-centric navigation technologies.

ASIAS - Via the ASIAS project, researchers, with support from other government agencies, e.g., NASA, industry, and academia, will continue to develop innovative, advanced tools and methods that will extract relevant knowledge from copious amounts of disparate safety information. Development will continue on safety metrics and vulnerability discovery capabilities. Using ASIAS and other aviation safety data, analytical and directed studies to identify safety issues and verify mitigation and safety enhancements will continue.

Operational Safety Oversight of the NAS through ASIAS - Research continues and extends the work initiated in 2011 that expanded ASIAS to include facility performance data. In 2012, research advances the integration of facilities databases and develops modules for active monitoring of facilities' performance and their impact on NAS safety. Using experience and infrastructure developed for integrating the facility database into ASIAS, additional research will be conducted to develop modules for the integration of air traffic safety data for prognostic analysis.

Terminal Area Safety - Researchers will analyze operational data, develop models, and evaluate new navigation technologies to ensure FAA maintains a desired level of safety while accommodating the need for more efficient use of the terminal area. Research activities will provide the ability for advanced flight simulators to be more realistic for evaluating and training stall recognition and recoveries outside the normal operating envelope to improve the safety of terminal operations.

2. What Is This Program?

The System Safety Management Program will develop an infrastructure that enables the free sharing and analysis of de-identified safety information that is derived and protected from government and industry sources. In addition, the program provides methodologies, research studies, and guidance material that provide aviation safety inspectors, aircraft certification engineers, analysts, and managers 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 System Safety Management Program develops risk management methods, prototype tools, technical information, and safety management system procedures and practices that will improve aviation safety. In addition, the program will develop an infrastructure that enables the free sharing of de-identified, aggregate safety information that is derived from government and industry sources in a protected, aggregated manner. It also conducts operational research to leverage proposed new technologies and procedures that may enhance pilot and aircraft safety during terminal operations.

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.

Major activities and accomplishments planned include:

Risk Management Decision Support

- Continue to demonstrate a two-third reduction in the rate of fatalities and injuries through the development of an analytical method and associated metrics.

ASIAS

- Develop automated tools to monitor each database for potential safety issues and to analyze disparate data drawn from multiple sources, enhancing discovery, identification, and evaluation of safety risks.
- Continue to develop 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.
- Continue to expand prototype system 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.
- Conduct analytical studies (e.g., aircraft hazard analysis, determination of risk values for potential unsafe conditions, and flight crew intervention design credit) using ASIAS and other aviation safety data.
- Develop methods and risk models to evaluate advanced aircraft systems and component integration.

Operational Safety Oversight of the NAS through ASIAS

- Complete development of a facility/equipment operations module that includes a collection of business objects that provides a view of NAS equipment maintenance functions, combined with ASIAS/ATC baselined data, specific to NAS safety oversight.
- Initiate development of a user interface and trend analysis capability that monitors NAS equipment operations with respect to failures, risk, and other off-nominal occurrences.

Terminal Area Safety

- Complete an evaluation air traffic and flight procedures for terminal area operations using pilot-in-the-loop flight simulator.
- Continue testing procedures and requirements to identify RNP/ PBN constraints related to terminal area operations.
- Develop models for the landing distance performance of selected aircraft make/model/series using standard operating practices.
- Continue developing wake encounter models for the advanced flight simulators.
- Identify new cockpit centric navigation technologies and data for the development of new procedures to enhance the safety and capacity within the terminal area.

<u>Performance Linkages</u>

The System Safety Management 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 aviation accidents and incidents by developing 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 are:

- By 2012, demonstrate a working prototype of network-based integration of information extracted from diverse, distributed sources.
- 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 2012, develop a user interface and trend analysis capability that monitors NAS equipment performance with respect to failures, risk, impact on ATC and other off-nominal occurrences.
- By 2013, 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, demonstrate a two-thirds reduction in the rate of fatalities and injuries.*
- By 2015, expand ASIAS system safety analysis to other domains (e.g., general aviation, rotorcraft, corporate, military).
- By 2017, enhance vulnerability assessment capabilities of discovery, identification, and evaluation of safety risks not currently known to the aviation community.

To reduce the risk for passengers and crews and enhance the traffic control process in terminal area operations, human-in-the-loop (pilot/controller) simulations, evaluations, and operational flight data analysis will be conducted.

- By 2012, develop methods to model unusual attitude encounters outside the normal operating envelope, allowing FAA to approve advanced flight simulators that more realistically model the behavior of an actual aircraft.
- By 2012, identify new navigation technologies and data requirements for the development of new procedures to enhance the safety and capacity of the terminal area.
- By 2012, identify 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.
- By 2014, determine the amount of credit granted for synthetic or enhanced vision system installation and the level of operations that can be approved in lieu of airport infrastructure.
- By 2015, distribute a validated and portable wake mathematical model for use in simulator training.

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. Also, the program responds to several GAO studies that call for the FAA to collect better data and improve its effort to identify and address safety

* The two-thirds reduction in the rate of aviation fatalities and injuries is based on a 2004 baseline.

issues. For FY 2012, development will continue on the working ASIAS prototype, a new air traffic control module will be developed, and analytical studies and safety assessments using ASIAS and other safety aviation data will be conducted. An initiative to develop transport airplane evaluative metrics will be initiated.

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 Strategic Plan 2009-13. Furthermore, the research efforts also support the FAA's NextGen efforts to enhance the efficiency of the national airspace system, especially for the performance based navigation initiatives. For FY 2012, research will include an evaluation of air traffic and flight procedures for terminal area operations by using human-in-the-loop flight and air traffic simulator, the development of models of unusual attitude encounters outside the normal operating envelope, and the identification of new, cockpit-centric navigation technologies and data for the development of new procedures to enhance safety and capacity within the terminal area.

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?

The FAA is conducting research in support of continued operational safety of transport category airplanes. The next phase, entitled Transport Airplane Risk Analysis Evaluative Metrics, requires developing the supporting statistically derived data. This will prolong the research and delay delivery of hazard and risk analysis information that would be useful for FAA aircraft certification engineers.

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 2012 – Air Traffic Control/Technical Operations Human Factors

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.i Air Traffic Control/Technical Operations Human Factors	$10,302,000	$10,634,000	+$332,000

For FY 2012, $10,634,000 is requested for Air Traffic Control/Technical Operations Human Factors. Major activities and accomplishments planned with the requested funding include:

Advanced Air Traffic Systems

- Continue development of a human factors design standard for Air Traffic Control (ATC) displays that is harmonized with the color vision testing used during controller selection.
- Continue development of an ATC symbology and style guide to aid the efficient development of ATC display details.
- Continue work on a revised Human Factors Design Standard that can be cited as a design requirement during ATC system procurements.

Individual and Team Performance

- Report on the effectiveness of the ATC Quick Reference Guide for supervisor best practices.
- Continue the Preventive Maintenance Tasks Vulnerable to Human Error study that seeks to identify and prevent human errors resulting in ATC system outages.
- Perform fatigue research measuring the effectiveness of fatigue risk management interventions that are scheduled for implementation.

Advanced Technical Operations Systems

- Continue to evaluate user manuals and other multi-media documentation in the Technical Operations domain.

Personnel Selection and Training

- Continue longitudinal validation of ATC selection instruments.
- Document the effectiveness of a selection battery to place controllers by option and match skills to optimal placement.
- Continue a study of controller entry and retirement age.
- Conclude development of potential approaches to increase the efficiency of air traffic controller training and staffing.

2. What Is This Program?

The Air Traffic Control/Technical Operations (ATC/TO) Human Factors Program provides leadership and products to motivate National Airspace System (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 that must be mitigated to enable the humans in the system to manage the future NAS traffic flow.

- Human reliability analytical tools and methods to assess and mitigate the potential for human error.
- Assessments of the effectiveness of fatigue-risk-management strategies.
- Air Traffic Organization (ATO) safety culture transformation through research in the TO community to identify effective interventions to move the ATO toward a "Just Culture."
- 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 FAA strategic goals for increased safety and greater capacity 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 2012 will emphasize the concept of human-system integration (HSI) and safety aspects of the functions performed by air traffic controllers and technical operations 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 (maintainer) workstations and enhances our understanding of the role that system design plays in mitigating human error, including 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 system safety by:

- Developing:
  - Organizational changes to transform the technical operations ATO safety culture.
- 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 system capacity by:

- 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, decrease the probability of system outages, and decrease the cost of air traffic services.
- 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 NAS air traffic.
  - 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 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 measuring the proposed technology benefits to controllers and maintainers.

- 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, and the Financial Services groups address personnel selection and training, including the ability to successfully screen applicants for controller positions.
- Collaborative research with the National Aeronautics and Space Administration 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, Georgia Institute of Technology, St. Louis University, Ohio State University, and The American Institutes for Research.

Major activities and accomplishments to be achieved include:

Advanced Air Traffic Systems

- Initiated a human factors standard for safety alert information to users of tower ATC displays.
- Initiated revisions to the Human Factors Design Standard for the application of human factors design criteria to new systems and equipment.

Individual and Team Performance

- Expanded the application of human error reporting and reduction research for transformation of the ATO safety culture.
- Assessed the effectiveness of controller fatigue mitigation strategies.

Advanced Technical Operations Systems

- Reviewed human factors requirements for a standard graphical user interface on maintenance work stations and system displays used by maintainers.
- Continued development of human factors information requirements for remote maintenance monitoring.

Personnel Selection and Training

- Applied a new training effectiveness evaluation methodology for new tower simulator systems.
- Tested an occupational test of controller color vision.

<u>Performance Linkages</u>

- By FY 2012, improve computer-human interface design to reduce information overload and resulting errors.
- By FY 2012, apply program-generated human factors knowledge to improve aviation system personnel selection and training.

3. Why Is This Particular Program Necessary?

The primary purpose of the ATC system is to prevent a collision between aircraft operating in the system and to organize and expedite the flow of traffic. Decisions are made by thousands of human operators and involve tens of thousands of aircraft as they use the services of airport towers, approach control facilities, en route air traffic control centers, the FAA System Command Center, and many airline operation centers. The safety and performance of the National Airspace System (NAS) is directly linked to the performance of these human operators. Within this complex system, from time-to-time, accidents and incidents still happen, often repeating the same sequence of events played out many times before. As a result, we are often left with the regrettable truth that there are very few "new" accidents, just different players. Among the most complex problems facing aviation today are those involving human error. To achieve quantifiable improvements in aviation safety and capacity, 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 capacity will involve the development of techniques and tools that increase controller efficiency. 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 need for air traffic services is growing and the requirement to include the human component in the development of the NAS is being addressed by this research program.

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 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 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 requested funding level covers slightly over half the research requirements identified by the sponsors in the ATO. A reduction will require the cancellation of major elements such as the Human Factors Design Standard used during acquisition programs to reduce human factors risk. 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.

Detailed Justification for – A11.j Aeromedical Research

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

FY 2012 – Aeromedical Research

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.j Aeromedical Research	$10,378,000	$11,617,000	+$1,239,000

For FY 2012, $11,617,000 is requested for Aeromedical Research. Major activities and accomplishments planned with the requested funding include:

The Civil Aeromedical Institute (CAMI) Aeromedical Research Program

- Analysis and distribution of zolpidem, a prescription medication used for the short-term treatment of insomnia, in postmortem specimens from aviation accident fatalities.
- Report on the effects of exposure to combustion gases (CO and HCN) in support of investigation of aviation accidents involving fire/smoke.
- Develop procedure to validate potential biomarkers by special biochemical methods. These biomarkers will assist in identifying fatigue and other aviation stressors.
- Provide guidance for measuring and estimating radiation exposure during commercial aerospace activities and develop instructional materials on radiation exposure to humans during commercial aerospace travel.
- Examine and model aviation accidents in Alaska over time. The model will provide a way of assessing risk within the Alaskan aviation community.
- Evaluate the performance of current aircrew oxygen regulators installed on commercial aircraft.
- Report 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.
- Assess 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.

Airliner Cabin Environment Research (ACER) Program

- Collect baseline data for VOC contaminants on loaded aircraft filters.
- Create prototype sensor network with select bleed air sensors for demonstrating feasibility of system to detect simulated contaminants.
- Detail investigation of what is generated during a bleed air event.
- Report that documents chemical reaction kinetics of high temperature degradation of aircraft engine oil and hydraulic fluids.
- Support regulatory, certification, and operations for existing Aviation Rulemaking Committees.

CAMI Aeromedical Research Program

Research will continue on identifying, assessing, and developing improved evacuation equipment and evacuation aids, such as lighting, aural way-finding systems, and symbolic information media. Emergency evacuation issues frequently arise during accidents, where scenarios develop that cannot be simulated during certification. Identifying these factors in the absence of accidents can be difficult, but is essential to prevent death and injury. Improvements in systems to inform passengers and crew about emergency issues and prepare occupants to speed evacuation will directly improve safety and take advantage of improvements in other areas such as fire safety.

Research will be ongoing to 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 and operations. Emergency evacuation issues frequently arise during accidents in which scenarios develop that cannot be simulated during certification. Conversely, proposed changes to aircraft and/or operations often suggest that reductions in evacuation efficiency will likely result as a consequence. Analytical tools and empirical data are needed to confirm the effects of such identified factors, using accident histories and findings in the technological literature, as well as empirical data and analyses derived from experimentation. Work on injury criteria for obliquely oriented seats will continue to determine the injury mechanisms and human impact tolerance levels and methods of predicting occupant injuries in obliquely facing seats during a survivable crash. Techniques will be developed to use advanced occupant models to accurately simulate human response to impact and predict potential injuries for all impact vectors and occupant sizes. Dynamic testing and occupant injury assessment have been required for seats in newly certified aircraft since the adoption of Title 14 of the Code of Federal Regulations (CFR) Part 25, 25.562, and similar regulations in Parts 23, 27, and 29 (1). The occupant injury criteria contained in those regulations are primarily focused on protecting the occupant from forward and vertical impacts. This research is required since the biomechanics of side impacts differ significantly from forward or vertical impacts.

Research on prevention of injuries that impede egress will also continue in FY 2012. Human impact tolerance levels and methods for predicting occupant unconsciousness and leg injuries that can occur during a survivable crash will be determined and enhanced means of mitigating injury causing mechanisms for the brain and leg will be investigated. The CAMI impact sled and anthropometric test dummies will be utilized to perform this research.

Airliner Cabin Environment Research Program

In the areas of aircraft cabin environments, evaluation of aircraft cabin for exposure to pesticides, volatile organic compounds, semi volatile organic compounds, assessment of potential polybrominated diphenyl ethers (PBDEs) exposure will continue in FY 2012. Models of engine oil and hydraulic fluid chemical kinetics, simulated bleed air events, experimental characterization of bleed air and recirculation air purification technologies will continue in support of research on purification of environmental control systems air supplies.

2. What Is This Program?

Agency outputs proceed from the FAA Office of Aviation Medicine (AAM), 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 National Air Transportation Center of Excellence for Research in the Intermodal Transport Environment (RITE).

The Airliner Cabin Environment Research Program supports FAA's Strategic 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 and ACER Aeromedical Research 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.

Major activities and accomplishments planning include:

CAMI Aeromedical Research Program

Aeromedical Systems Analysis

- Provide incidental medical findings and injury description and injury mechanisms analysis to support the development of prevention and mitigation strategies: Aerospace Accident Injury and Autopsy Data System (AAIADS).
- Conducte a risk assessment of selective serotonin reuptake inhibitors use in civil aviation.

Accident Prevention and Investigation

- Quantify the effects and impact of fatigue in aviation using gene-expression research.
- Determine the usefulness of blood from aviation accidents as an RNA source for gene-expression analysis.
- Determine the prevalence of psychotropic drugs in pilot fatalities from civil aviation accidents.
- Assess unapproved medications found in fatally injured pilots involved in homebuilt-aircraft accidents.
- Correlate the incidence of quinine positives in aircraft fatalities with elevated serotonin metabolite ratios.

Protection and Survival

- Develop methods to qualify replacement elements for worn seat cushions used in energy-absorbing seats.
- Develop mathematical prediction of emergency evacuation performance.
- Conducte the performance evaluation of inflatable emergency equipment for ditching scenarios.

Aviation Physiology

- Calculate galactic cosmic radiation dose rates in the atmosphere at altitudes above 60,000 feet.
- Develop a Windows version of the CARI program.
- Evaluate and developed oxygen system guidelines for high-altitude aircraft.

Airliner Cabin Environment Research Program

- Provide scientific knowledge base on medical effects of combined exposures to carbon monoxide, carbon dioxide, and ozone from mild hypoxic conditions associated with reduced air pressures.
- Evaluate toxicological aspects of cabin environmental (air) quality: development of reference laboratory to support aircraft cabin air contaminants analysis.
- Validate computational models of air contaminants, VOCs; biological and viral contaminants to evaluate health impacts on passengers and crew.

<u>Performance Linkages</u>

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 the development of 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.
- By 2015, establish design criteria for aircraft-cabin-air-quality-sensing systems.
- By 2015, demonstrate advanced methods to remove contaminants from bleed-air and non-bleed-air ventilation 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 three 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 and Cabin Environment Research focused on airliner occupant health and safety.

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 Strategic 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 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?

The Aeromedical Research program is principally an in-house effort; 84 percent of FY 2012 funds are assigned for CAMI to address: (a) aeromedical PCB&T (50+ full-time government employees, $7.125 M), (b) $1.094 M baseline laboratory operating costs, and (c) $1.550 M to conduct specialized Fire and Cabin Safety research; thus the CAMI aeromedical FY 2012 non-PCB&T funds total $2,644. A reduction in funding will extend research time to assess 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 (FY 2012 Major Activity in the Airliner Cabin Environment Research Program).

Detailed Justification for – A11.k Weather Program

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

FY 2012 – Weather Program

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.k Weather Program	$16,789,000	$16,366,000	-$423,000

For FY 2012, $16,366,000 is requested for the Weather Program. Major activities and accomplishments planned with the requested funding include:

- Develop advanced storm prediction probabilistic forecast capability.
- Develop initial Current Icing Product (CIP) algorithm for Alaska.
- Update high ice water content (HIWC) algorithm to support FY 2012 field program.
- Evaluate rapid refresh ensemble with 3 km Continental United States (CONUS) and Alaskan nests at National Centers for Environmental Prediction (NCEP).
- Transition turbulence forecast capability including mountain-waves for implementation.
- Test and assess CONUS ceiling, visibility, and flight category 1-3 hour forecast capability.
- Test and implement observation trending and locale specific data capability to Helicopter Emergency Medical Services (HEMS) weather tool.
- Develop volcanic ash concept of operations and initial set of functional and performance requirements.
- Develop verification techniques and approaches that assess research capabilities in support of the Research Transition process.
- Develop Terminal Area Icing Weather Information System concept design documents including description of operational use.
- Conduct research field program using high ice water content and particle size measurement instrumentation.

The Weather Program will continue to develop and enhance forecast and nowcast capabilities to support DOT safety strategic goal, FAA Strategic 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. In FY 2012 additional turbulence forecast capabilities are being developed to enhance en route safety and capacity, an advanced probabilistic storm prediction capability is being developed to enhance terminal and en route capacity, an in-flight icing capability for Alaska is being developed to enhance safety especially for general aviation, a ceiling visibility 0-12 hour capability is being developed to enhance en route safety especially for general aviation, and a volcanic ash dispersion ensemble forecast capability is being developed with NOAA to enhance en route safety and capacity. Additionally in FY2012, modeling capability via a rapid refresh ensemble will be evaluated that will provide enhanced icing, ceiling and visibility, turbulence, and convective forecasts for the CONUS and Alaska. This will include evaluating the ensemble using CONUS and Alaska nests, where a nest is a smaller, specific area in a large domain that is analyzed in greater detail to resolve weather structures that may contain potentially hazardous weather. Capabilities developed are transitioned to National Weather Service (NWS), FAA, and industry weather systems.

Additionally the HEMS weather tool will be enhanced to provide additional altitude and location specific data to increase safety and the FAA will be collaborating with NASA on a field program to develop measurement technology and forecast capability of high ice water content conditions which are a critical safety hazard.

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. The 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 operational improvements specified in the NextGen Integrated Work Plan (IWP) and the FAA NextGen Implementation Plan. 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 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 detailed in the NextGen Integrated Work Plan (IWP) and the FAA NextGen Implementation Plan. 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 Strategic 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 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).

Major activities and accomplishments planning include:

- Develop CONUS 0-8 hour advanced storm prediction capability including lightning proxy.
- Integrate Canadian weather radar information into the High-Resolution Rapid Update National 3D Radar Mosaic.
- Complete Forecast Icing Product and CIP severity Weather Research & Forecast (WRF)/Rapid Refresh (RR) transition.
- Complete prototype HIWC algorithm in support of NASA trial field program.
- Test 3km High-Resolution Rapid Refresh WRF model at NOAA.
- Complete turbulence forecast capability for WRF rapid refresh transition.
- Develop prototype CONUS ceiling, visibility, and flight category 1-3 hour forecast capability.
- Conduct QA evaluations, utilizing Network-Enabled Verification System (NEVS) of weather research capabilities to support the research transition process.
- Implement FAA approved products for operational use within the NAS.
- Evaluate LWE system for measurement of freezing rain, freezing drizzle, snow & ice pellets and the ability to distinguish between them.

Performance Linkages

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 Strategic 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 NexGen weather operational improvements are:

- By FY 2012, 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 Strategic 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 Strategic 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, & 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 nowcasting 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 management tools.

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?

A funding reduction would delay completion of the NextGen requirement for a turbulence probabilistic forecast for all flight levels.

Detailed Justification for – A11.l Unmanned Aircraft Systems Research

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

FY 2012 – Unmanned Aircraft Systems Research

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.l Unmanned Aircraft Systems Research	$3,467,000	$3,504,000	+$37,000

For FY 2012, $3,504,000 is requested for Unmanned Aircraft Systems Research. Major activities and accomplishments planned with the requested funding will include:

Sense and Avoid (SAA)

- Determine performance characteristics and operational requirements for SAA technologies.
- Continue FAA-United States Air Force (USAF) joint flight tests to study on-board SAA technology.
- Identify the barriers for systems and equipment providing equivalent SAA capabilities.

Control and Communications (C2)

- Define UAS control and communication system performance requirements such as latency, availability, integrity and security and critical fly-by-wireless certification challenges.

Minimum Requirements for UAS Control Stations

- Complete development of information to support the definition of minimum human factors requirements for UAS control stations by recommending compensatory strategies in equipment design and training to minimize the impact of the pilot's inability to directly sense data from the aircraft and its immediate environment.
- Define certification criteria for new automated functions to ensure that UAS automation meets an equivalent level of safety to manned aircraft
- Identify information required for decision-making and execution of operational changes

UAS Maintenance and Repair Issues

- Identify the UAS technology developments currently underway for small UAS to establish a central repository of historical data used to track continuous airworthiness of life-limited components
- Determine the requirements that the FAA, other government agencies, and industry may have for evaluation of equipment and systems that are peculiar to UAS and how they are analyzing this equipment and systems.

Safety Management System (SMS) and System Safety Criteria

- Use Causal-Model for Air Transport Safety (CATS) to conduct causal analysis of SAA encounters in the NAS with a focus on interaction of visual flight rule (VFR) aircraft and instrument flight rule (IFR) traffic.
- Study SAA 14 CFR requirements for VFR-IFR encounters by using interim results from CATS analysis.

The FY 2012 funding request will support the UAS program, particularly in research areas of UAS technologies which directly impact the safety of the NAS. The program will focus on sense and avoid; command, control and communications; and UAS ground station 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:

- Aircraft Safety Subcommittee of the Research, Engineering and Development Advisory Committee – These representatives from industry, academia, and other government agencies annually review program activity, progress, and plans.
- Technical Community Representatives Groups – FAA representatives apply formal guidelines to ensure the program's research projects support rulemaking and the development of guidance for means of compliance with rules.
- 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 (IA) to leverage resources and implement new technologies for civil applications.
- Other entities include the Department of Homeland Security (DHS), Department of Commerce (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 an MOC.
- Cooperative Research and Development Agreement (CRDA) with industry to jointly study UAS regulatory compliance issues, e.g., type design, airworthiness, operation, maintenance, and repairs.

Major activities and accomplishments planned include:

Sense and Avoid

- Continue to evaluate a UAS SAA system including considerations for civil certification of logic implementations for UAS collision avoidance and separation assurance.
- Determine performance characteristics and operational requirements for SAA technologies. Included will be the development and evaluation of specific SAA technologies including both airborne and ground-based systems in compliance of regulatory requirements (airworthiness and flight operations).
- Continue FAA-USAF joint flight tests to study on-board SAA technology.

Control and Communications

- Continue to identify potential safety implications of system performance impediments of communications latency.
- Continue development and evaluation of UAS C2 technologies and performance requirements (e.g., data link requirements, C2 spectrum bandwidth estimates, latency and availability, communication with ATC, and interactions with other NAS users) to ensure operational safety with consideration of current regulatory basis for aviation.
- Identify and make recommendations on communications performance standards for difference classes of airspace, phases of flight, and system architecture (e.g., line of sight (LOS) and SATCOM relay)

Safety Management System

- Perform risks analyses to determine impacts of specific hazards, mitigation strategies, recommended approaches, safety measurements, and oversight requirements.
- Initiate the collection of UAS operational data and performed analyses to develop technical information required to support establishment of regulatory standards.

Minimum Requirements for UAS Control Stations

- Develop information to support the definition of minimum human factors requirements for UAS control stations by recommending compensatory strategies in equipment design and training to minimize the impact of the pilot's inability to directly sense data from the aircraft and its immediate environment
- Define certification criteria for new automated functions to ensure that UAS automation meets an equivalent level of safety to manned aircraft.
- Identify information required for decision-making and execution of operational changes

UAS Maintenance and Repair Issues

- Identify the UAS technology developments currently underway in small UAS to establish a central repository of historical data used to track continuous airworthiness of life-limited components
- Determine the requirements that the FAA, other government agencies, and industry may have for evaluation of equipment and systems that are peculiar to UAS and how they are analyzing this equipment and systems.

<u>Performance Linkages</u>

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 develop airworthiness standards, devise operational requirements, establish maintenance procedures, and conduct safety oversight activities. The program is structured into multiple research areas: system safety; SAA; C2; contingency management (i.e., lost-link logic and procedures, diverts, emergency landings, and flight termination); certification and airworthiness standards;

and maintenance and continuing airworthiness. The research began with a baseline survey to determine the existing technologies used in UAS and needs of corresponding regulatory standards. Technologies used to avoid mid-air collisions due to UAS operations will be examined and tested. ATC voice and data communications architectures and requirements necessary to support UAS operations in the NAS, as well as the necessary safety procedures for contingency management of UAS, will be researched. A system safety approach based on regulatory framework was initially developed to identify the potential hazards, perform risk assessments, and evaluate mitigation strategies for safe operations in the NAS. The goals of the focused research endeavors are:

- By FY 2012, determine a set of performance characteristics and operational requirements for SAA technologies.
- By FY 2013, analyze data and identify potential safety implications of system performance impediments of communications latency.
- By FY 2013, identify the UAS technology developments currently underway to establish a central repository of historical data for maintenance and repairs and determine the requirements that the FAA, other government agencies, and industry may have for evaluation of equipment and systems that are peculiar to UAS.
- By FY 2015, identify and make recommendations on how communications performance standards will vary among different classes of airspace and phases of flight, considering both a LOS and SATCOM-relay type architecture.
- By FY 2016, conduct field evaluations of UAS technologies in an operational environment, including SAA, C2, and contingency management technologies. The documented results will be used to develop certification and airworthiness standards.

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.

The FAA UAS Research Program has initiated a system approach with focus on safety. It applies the SMS principle based on the existing regulatory framework (i.e. Title 14 Code of Federal Regulations, which ensures the common safety baselines, enforces the mandatory safety requirements, and allows technology-driven solution)s. It is a safety-focused, technology-driven, and NextGen evolution-guided approach. 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 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 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?

A reduction in funding will delay research in the safety management system, sense and avoid, control and communications, and control station research areas.

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 2012 – NextGen – Alternative Fuels for General Aviation

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.m NextGen – Alternative Fuels for General Aviation	$0	$2,071,000	+$2,071,000

For FY 2012, $2,071,000 is requested for NextGen – Alternative Fuels for General Aviation. Major activities and accomplishments planned with the requested funding include:

- Evaluate the performance of a fleet representative, naturally aspirated engine on ultra-low lead fuels.
- Evaluate the impact on the general aviation (GA) fleet from the reduction and eventual removal of lead from aviation gasolines.
- Evaluate the safety and performance of high compression engines on unleaded, mid-octane aviation alkylate fuel.

Research will focus on the feasibility of reducing high-octane lead additives in aviation gasoline and how that will impact fleet performance and certification. Test data and laboratory analyses of ultra-low lead 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 increased aromatic limits in the low lead fuel for octane enhancement and its impact on other safety critical performance metrics.

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 Aircraft Fuel System Materials Task Force (ASTM TF) work of developing a fuel qualification protocol for aviation and compression ignition fuel and additives qualification to ensure deviations to the current specification properties and fit-for-purpose properties ensure safety of aviation fuels. FY 2012 research will also address development of new engine, rig, and laboratory test methods necessary to evaluate fuels which differ from traditional hydrocarbon, refinery based fuels. Planning will begin for the addition of new test capabilities and tools to the laboratory to conduct full envelope testing of turbocharged aircraft engines. The data from that testing will be used to update the current detonation advisory circular The capability to measure lead emissions from GA engines is also planned to be added.

Additionally, research will also examine technologies that could be used to modify the GA legacy piston engines to run on significantly reduced octane unleaded fuels. Test data will be collected from GA engines on the effects of variations in fit-for-purpose property deviations from current aviation gasoline specification to the fuel qualification protocol from the ASTM TF for Otto Cycle fuels at ASTM International.

2. What Is This Program?

This program will 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 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:

- 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 Exxon Mobil, Conoco Phillips, 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.
- Academia and national laboratories.

Partnerships include:

- CRC Unleaded Aviation Gasoline Development Group – includes Exxon Mobil, Conoco Phillips, 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.
- General Aviation Manufacturers Association - Future Avgas Strategy and Transition Plan (GAMA FAST) – includes engine and airframe original equipment manufacturers; this group is developing a plan for the introduction of unleaded fuel to replace 100LL and assess the impact on the current fleet of aircraft and engines.
- 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 protocol for Aircraft Fuel System Materials (ASTM) specification approval and is researching how changes from current specification and fit-for-purpose properties will impact safety.

Major activities and accomplishments planning include:

- Publish a detailed research plan to address alternative fuels for GA aircraft that is coordinated with EPA, GAMA, CRC, and the GA community and that addresses continued safe operation of aircraft, reduction and eventual elimination in the use of lead as an additive, and alternative fuel certification.
- Begin initial feasibility activities, including economic feasibility, environmental impacts, and assessment of potential for GA aircraft reduced, unleaded, and renewable alternative fuels.

- Begin engine and laboratory testing on ultra-low lead fuels to address the feasibility of near-term reduction in lead levels in aviation gasoline as a temporary measure to reduce leaded aviation emissions.
- Begin engine and laboratory testing on mid-octane, unleaded aviation alkylate as an input to initial safety and performance impact on the legacy fleet from potential for removal of lead from aviation gasoline.
- Begin engine test data and laboratory characterization of high-octane, quasi-drop-in, unleaded fuels to replace 100LL avgas.

Performance Linkages

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 develop 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 support development of qualification and certification methodologies for those fuels. Longer term research includes simulated altitude 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 2012, complete feasibility assessment of near-term reduction in the current lead levels in avgas on GA aircraft and engine safety, performance, certification methodologies as a temporary measure toward full lead removal, assessment of removal of lead from aviation alkylate and use of the remaining mid-octane conventional fuel.
- By FY 2013, complete feasibility assessment of 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 2013, establish capability to measure lead emissions from piston engines operating on ultra-low lead and low lead fuels.
- By FY 2014, complete analyses to extrapolate lead emissions over GA fleet.
- By FY 2014, develop methodology and acquire tools for altitude 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 2015, complete testing to be used to update FAA AC 33.47, regarding detonation testing equipment, analyses, safety margin, and altitude determination.
- By FY 2016, develop engine and fuel test methods to evaluate the performance, safety, durability, and operability of unleaded avgas.
- By FY 2017, complete test engine emission evaluation of existing biomass derived and high-aromatic, high-octane fuels.
- By FY 2017, 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 need to find a replacement for current leaded avgas (100LL). The replacement fuel should perform as well as 100LL in general aviation (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. Research will evaluate and characterize new alternative fuel formulations that will have protected the environment while sustaining growth in air transportation.

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 would result in a decrease in funding to the Next Gen - Alternative Fuels for General Aviation Program and could delay the empirical testing of assessments needed to produce hard data for the determination of certification impact and safety assessment of whether the near term reduction in lead content of aviation gasoline could meet the estimated EPA target.

Detailed Justification for – A12.a Joint Planning and Development Office

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

FY 2012 – Joint Planning and Development Office

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.a Joint Planning and Development Office	$14,407,000	$14,067,000	-$340,000

For FY 2012, $14,067,000 is requested for Joint Planning and Development Office (JPDO). Major activities and accomplishments planned with the requested funding include:

Planning and Agency/Industry Alignment

- Develop NextGen Portfolio Analysis that recommends the alignment of resources within the federal government and U.S. industry to develop and implement the Next Generation Air Transportation System (NextGen) in the most expedient and cost-effective manner.
- Coordinate and facilitate the transfer of technologies from aeronautics research programs and direct research that will result in achieving NextGen.

Systems Integration and Transformation Analysis

- Establish standards and application for Net Enabled Weather information exchange for integration into air transportation management decision making.
- Develop policy recommendation for key architectural decisions including level of automation and aircraft system vs. ground system responsibility for separation assurance.
- Continue to refine research plans, which will describe research and supporting activities required to drive implementation decisions to effect the NextGen transformation.
- Develop Integrated Surveillance governance to facilitate robust multi-agency information sharing requirements, engineering analysis, prototype demonstrations, and implementation planning.

JPDO will continue to:

- Report progress and maintain NextGen National Integrated Plan's Enterprise Architecture, Concepts, and Integrated Work plan.
- Continue to define benefits of NextGen concepts through modeling and simulation.
- Continue to refine Life-cycle cost estimates for NextGen through collaboration with partner agencies and industry.
- Continue to support Senior Policy Committee decision-making by refining NextGen Policy agenda.
- Continue to coordinate and develop multi-agency NextGen Budget Portfolio.
- Continue enhancement of Enterprise Architecture and Multi-agency Integrated Work Plan.

2. What Is This Program?

The JPDO is responsible for defining and facilitating the implementation of NextGen. At this stage in the transformation, outputs are a series of plans and analyses that define a proposed end-state and a path for achieving it. The objective is to drive collaborative decisions—involving government and industry—that will ultimately achieve the transformation.

As the steward of NextGen, JPDO seeks to address long-term imbalances in aviation capacity and demand. At the same time, it seeks to ensure the future operating environment is safe, well managed, environmentally responsible, and harmonized with international standards. JPDO's mission is to lead the transformation of today's aviation system into that of the future, the scope of which contributes to DOT current strategic goal of Economic Competitiveness and Safety.

The JPDO is truly a collaborative enterprise. Employees from the National Aeronautics and Space Administration (NASA) and the Departments of Transportation, Commerce, Defense (DoD), and Homeland Security (DHS) actively lead and/or participate in JPDO activities. Similarly, the JPDO Board includes executives from each department/agency, as well as the White House Office of Science and Technology Policy. The Senior Policy Committee includes Secretaries, Deputy Secretaries, and/or Administrators from the participating organizations, as well as the Director of the Office of Science and Technology Policy.

The private sector is also an integral part of JPDO's work. In FY 2006, the NextGen Institute was established as an alliance of major aviation stakeholder communities

Major activities and accomplishments planning include:

Planning and Agency/Industry Alignment

- Continue to refine research plans, which will describe research and supporting activities required to drive implementation decisions to effect the NextGen transformation.
- Continue modeling planned improvements to test their efficacy in accomplishing NextGen goals.
- Continue enhancement of Enterprise Architecture and Multi-agency Integrated Work Plan in response to the outcome of demonstrations, research, changes in agency budgets, etc.
- Facilitate the transfer of technologies from research programs that are ready for implementation (e.g., NASA and the Department of Defense) to the federal agencies with operational responsibilities and to the private sector, as appropriate.

Systems Integration and Transformation Analysis

- Risk adjusted NextGen 2025 definition including capabilities, benefits, and cost.
- Establish analysis to mitigate research and development risk for 2025. Specifically:
    - Unmanned Aircraft Systems (UAS) and other advanced technologies that will lead to NAS integration.
    - Trajectory Based Operations.
- Develop Information Sharing Standards, Models, Technologies for Aviation Weather Community Interest.
- Establish an Intergovernmental Integrated Surveillance Memorandum of Understanding and implement an initial operational capability by 2012.

<u>Performance Linkages</u>

FY 2012:

- Enhance the NextGen planning information to reflect:
    - Integration of net-enabled weather into automation decision making;
    - Enhanced operational scenarios that describe information sharing and procedures between flight/ airline operations;
    - NextGen trajectory-based flight processing, including air navigation service provider, flight operations center, and flight crew roles & responsibilities.
- Continue development of an interagency, Integrated Surveillance capability including:
    - Initial information sharing operation
    - Enterprise Architecture, Concept of Operations, and funding profile.

- Continue coordination of network–enabled information sharing standards for participating agencies & organizations including multi-agency governance processes.
- Continue to coordinate and conduct demonstrations that will test operational concepts, address operational challenges, and provide alternatives for architectural trade-offs.
- Continue to refine NextGen planning information: Concept of Operations (ConOps), Enterprise Architecture (EA), and Integrated Work Plan (IWP).

FY 2013-2015:

- Continue research and development to support all NextGen capabilities.

FY 2016 and Beyond:

- Continue development to support all NextGen capabilities
- Identify alternatives as a result of needed research that may be immature.

3. Why Is This Particular Program Necessary?

The nation's air transportation system has slowly evolved into one that has become brittle, inflexible to change, and grounded in antiquated policy, technology and business practices. The system is no longer scalable. The United States aviation system must transform itself and be more responsive to the tremendous social, economic, political and technological changes that are evolving worldwide.

In Public Law 108-176 Congress recognized the need to do business differently. To ensure this change occurs, Congress created the Joint Planning and Development Office established by the Department of Transportation within the Federal Aviation Administration will manage the work related to the NextGen.

The JPDO provides the multi-agency governance structure that guides the development of the nation's air transportation system of 2025. The JPDO together with partner agencies defines the capabilities and mechanisms that build new capacity to accommodate a wide range of customers and address an even wider spectrum of issues. These include increasing mobility for private, commercial, civil, & military aviation, airport and airspace capacity that is adaptable to unforeseen changes in traveler and shipper needs, and capacity increases that are balanced within safety and security guidelines.

The JPDO maintains the plan and provides biennial reporting on the progress that participating agencies make in transforming the air transportation management system into a space-based system capable of avoiding future capacity gridlock regardless of weather conditions.

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?

Any current or future reduction would result in a decrease in funding to technology transfer and would reduce activities by one third and also the enterprise architecture by one quarter.

Detailed Justification for – A12.b NextGen - Wake Turbulence

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

FY 2012 – NextGen - Wake Turbulence

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.b NextGen - Wake Turbulence	$10,631,000	$10,674,000	+$43,000

For FY 2012, $10,674,000 is requested for NextGen - Wake Turbulence. Major activities and accomplishments planned with the requested funding include:

- Continue to maintain and add to the world's most extensive aircraft wake transport data base for use in new air traffic control procedure development and assessments of wake encounter risk associated with those new procedures.
- Obtain RTCA agreement on weather observation parameters to be transmitted from aircraft –vital to the development of dynamic wake separation processes.
- Continue to incorporate wake transport and decay as well as aircraft navigation performance analysis results into FAA wake-encounter risk models.
- Initiate development of wake turbulence mitigation processes/procedures to support the NextGen era time based en-route operational environment.
- Continue development of wind forecast algorithm and its information needs for use in the Wake Turbulence Mitigation for Single Runway (WTMSR) air traffic control decision support tool.
- Continue cooperative development with European Organization for the Safety of Air Navigation (EUROCONTROL) of NextGen/SESAR of ground and aircraft based situation display concepts relative to wake separation constraints required for implementation of the NextGen/SESAR concepts for air routes and airport approach/departure paths.
- Evaluate reports of wake turbulence encounters as part of the FAA Safety Management System assurance process for changes to Air Traffic Control (ATC) procedures.
- Continue to conduct experiments, analyses, and aviation community forums to define, in terms of a wake turbulence hazard, what is an unacceptable level of wake turbulence for an encountering aircraft.
- Continue development of modeling tools to evaluate system-wide safety risk associated with the NextGen pair-wise separation concepts.
- Provide engineering and analysis support to develop airport-specific procedure modifications to enable dependent instrument approaches to an airport's closely spaced parallel runway (CSPR).
- Continue development of wake turbulence transport and decay modeling tools for use in evaluating proposed, trajectory-based, operational concepts.
- Provide wake turbulence evaluation support in determining wake separation standards for new aircraft being introduced into the NAS.

In FY 2012, FAA must continue 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 Wake Turbulence Program's 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.

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 ANSP decision support tool that adjusts required wake separations based on wind conditions would allow ATC 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. The research program in FY 2012 will continue work begun in FY 2008 to address the feasibility and benefit of a wake avoidance decision support capability for the flight deck.

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 2012, 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 in instrument meteorological conditions and capacity for more flights in high-usage airspace, and
- Providing more capacity-efficient wake separations to aircraft with the same or reduced safety risk.

The program 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 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:	Stakeholders:
Pilots	Joint Planning and Development Office
ANSP personnel	Commercial pilot unions
Air carrier operations	Other International Civil Aviation Organization (ICAO)
Airport operations	Air navigation service providers
	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 partners:

- 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
- CSSI, Incorporated

Major activities and accomplishments planning include:

- Provide engineering and analysis support to develop airport-specific procedure modifications to enable dependent instrument approaches to an airport's CSPR.
- Continue data collection to determine the characteristics of wake vortices generated by departing and arriving aircraft. Emphasis is on collecting data on wake generated by Boeing 757 and heavier aircraft. Data is being used in development of air navigation service provider decision support tools in reducing the required wake mitigation separation applied to airport single runway arrivals and departures.
- Evaluate reports of wake turbulence encounters as part of the FAA SMS assurance process for changes to ATC procedures.
- Develop initial wake separation standards to be applied to the new Boeing 747-800 series aircraft

Performance Linkages

The NextGen - Wake Turbulence Program supports the DOT strategic goal of Economic Competitiveness by maximizing economic returns on transportation policies and investment on average daily airport capacity.

The following illustrate some target milestones:

- By FY 2012, determine the National Airspace System (NAS) infrastructure requirements (ground and aircraft) for implementing the NextGen Trajectory Based Operation and High Density concepts within the constraints of aircraft-generated wake vortices and aircraft collision risk.
- By FY 2013, develop as requested, airport specific instrument meteorological conditions (IMC) CSPR approach procedures that would insure wake safety and increase IMC capacity of the CSPR.
- By FY 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.

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 program has produced the airport specific procedure and safety analyses to bring a new air traffic control wake mitigation procedure into everyday operation at the Seattle – Tacoma International Airport and an impending implementation at the Memphis airport. Seattle is currently getting up to 8 more arrival operations per hour (when compared to its former wake mitigation procedure) when weather forces it to switch to using only instrument approaches to its runways. The NextGen - Wake Turbulence Program is continuing to facilitate implementations of this procedure at Newark, Cleveland and Boston. These airports will have a similar operational improvement as Seattle.

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.

The requested FY2012 NextGen - Wake Turbulence Program will expand the crosswind based wake mitigation concept from its use on closely spaced parallel runways to an application on single runways – potentially providing an air traffic control decision support tool that will allow more operations at an even greater number of the nation's busiest airports. The Program will also research how the NextGen era aviation system capacity enabling concepts (Trajectory Based, Flexible Terminal) can be implemented without being severely limited by wake mitigation constraints.

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?

A reduction would impact the FAA's progress in developing the Wake Turbulence Mitigation for Single Runways (WTMSR) concept feasibility prototype. It is planned to modify the FAA terminal automation development laboratory platform at the FAA William J Hughes Technical Center to prototype the decision support tool functionality of the WTMSR concept. A reduction in funding slows the pace of the prototype development, delaying its completion by three months.

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 2012 – NextGen – Air Ground Integration Human Factors

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.c NextGen – Air Ground Integration Human Factors	$5,688,000	$10,545,000	+$4,857,000

For FY 2012, $10,545,000 is requested for NextGen – Air Ground Integration Human Factors. Major activities and accomplishments planned with the requested funding include:

Roles and Responsibilities

- Complete 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.
- Develop recommendations for function allocation strategies and policy between pilots(s), controller(s), airline operations centers (AOC) and automated systems to communicate, execute, monitor and resolve conflicts during delegated separation operations.

Human System Integration – Information Needs

- Determine 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.
- Define information needs for pilots to determine acceptability of suggested conflict avoidance maneuvers provided by automated systems or ATC.
- Complete 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.
- Complete 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

- Complete 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, develop 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

- Complete research to develop flight crew training recommendations for flight deck automation supporting NextGen operations for single pilot and two pilot crews.
- Conduct research to support guidance for data communications procedures, training, displays and alerts.

Risk and Error Management

- Develop 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.

- Initiate research to determine the expected nature, frequency and potential impact of pilot errors that may lead to exceeding Required Navigation Performance (RNP) containment criteria for trajectory operations.
- Assess 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.

The program will continue 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. Each of these research areas, although general in nature, will continue 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 will continue to enable safe and effective changes to pilot and ATC roles and responsibilities for NextGen procedures and will also continue 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 will continue 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 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. The program collaborates with the NextGen - Self Separation Human Factors Program to ensure robust examination of NextGen human factors issues. Through use of modeling, simulation, and demonstration, the program assesses interoperability of tools, develops design guidance, determines training requirements, and verifies procedures for ensuring safe, efficient and effective human system integration in transitions of NextGen capabilities.

Outputs 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.

By 2017, demonstrate that NextGen operations, procedures and information can be standard and predictable for users (e.g., pilots, controllers, airlines, passengers) at all types of airports and for all aircraft across the full range of environmental conditions.

Integration of air and ground capabilities poses 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.

The safety factors that primarily have an impact on separation assurance must be jointly approached by both the flight deck and air traffic research communities. The increased levels of automation and new enabling technologies that will likely transform the National Airspace System (NAS) in the future will bring new human factors challenges. As the NAS moves toward a more automated system and roles and responsibilities change in a series of planned steps, intent information as well as positive information on delegation of authority must be clear and unambiguous. This changing environment requires a close examination of new types of human error modes to manage safety risk in the human factors domain.

Equipment design methods, training, and procedures must be developed to decrease error likelihood and/or increase timely error detection, for example in the case of blunders on closely spaced parallel approaches.

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 NextGen environment will include an 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 researchers 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

Major activities and accomplishments planning include:

Roles and Responsibilities

- Define a taxonomy for describing the relationship between flight deck and ATC automated systems and human operators within NextGen applications.
- Assess human-automation coordination methods for performance costs and benefits in the context of near-term NextGen applications.

Human System Integration – Information Needs

- Determine which flight procedures and controller tasks are associated with NextGen applications, using task and information needs analysis techniques, and develop guidelines for each type of procedure in NextGen.
- Develop 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.
- Continue 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

- Develop 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.

Human System Integration – System Integration

- Complete research to identify human factors issues and potential mitigation strategies for the use of legacy avionics in NextGen procedures.
- Conduct research to support guidance for data communications procedures, training, displays and alerts.

Risk and Error Management

- Assess human error impact and mitigation in ADS-B applications including oceanic in-trail procedures, flight deck interval management, and closely spaced parallel operations.
- Develop 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.

Performance Linkages

The NextGen – Air-Ground Integration Human Factors Program supports the DOT strategic goal of Economic Competitiveness by leading U.S. transportation interests in targeted markets around the world through NextGen technologies.

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 2012 initiate research to assess pilot performance in normal and non-normal NextGen procedures, including single pilot operations.
  - 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 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 mid-term sees a shift to the management of traffic by trajectories (Trajectory-Based Operations) throughout the operation, including initial flight planning, all phases of the flight, and post-flight analysis. 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 time. 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.

In the mid-term timeframe, a data communications capability between the air and the ground will permit the initial transition to air-to-ground data communications exchanges. Implementation of data communications 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 (4D) 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 ATO 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?

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 NextGen Air Ground Integration Human Factors program would defer until FY 2013 the planned FY 2012 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 2012 – NextGen – Self-Separation Human Factors

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.d NextGen – Self-Separation Human Factors	$8,247,000	$9,934,000	+$1,687,000

For FY 2012, $9,934,000 is requested for NextGen – Self-Separation Human Factors. Major activities and accomplishments planned with the requested funding include:

Surface/Runway Operations Awareness

- Conduct 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.
- Initiate 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.
- Conduct 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

- Conduct 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, initiate 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 includes 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

- Initiate 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).
- Continue 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, continue research to support development of training guidance for NextGen applications and technologies.
- Continue research to develop risk and error management strategies to identify and mitigate human-system errors.
- Initiate research to develop recommendations for location and grouping of NextGen related displays relative to the primary field of view.

The program will continue 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 2017. Research priorities address the implementation of RTCA NextGen Task Force recommendations as described in the NextGen Implementation Plan. Research will continue 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.

Research will continue to:

- Enable reduced and delegated separation in oceanic airspace and en route airspace.
- Support development of training guidance for NextGen applications and technologies.
- Develop risk and error management strategies to identify and mitigate human-system errors.
- Develop recommendations for location and grouping of NextGen related displays relative to the primary field of view.

2. What Is This Program?

The NextGen – Self-Separation Human Factors Research Program 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.

Outputs include:

- Defining the potential impact and human factors issues of new technologies such as enhanced vision, synthetic vision, and electronic flight bags on separation activities.
- Defining human factors technical information needed to support the development of standards, procedures, and training by Flight Standards to implement NextGen applications.
- Developing procedures and training needed to implement new roles and responsibilities for pilots and controllers during trajectory operations.
- Defining human and system performance requirements for separation activities (e.g., spacing, merging, and passing).
- Developing and applying error management strategies, mitigating risk factors, and reducing automation-related errors associated with NextGen operations.
- Developing human factors criteria for the successful use of flight deck performance monitoring and decision support tools as they relate to NextGen operations.

Program researchers 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 research 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).

Major activities and accomplishments planning include:

Surface/Runway Operations Awareness

- Complete initial research to evaluate and recommend minimum display standards for use of enhanced and synthetic vision systems, as well as airport markings and signage, to conduct surface movements across a range of visibility conditions.
- 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.
- Conduct research on existing Synthetic Vision System (SVS) and EFVS to evaluate time required, accuracy, and pilot workload associated with recognizing and reacting to potential ground collisions or conflicts with other aircraft, vehicles and obstructions across a range of visibility and lighting conditions.

Reduced Separation

- For closely spaced parallel operations, continue research to determine CDTI requirements to support multiple simultaneous approaches, and evaluate workload and effects of blunder during the approach.

Delegated Separation

- Develop human performance models to predict errors and their impacts on performance for NextGen delegated separation operations.

Cross-cutting

- Continue development of a repository of NextGen human factors data, incorporating results of human factors research and human factors issues that surface during operational experience with systems and procedures relevant to near to mid-term NextGen applications.
- Evaluate the performance costs and benefits of various methods of decision support to include ability of human operators to understand automated system strengths and weaknesses.

<u>Performance Linkages</u>

The NextGen – Self Separation Human Factor Program supports the DOT Strategic Goal of Economic Competitiveness by leading U.S. transportation interests in targeted markets around the world through NextGen technologies.

Conduct R&D to 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 2012 complete initial research to evaluate and recommend minimum display standards for use of enhanced and synthetic vision systems, as well as airport markings and signage, to conduct surface movements across a range of visibility conditions.
  - By 2014 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 2015, complete research and provide human factors guidance to reduce arrival and departure spacing including variable separation in a mixed equipage environment.
  - By 2012 initiate research to evaluate alternative methods of allocating functions and coordinating between automated systems, pilots, Air Traffic Control (ATC), and Airline Operations Center (AOC) personnel in reduced and delegated separation procedures.
  - By 2014 complete research to identify likely human error modes and recommend mitigation strategies in closely spaced arrival/departure routings, including closely spaced parallel operations.
  - By 2015, enable reduced and delegated separation in oceanic airspace and en route corridors.
  - By 2013 complete initial research to provide recommended guidance for design of cockpit displays and alerts to support delegated separation.
- 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 (VMC) 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 ATO 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?

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?

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. Reduction in funding would delay the capability for 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' displays.

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 2012 – NextGen - Weather Technology in the Cockpit

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.e NextGen - Weather Technology in the Cockpit	$9,570,000	$9,186,000	-$384,000

For FY 2012, $9,186,000 is requested for NextGen - Weather Technology in the Cockpit. Major activities and accomplishments planned with the requested funding include:

- Develop preliminary Weather Technology in the Cockpit (WTIC) functional and performance requirements from the adjudicated WTIC mid-term ConOps.
- Develop icing and turbulence products to disseminate signal latency, bandwidth, and quality of service requirements to the flight deck.
- Develop minimum requirements for the flight deck to support the management of meteorological (MET) information communications, storage and retrieval, and data latency.
- Identify the functional and performance requirements for a high-fidelity WTIC simulation, test and evaluation capability.
- Evaluate 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.
- Demonstrate and evaluate the usefulness of the uplinking turbulence eddy dissipation rates (EDR) to flight deck for aircrew mitigation procedures.
- Equip aircraft to support aircrew evaluations of graphical icing and turbulence and cloud tops presentations.
- Implement Turbulence EDR algorithms including joint effort with aircraft manufacturers.

Research will include the expansion of the flight demonstration and evaluation to uplink in-flight display of 30kft and 40kft convective cloud top heights to include flights into the Gulf of Mexico, Caribbean, and South America regions and to Atlantic flights to Europe and Africa; support the development of AIS/MET datalinks Minimum Operation Performance Standards and Minimum Aviation Safety Performance Standards with the commercial industry through RTCA Special Committees and EUROCAE 186/WG-51, 206/WG-76, 214/WG-78, 217/WG-44, 222, and 223; evaluation of the global communications demand, bandwidth, quality of service, security, latency, and coverage requirements to uplink, downlink, and crosslink MET information via broadcast and request and reply datalink services, and the research and development of a conceptual approach to sustain a common weather picture between the ground and onboard weather systems with human-in-the-loop evaluations.

Efforts will include the transitioning of the in-flight display demonstrations and evaluations of cloud tops, graphical turbulence and icing products, and EDR Turbulence to electronic flight bags (EFB) or Multifunctional Displays (MFD). The development of the minimum requirements for the flight deck to support the management of MET information communications, storage and retrieval, and data latency, the minimum requirements for human computer interface, MET information presentation, and intent of use for EFB/MFD, human factors interfaces and automated prototype weather information integration modules for flight deck technologies (e.g., FMS, EFB, etc.); initiate a study to identify the requirements to develop a high-fidelity WTIC simulation, test and evaluation capability; and define a path for further development of airborne network-enabled use of radar-derived weather data capabilities that will advance cockpit systems to meet NextGen objectives (collaboration with NASA).

2. What Is This Program?

One of the weather-related goals of NextGen is to reduce weather delays, allowing more efficient and flexible ATM. The objective of the NextGen - Weather Technology in the Cockpit Program is to enable flight deck weather information and communications management minimum standards and human factors requirements that will provide flight crews with timely, comprehensive weather information from on-board sensors, cross-link from nearby aircraft, and up-link from ground-based processors to support flight re-planning and weather hazard avoidance in flight, as well as airborne sensor observations to nearby aircraft for weather avoidance decisions and ground-based processors for direct and forecast use in ATM decision-support processes.

The initial research will evaluate the overarching NextGen ConOps and requirements for NextGen weather support on the flight deck; identify the current capabilities to meet NextGen requirements, evaluate planned and funded development of new weather support capabilities; identify gaps between NextGen requirement and current developing weather support capabilities; allocate gaps to commercial sector, government, or both and NextGen Solution Sets to derive WTIC functional and performance requirements; and finally develop and execute the WTIC research program plan.

The WTIC program will also identify global datalink requirements and standards to transport meteorological (MET) information to and from the flight deck. The WTIC program requires datalinks to support uplink, downlink, and crosslink advisory and safety critical MET information to Parts 91, 121, and 135 NAS users in various coverage environments. Consequently, the WTIC program will define requirements and standards for bandwidth, security, quality of service, and reliability to the government and non-government operated datalinks to implement the MET datalink information.

In addition, the 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, both on the flight deck and on the ground in hazardous weather. Although, technologically advanced graphical weather information products have entered the general aviation (GA) market in the recent decade, the percentage of accidents that has an attributed the cause to weather or weather-related pilot error has remained fairly stable (NTSB, 2006, 2008, 2009). The HF research will attempt to identify the shortcomings in current capabilities and to identify areas 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 of development aircraft certifications 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, demonstrate that technology and automation, combined with policy, procedures, and regulatory oversight, meets the Next Generation Air Transportation System (NextGen) goal to improve aviation safety in the presence of adverse weather not anticipated during prelight. Demonstrations will show the technology and automation used in the cockpit provides pilots and aircrews with the safest and most efficient route for aircraft traversing areas impacted by adverse weather conditions.

The germane characteristics of the technology generally identified 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. However, in the far term, the technology and automation envisioned in the NextGen ConOps is expected to migrate to automated processing via machine-to-machine interface between ground-based and aircraft systems (e.g., analysis and processing of data and information are performed automatically and recommendations are provided to the human overseeing the aircraft operation). As a result, the NextGen ConOps differs dramatically from current operations regarding weather procedures; therefore, an examination of the NextGen goals and related procedures is warranted.

The NextGen - Weather Technology in the Cockpit 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 NextGen - Weather Technology in the Cockpit 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.

Major activities and accomplishments planning include:

- Develop mid-term ConOps and obtained partner, stakeholder, and user concurrence for weather technology in the cockpit based on foundational elements identified in the NextGen ConOps, including integration of weather-in-flight-deck decision-support tools, weather dissemination management, and GA operations.
- Validate ARP 5740, Cockpit Display of Data Linked Weather Information.
- Determine the incremental weather information needed in cockpit operations for flight replanning and en route avoidance maneuvers, decision support, and situational awareness (for FAR Parts 121, 135, 91).
- Verify and validated NAS datalinks signal latency, bandwidth, and quality of service to disseminate icing and turbulence products to the flight deck within the NAS.
- Demonstrate the usefulness of an in-flight display of uplinked satellite-based product that outlined 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.
- Initiate the demonstration and evaluation of the usefulness of the uplinking turbulence eddy dissipation rates (EDR) to flight deck for aircrew mitigation procedures.
- Equip selected aircraft with certified EFBs to accomplish flight crew evaluations of convective oceanic cloud top flight, graphical turbulence and icing operational evaluation.

- Implement Turbulence EDR algorithms including joint effort with aircraft manufacturers.
- Investigate means for airborne network-enabled use of radar-derived weather data (collaboration with NASA).

Performance Linkages

The NextGen - Weather Technology in the Cockpit 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 2012, simulate and validate data-linked bandwidth, quality of service, security, and latency standards requirements for meteorological information to the cockpit.
- By FY 2012, develop MET Symbology use cases for human-in-the loop demonstrations.
- By FY 2012, demonstrate inflight cockpit display of data-linked hazardous weather for transoceanic aircraft.
- By FY 2013, develop human factors interfaces and automated prototype weather information integration modules for flight deck technologies (e.g., FMS, EFB, etc.).
- By FY 2014, simulate and validate cockpit use of data-linked weather decision support tools, including probabilistic forecasts.
- By FY 2014, high fidelity integrated weather technology in the cockpit simulation, test, and evaluation capability to facilitate new technologies assessments and human-in-the-loop evaluation of NextGen operational concepts.
- By FY 2014, evaluate concepts of use for weather information integrated in NextGen air and ground capabilities for airline operations centers and pilots.
- 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 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.

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)". Between 1994 and 2003, there were 19,562 aircraft accidents involving 19,823 aircraft. Weather was a contributing or causal factor in 4,159 (21.3 percent) of these accidents. Of the 4,159 weather-related accidents, 4,167 aircraft were involved. From 1994 to 2003, the annual number of weather-related accidents has declined. However, the annual number of weather-related accidents has remained roughly constant as a percentage of total accidents. An example of the limits of pilots' ability to cope with severe weather is the crash of an Air France jet last year over the Atlantic Ocean, killing all 216 passengers and 12 crew members. Pilots currently have little information as they fly over remote stretches of the ocean, which is where some of the worst turbulence occurs. Providing pilots with at least an approximate picture of developing storms could help guide them safely around potentially severe weather.

Having access to more weather hazard information in the cockpit does not, however, 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 intent of this program is to identify why the introduction of state-of-the-art weather information products have not dramatically improved the safety of GA operations concerning weather. This information will be leveraged for identifying shortcomings in current capability to support pilot weather decision making and identify areas to focus NextGen technology advancements to optimize the safety and efficiency of flight operations in hazardous weather for Parts 91, 135 & 121. The key is to provide high quality weather decision support tools to enable efficient flight replanning and enroute avoidance maneuvers in the presence of adverse weather not anticipated during preflight with a focus upon NextGen operations.

The WTIC Program research is to insure the adoption of cockpit, ground, and communication technologies, practices, and procedures that will provide pilots with shared and consistent weather information to enhance situational awareness, plus engage the aircrafts as a "network node" that autonomously exchanges weather information with surrounding aircraft and systems. The aircraft industry is moving toward Electronic Flight Bags (EFB) to enable secondary flight data information management and display. The shift in processing from the ground to the air requires significant increase in computing power which potentially can be supported with EFB technologies. The WTIC Program research will address the technologies, standards, requirements, and procedural gaps to enable a WTIC capability to be implemented in NextGen.

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?

A reduction in the WTIC FY 2012 total funding will impact the WTIC Airborne Sensor Technologies effort. A two percent reduction would have a minor impact to define a path for further development of airborne network-enabled utilization of radar-derived weather data capabilities. The impact will require NASA to adjust the FY 2012 planned deliverable schedule.

A further reduction will require NASA to rescope the total effort to develop a network-enabled utilization of airborne radar-derived weather data capabilities. This reduction will impact flight demonstration of the capabilities in the out years (FY 2014 and 2015); therefore, the program will not be able to test the fully network-enabled utilization of airborne radar-derived weather data capabilities.

Detailed Justification for – A13.a Environment and Energy

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

FY 2012 –Environment and Energy

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A13.a Environment and Energy	$15,522,000	$15,327,000	-$195,000

For FY 2012, $15,327,000 is requested for Environment and Energy. Major activities and accomplishments planned with the requested funding include:

Noise and Emissions Analyses and Interrelationships

- Complete annual assessment of noise exposure and fuel burn.
- Develop integrated architecture for noise and emissions modules communications.
- Develop model for assessing global exposure to noise from transport aircraft.
- Validate methodologies used to assess aviation noise exposure and impacts as well as emissions and their impacts on air quality and climate change.
- Publish updates for airport air quality analysis handbook.
- Develop guidance document for estimating and reducing emissions from airport ground-support equipment.
- Continue integration and harmonization of databases and code management protocols.
- Continue 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.
- Develop and disseminate a preliminary planning version of Aviation Environmental Design Tool (AEDT) that will allow integrated assessment of noise and emissions inventories at the local, regional, and global levels.
- Develop methodology for use in AEDT to analyze open rotor aircraft noise and tradeoffs.

Aircraft Noise

- Continue 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.
- Assess land use practices and investigate mitigation strategies beyond 65 dB DNL.
- Continue investigation of feasibility of more stringent international noise certification standards for transport category and subsonic jet airplanes.
- Initiate studies to develop a new international noise standard for small prop engines and helicopters.
- Conduct pilot studies to develop relationships between noise exposure and health and welfare impacts.
- Advance methodologies to model noise propagation and structural response for current and potential future unconventional aircraft configurations.
- Investigate metrics for noise exposure from non-conventional open rotor and supersonic aircraft.

- Apply methodologies to incorporate potential health impacts of aircraft noise exposure within APMT.
- Assess potential global benefits of using newly developed noise-reduction technologies and identify technology goals for long-term reduction of aircraft noise.
- Update noise research roadmap.
- With the Aviation Emissions activity, conduct two COE-focused sessions at a national and an international conference.
- Publish COE PARTNER research findings.

Aviation Emissions

- Assess technological and scientific basis to support future ICAO engine emission standards.
- Advance science and develop metrics and reduce uncertainties in assessment of regional and global climate impacts of aviation.
- Advance and exercise multiscale air quality analysis models for impacts of airport and full flight aircraft emissions.
- Evaluate and publish sampling, measurement and analyses techniques and procedures for aircraft emissions testing and certification that are both harmonized and simplified.
- Develop measurement and sampling protocols and expand databases for aviation emissions of Hazardous Air Pollutants (HAPs) and PM.
- Validate modeling capability for dispersion of chemically reactive aircraft plume.
- Apply methodologies to incorporate air quality and health impacts of aircraft emissions within APMT.
- Assess potential global benefits of using newly developed emissions-reduction technologies, and identify technology goals for long-term reduction of aircraft engine emissions and fuel burn.
- With the Aircraft Noise activity, conduct two COE-focused sessions at a national and an international conference.
- Publish COE PARTNER research findings.

In FY 2012, the Energy and Environment Program will continue to focus on multiple fronts to support the Strategic 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 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 Strategic 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 Strategic Plan Noise Exposure Performance Target to reduce the number of people exposed to significant noise by four percent compounded annually through FY 2013 from the calendar year 2005.
- The Strategic Plan Aviation Fuel Efficiency Performance Target to improve aviation fuel efficiency by one percent per year through FY 2013 to 11 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 2012 Target is 10 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 Strategic 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.

Major activities and accomplishments planning include:

Noise and Emissions Analyses and Interrelationships

- Continue upgrades to AEDT, APMT and EDS including enhanced methodologies for noise, emissions and fuel burn calculations, harmonization of databases and modules for tools communication, integration and assessment as well as application of these aviation environmental tools for annual noise exposure and fuel burn assessments for Strategic Plan and for cost-benefit and other analyses to support CAEP program.

Aircraft Noise

- Continue to update procedures and technical guidance for aircraft noise certification. Initiate feasibility studies for more stringent international aircraft noise certification standards. Continue work on many fronts including assessment of land-use practice and investigation of mitigation strategies beyond 65dB DNL; characterization of aircraft noise and its propagation; and improved understanding and representation of metrics for noise exposure and related health and welfare impacts.

Aviation Emissions

- Continue to develop and publish procedures and technical guidance materials for engine emissions testing and certification, improved characterization of aircraft emissions and modeling analysis capability for air quality and climate impacts; assess related health and welfare impacts; and advance best practices for aircraft emissions measurements.

<u>Performance Linkages</u>

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:

- By FY 2013, develop and field a fully validated Aviation Environmental Design Tool (AEDT).
- By FY 2013, advance further development of Aviation Portfolio Management Tool (APMT) and Environmental Design Space Tool (EDS) and employ them for cost-benefit analyses and aircraft technology evaluation, respectively.
- By FY 2013, use collected Hazardous Air Pollutants (HAPs) and PM emissions data, directly measured from aircraft engines to replace, to the extent possible, approximation methods and factors used in modeling tools.
- 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 FY2015, advance multiscale air quality modeling capability for aviation health impacts and employ for environmental cost-benefit analyses.
- By FY2015, advance characterization of aviation noise and related health and welfare impacts and employ for environmental cost-benefit analyses.
- By FY2016, Advance scientific approaches and methodologies for improved integrated analysis of noise and emissions inventories and impacts.

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 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?

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.

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 2012 – NextGen Environmental Research – Aircraft Technologies, Fuels, and Metrics

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A13.b NextGen Environmental Research – Aircraft Technologies, Fuels, and Metrics	$26,509,000	$20,523,000	-$77,000

For FY 2012, $20,523,000 is requested for NextGen Environmental Research – Aircraft Technologies, Fuels, and Metrics. Major activities and accomplishments planned with the requested funding include:

Major activities and accomplishments planned with the requested funding include:

Technology Maturation

- Fabricate advanced aircraft component level flight test hardware.
- Integrate advanced low NOx combustor on engine demonstrator.
- Begin integration flight management system for flight demonstration.
- Conduct component level engine rig tests.
- Complete preliminary design review of advanced engine configuration for demonstration.
- Advance turbine blades and ceramic matrix composite turbine component for integration and testing.

Alternative Turbine Fuels

- Conduct demonstration testing for renewable alternative fuels.
- Conduct safety assessment for renewable alternative fuels.
- Conduct performance and environmental assessment of additional candidates for "drop-in" renewable alternative fuels.
- Assess production capacity and commercial fleet infusion of aviation alternative fuels.
- Initiate transition plans for alternative fuels.
- Identify additional candidates for "drop-in" aviation alternative fuels.

Metrics, Goals and Targets

- Evaluate noise and emissions impacts metrics for use in Next Generation Air Transportation System (NextGen) environmental analysis.
- Perform integrated NextGen noise and emissions impacts analysis.
- Initiate second phase of Aviation Climate Change Research Initiative (ACCRI) for assessment of aviation climate impacts.
- Refine and assess intermediate targets towards meeting NextGen environmental goals.

In FY 2012, 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 will focus on safety, performance and environmental assessments for qualification of renewable alternative fuels. Activities will also initiate to assess production capacity and fleet infusion as well as to develop transition plans for alternative fuels. On the Metrics, Targets and Goals front, activities will continue to refine and evaluate metrics for NextGen environmental impacts, advance capability for and assessment of environmental noise, air quality and climate impacts. This also includes improved climate impacts assessment under second phase of ACCRI activities. The work will also continue 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 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; and
- 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; and
- 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 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.

Major activities and accomplishments planning include:

Noise, emissions, and fuel burn reduction technologies maturation

- Advance CLEEN systems analyses for most promising technologies.
- Continue CLEEN component-level tests for most CLEEN promising technologies.
- Initiate Round 2 ground rig tests and continued design of CLEEN demonstration experiment.

Alternative turbine engine fuels

- Complete detailed feasibility study, including economic feasibility, environmental impacts, and assessment of potential for gas turbine renewable alternative fuels.
- Develop federally-agreed methodology to conduct environmental impact life cycle analyses for a range of renewable alternative turbine fuels.
- Initiate efforts to experimentally assess environmental impacts and benefits and costs of renewable alternative turbine engine fuels.

NextGen environmental metrics, goals, and targets

- Continue analysis of targets to achieve NextGen environmental goals.

- Continue efforts to determine how projected NextGen operations-generated emissions and noise impact human health and welfare and global climate and identify key uncertainties.
- Continue comprehensive, integrated assessment of NextGen air quality and noise impacts.

Performance Linkages

The NextGen Environmental Research – Aircraft Technologies, Fuels, and Metrics program supports DOT strategic goal of environmental sustainability by increasing the use of environmentally sustainability 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 2016, 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 develop plans for potential second phase of CLEEN program.

Airframe and engine technologies supporting milestones:

- By FY 2012, fabricate advanced aircraft component flight test hardware and complete flight tests.
- By FY 2012, integrate advanced low NOx combustor on engine demonstrator and conduct engine tests.
- BY FY 2012, Begin flight management system (FMS) demonstration.
- BY FY 2012, conduct preliminary design review for advanced engine configuration testing.
- By FY 2012, perform acoustic validation testing and analysis to verify noise reduction predictions.
- By FY 2012, characterize and test aircraft material properties for noise reduction.
- By FY 2013, perform detailed design review of advanced turbine blade cooling configuration and materials.
- By FY 2013, perform testing of exhaust system components.
- By FY 2013, perform detailed design review and component manufacture for advanced engine configuration testing.
- By FY 2013, perform acoustic validation testing and analysis to verify noise reduction predictions.
- By FY 2014, characterize and test aircraft material properties for noise reduction.
- BY FY 2014, perform ground test for advanced engine configurations.
- By FY 2014, complete testing of Flight Management System.
- By FY 2015, perform flight tests for advanced engine configurations.
- By FY 2015, develop plans for analyses and demonstration of evolving technologies in a potential second phase to CLEEN.
- By FY 2016, develop plans for analyses and demonstration of evolving technologies in a potential second phase to CLEEN.

By FY 2015, 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 2012, conduct demonstration testing for renewable alternative fuels.
- BY FY 2012 conduct safety assessment for renewable alternative fuels.
- By FY 2012, conduct performance and environmental assessment of additional candidates for "drop-in" renewable alternative fuels.

- By FY 2012, assess production capacity and commercial fleet infusion of aviation alternative fuels.
- By FY 2012, initiate transition plans for alternative fuels.
- By FY 2012, identify additional candidates for "drop-in" aviation alternative fuels.
- By FY 2013, conduct safety assessment of renewable fuels.
- By FY 2013, conduct significant demonstration of additional drop-in alternative turbine engine fuels.
- By FY 2013, complete renewable alternative turbine engine fuels safety, environmental, and business case assessments.
- By FY 2014, complete transition plans for drop-in alternative fuels.
- By FY 2014, complete renewable fuels safety assessment.
- By FY 2015, complete transition plans for renewable alternative fuels.
- By FY 2016, identify and initiate assessment of non-drop-in fuels.
- By FY 2015, conduct initial feasibility study, including economic feasibility, environmental impacts, and assessment of potential for non-drop-in alternative aviation fuels.
- By FY 2016, conduct a demonstration of the performance characteristics of a non-drop-in alternative aviation fuel.

By FY 2016, investigate metrics, uncertainties on aviation emissions health and welfare and climate impact to facilitate NextGen EMS implementation.

Metrics supporting milestones:

- By FY 2012, initiate the second phase of Aviation Climate Change Research Initiative to reduce uncertainties in aviation climate impacts and refine associated magnitude.
- By FY2012, Evaluate noise and emissions impacts metrics and perform NextGen environmental analyses
- By FY 2013, continue refinements of aviation environmental impacts and metrics.
- By FY 2013, reduce key uncertainties of aviation impacts to levels that better inform appropriate action.
- By FY 2013, refine estimates of interim NextGen environmental targets and perform gap analyses.
- 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.

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 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?

Any reduction in the requested budget will reduce and 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 ACCRI. Delay in advancing progress in these areas will 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.

Detailed Justification for – A14.a System Planning and Resource Management

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

FY 2012 – System Planning and Resource Management

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A14.a System Planning and Resource Management	$1,766,000	$1,718,000	-$48,000

For FY 2012, $1,718,000 is requested for System Planning and Resource Management. Major activities and accomplishments planned with the requested funding include:

R,E&D Portfolio Development

- Prepare the FY 2013 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 2013.
- Support the REDAC in its preparation of other reports, as requested by the Administrator.
- Deliver the 2011 National Aviation Research Plan (NARP) to the Congress with the President's FY 2012 Budget.

Research Partnerships

- Coordinate R&D activities with internal and external partners.
- Begin 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

- 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 2014 program, review the proposed FY 2014 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 2012, this initiative will begin to measure quality, timeliness, and value of collaboration, expanding upon work accomplished in prior fiscal 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.

In FY 2012, FAA will perform the following:

R,E&D Portfolio Development

- Publish the annual NARP.
- Manage the R,E&D portfolio development.
- Prepare the annual R,E&D budget submission.
- Host two REDAC meetings and multiple subcommittee meetings. The Committee provides advice on and reviews plans for the annual FAA R&D budget, and produces periodic and special reports providing advice and recommendations to FAA on its R&D portfolio.

Research Partnerships

- Establish and cultivate research partnerships both domestically and internationally to leverage programs, laboratories, and facilities to support the implementation of Next Generation Air Transportation System (NextGen) operational improvements.
- Manage the formulation and execution of interagency agreements and action plans with external research partners such as the National Aeronautics and Space Administration (NASA), Air Force Research Lab, the European Organization for the Safety of Air Navigation (EUROCONTROL), and Single European Sky Air Traffic Management Research (SESAR) Joint Undertaking.
- Identify, validate, and catalog existing and needed research and technology activities internal and external to FAA to support the operational needs of the FAA's National Airspace System Enterprise Architecture.
- Conduct the 2011 USA/Europe Air Traffic Management R&D Seminar on NextGen and SESAR.

Performance Measurement

- Develop a strategic mapping for international collaboration.
- Identify a process to measure quality, timeliness, and value of collaboration.

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.

Major activities and accomplishments planning include:

R,E&D Portfolio Development

- Prepare the FY 2013 R,E&D budget submission.
- Manage FAA's R,E&D portfolio to meet efficiency goals.
- Obtain REDAC recommendations on planned R,E&D investments for FY 2013.
- Support the REDAC in its preparation of other reports, as requested by the Administrator.
- Deliver the 2011 NARP to the Congress with the President's FY 2012 Budget.

- Develop a strategic mapping for international research collaboration.
- Identify a process to measure quality, timeliness, and value of international research collaboration.

Research Partnerships

- Coordinate R&D activities with internal and external partners.
- Conduct the 2011 U.S.A/Europe Air Traffic Management R&D Seminar on NextGen and SESAR.
- Update the Integrated Plan for Research Transition Teams with NASA.

Performance Measurement

- Develop strategic mapping for international research collaboration.
- Identify a process to measure quality, timeliness, and value of international research collaboration.

Performance Linkages

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 2012, 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 2012, publish the NARP, which documents the annual R&D budget portfolio, describes activities of the REDAC, and contains the FY 2012-2016 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 as well as to submit to Congress each year, the mandatory plan for the FAA research and 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 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?

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 2012 – William J. Hughes Technical Center Laboratory Facility

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A14.b William J. Hughes Technical Center Laboratory	$4,588,000	$3,777,000	-$811,000

For FY 2012, $3,777,000 is requested for the William J. Hughes Technical Center (WJHTC) Laboratory Facility. Major activities and accomplishments planned with the requested funding include:

Simulation Facilities

- The Simulation Team will achieve four fully functional cockpit simulators in the Cockpit Simulation Facility.
- The Simulation Team will fully integrate Target Generator Facility (TGF) into the Next Generation Air Transportation System (NextGen) Integration and Evaluation Capability (NIEC) simulation environment.
- The Simulation Team will support FAA involvement in the Research Park located near the William J. Hughes Technical Center.

Flight Program's Airborne Laboratories

- The Flight Program will be enhancing test aircraft(s) to allow participation in Weather in the Cockpit development and testing.
- The Flight Program anticipates the installation of an Enhanced Vision System into the Bombardier Global 5000 aircraft in support of the Airport Lighting Program.
- It is anticipated that the Flight Program will be support "Self Separation" procedure development and flight testing.

Concepts and Systems Integration

- Support 4DT profiles
- Integrate Traffic Flow Management Auxiliary Platform into the NIEC.
- Develop 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 will continue to modify, configure, and sustain these research facilities located at the WJHTC to support its R&D program goals.

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, including the Human Factors Laboratory and the NIEC.

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 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 southern Florida. 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 southern Florida, the Gulf of Mexico and Juneau 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 UFA, Inc., to quantify voice recognition and response (VRR) system performance in Technical Center Human in the Loop (HITL) simulations.

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

- Dynamic Vertical Reduced Separation Minima
- UAS
- ADS-B Concept Evaluation

Research & Development Flight Program – Airborne Laboratories

- Satellite Communications and Navigation Programs
- Separation Standards
- WAAS
- Terminal Instrumentation Procedures
- Safety
- Runway Incursion
- NextGen
- Local Area Augmentation System (LAAS)
- ADS-B
- Common Automated Radar Terminal System

Concepts and System Integration Facilities

- ATC Human Factors
- Airway Facilities Human Factors
- NextGen Concept Validation Studies
- Unmanned Aerial Systems
- ADS-B
- Data Communications (Data Comm)

Major activities and accomplishments planning include:

Simulation Facilities

- Full realization of TGF's capability to support ATC tower visualization and surface movement studies. This capability supports research in the areas of runway incursions, and taxi clearances.
- The Cockpit Simulation Facility will have achieved a fully integrated simulation environment with its B-737-800/900, EMB-175, and A-320 simulators.

Flight Program's Airborne Laboratories

- The Flight Program work to enhance the flying laboratories to meet the anticipated future needs of our flight test customers. These include the capability to capture all "Flight Data Recorder" information and make it available to project personnel in a variety of formats. The first aircraft to be equipped with this capability will be the Global 5000.
- The Flight Program will be participating in Alternate Fuels testing, modifying test aircraft and performing various flight tests.

Concepts and Systems Integration

- The Human Factors team continues to merge results from three ongoing projects: FEWS, FTWS and TODDS. Lessons learned will be applied to continued development work on the common automation platform to create one UI for all ATC environments.
- The NIEC team will continue to improve laboratory capabilities and integrate new tools and systems to support NextGen studies. Staffed NextGen Study Phase 2 will run early FY11.

<u>Performance Linkages</u>

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 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?

A reduction of funding to this program will reduce the number of fully functional cockpit simulators from four to three available in FY2012 to support complex human-in-the-loop, end-to-end airspace simulations for research, development, operational test and evaluation, and integration of NextGen into the NAS, including Trajectory Based Operations development support.

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, $3,600,000,000, 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 $3,515,000,000 in fiscal year 2012, 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 $101,000,000 shall be obligated for administration, not less than $15,000,000 shall be available for the airport cooperative research program, not less than $29,250,000 shall be for Airport Technology Research.

GRANTS-IN-AID FOR AIRPORTS

Program and Financing (in millions of dollars)

Identification code: 69-8106-0-7-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
	Direct Program:			
0001	Grants-in-aid for airports	3,474	3,379	3,370
0002	Personnel and related expenses	91	93	101
0003	Airport technology research	22	22	29
0005	Small community air service	6	6	. . . .
0006	Airport Cooperative Research	15	15	15
0100	Total direct program	3,608	3,515	3,515
0801	Reimbursable program	1	1	1
0900	Total new obligations	3,609	3,516	3,516
	Budgetary resources available for obligation:			
1000	Unobligated balance carried forward, start of year	395	4	189
1021	Recoveries of prior year unpaid obligations	96	. . . .	. . . .
1050	Unobligated balance (total)	491	4	189
	New budget authority (gross), detail:			
	Discretionary:			
1102	Appropriation (trust fund)	3,000	3,000	3,600
1137	Appropriation applied to liquidate contract authority	-3,000	-3,000	-3,600
1160	Appropriation (total discretionary)	. . . .	. . . .	. . . .
1600	Contract authority(mandatory)	3,515	3,700	3,700
1621	Unobligated balance permanently reduced	-394	. . . .	. . . .
1640	Contract authority (total mandatory)	3,121	3,700	3,700
1700	Spending authority from offsetting collections	1	1	1
1900	Total budget authority (gross)	3,121	3,701	3,701
1930	Total Budgetary Resources Available	3,613	3,705	3,890
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	4	189	374
	Change in obligated balances:			
3000	Obligated balance, start of year	4,703	4,933	5,030
3030	Total new obligations	3,609	3,516	3,516
3040	Total outlays (gross)	-3,283	-3,419	-3,811
3080	Recoveries of prior year obligations	-96	. . . .	. . . .
3090	Unpaid obligations, end of year (gross)	4,933	5,030	4,735
	Budget authority and outlays , detail:			
4000	Budget authority, gross (discretionary)	1	1	1
4010	Outlays from new discretionary balances	617	693	698
4011	Outlays from discretionary balances	2,666	2,726	3,113
4080	Outlays, net (discretionary)	3,282	3,418	3,810
4090	Budget authority, gross (mandatory)	3,121	3,700	3,700
	Offsets:			
	Against gross budget authority and outlays:			
4033	Offsetting collections (cash) from: Non-Federal sources	-1	-1	-1
	Net budget authority and outlays:			
4180	Budget authority	3,121	3,700	3,700
4190	Outlays, net (total)	3,282	3,418	3,810

	Memorandum (non-add) entries:			
5052	Obligated balance, SOY: contract authority	3,555	3,676	4,376
5053	Obligated balance, EOY: contract authority	3,676	4,376	4,476
5061	Limitation on obligations (Trust Funds)	3,515	3,515	3,515

Summary of Budget Authority and Outlays (in millions of dollars)

	FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
Enacted/requested:			
Budget Authority	3,121	3,700	3,700
Outlays	3,282	3,418	3,810
Legislative proposal, not subject to PAYGO:			
Budget Authority	....	....	-1,276
Outlays	....	....	-197
Total:			
Budget Authority	3,121	3,700	2,424
Outlays	3,282	3,418	3,613

Subchapter I of chapter 471, title 49, U.S. Code (formerly the Airport and Airway Improvement Act of 1982, as amended) 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 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Direct obligations:			
	Personnel compensation			
1111	Full-time permanent	55	58	63
1113	Other than full-time permanent	1	1	1
1115	Other personnel compensation	1	1	1
1119	Total personnel compensation	57	60	65
1121	Civilian personnel benefits	16	17	18
1210	Travel and transportation of persons	4	4	4
1252	Other services	48	49	50
1260	Supplies and materials	1	1	1
1310	Equipment	1	1	1
1410	Grants, subsidies, and contributions	3,481	3,383	3,376
1990	Subtotal, direct obligations	3,608	3,515	3,515
2990	Reimbursable obligations	1	1	1
9999	Total new obligations	3,609	3,516	3,516

Personnel Summary

Identification code: 69-8106-0-7-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
1001	Direct: Civilian full-time equivalent employment	547	557	572
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 2012 shall be reduced by $1,091,000,000.

GRANTS-IN-AID FOR AIRPORTS
Program and Financing
(in millions of dollars)

Identification code: 69-8106-2-7-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
	Direct Program:			
0001	Grants-in-aid for airports	....	....	-1,091
0900	Total new obligations (object class 41.0)	....	....	-1,091
	New budget authority (gross), detail:			
	Discretionary:			
1600	Contract authority (mandatory)	....	....	-1,276
1930	Total budget authority (gross)	....	....	-1,276
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	....	....	-185
	Change in obligated balances:			
3030	Total new obligations	....	....	-1,091
3040	Total outlays (gross)	....	....	197
3090	Unpaid obligations, end of year (gross)	....	....	-894
	Budget authority and outlays , detail:			
4010	Outlays from new discretionary balances	....	....	-197
4090	Budget Authority, gross	....	....	-1,276
	Net budget authority and outlays:			
4180	Budget authority	....	....	-1,276
4190	Outlays, net (total)	....	....	-197
	Memorandum (non-add) entries:			
5053	Obligated balance, EOY: contract authority	....	....	-1,276
5061	Limitation on obligations (Trust Funds)	....	....	-1,091

The Budget proposes to lower funding for the ongoing airport grants program to $2.4 billion, a reduction of $1.1 billion, by eliminating guaranteed funding for large and medium hub airports. The Budget proposal 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 $3.1 billion in one-time funding that will be made available under the President's infrastructure proposal targeted at investments 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	....	....	-1,091
9999	Total new obligations (object class 41.0)	....	....	-1,091

GRANTS-IN-AID FOR AIRPORTS
(Legislative proposal, subject to PAYGO)

Program and Financing
(in millions of dollars)

Identification code: 69-1305-4-1-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
	Direct Program:			
0001	Grants-in-aid for airports	....	....	2,325
0900	Total new obligations	....	....	2,325
	Budgetary authority, Appropriation, Mandatory:			
1200	Appropriation	....	....	3,100
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	....	....	775
	Change in obligated balances:			
3030	Obligations incurred, unexpired accounts	....	....	2,325
3040	Outlays (gross)	....	....	-496
	Budget authority and outlays, net, Mandatory:			
4090	Budget authority, gross	....	....	3,100
4100	Outlays from new mandatory authority	....	....	496
	Net budget authority and outlays:			
4180	Budget authority	....	....	3,100
4190	Outlays, net (total)	....	....	496

To spur job growth and allow States to initiate sound multi-year investments, the Budget includes a $50 billion boost above current law spending for roads, railways and runways. The Budget requests a one-time appropriation of $3.1 billion in mandatory General Fund resources for the Grants-in-Aid program. Most of this funding will be used for runway construction and other airport improvement projects aimed at increasing overall system efficiency in the future.

Object Classification
(in millions of dollars)

Identification code: 69-1305-4-1-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Direct obligations:			
1410	Grants, subsidies, and contributions	....	....	2,325
9999	Total new obligations	....	....	2,325

GRANTS-IN-AID FOR AIRPORTS
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	FY 2010 ACTUAL	FY 2011 CR (ANNUALIZED)	FY 2012 REQUEST	CHANGE FY 2010-2012
Grants-in-Aid for Airports				
AATF	3,378,106	3,378,106	2,278,750	(1,099,356)
General Fund	0	0	3,100,000	3,100,000
Personnel & Related Expenses	93,422	93,422	101,000	7,578
Airport Technology Research	22,472	22,472	29,250	6,778
Airport Cooperative Research	15,000	15,000	15,000	0
Small Community Air Service[1]	6,000	6,000	0	(6,000)
TOTAL	**3,515,000**	**3,515,000**	**5,524,000**	**2,009,000**

FTEs				
Direct Funded	547	557	572	25
Reimbursable	1	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]The $6 million for the Small Community Air Service was transferred to the Department of Transportation to administer.

Executive Summary: Grants-in-Aid for Airports

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

For FY 2012, FAA requests $5.524 billion, which includes $3.1 billion from the President's infrastructure proposal, to fund the Grants-in-Aid for Airports program, commonly known as the AIP. This is an increase of $2 billion (57 percent) above the FY 2010 enacted level. The Budget proposes to lower funding for the ongoing airport grants program to $2.4 billion, a reduction of $1.1 billion, by eliminating guaranteed funding for large and medium hub airports, consistent with the recommendation of the President's National Commission on Fiscal Responsibility and Reform.

In addition, FAA requests a one-time appropriation of $3.1 billion in mandatory General Fund resources for the Grants-in-Aid program. To spur job growth and allow States to initiate sound multi-year investments, the Budget includes a $50 billion boost above current law spending for roads, railways and runways, of which $3.1 billion is for airport grants. Most of this funding will be used for runway construction and other airport improvement projects aimed at increasing overall system efficiency in the future.

The improvements that Grants-in-Aid provide reduce the risk of runway incursions by reconfiguring taxiways, perimeter service roads and other facilities. They preserve or enhance airfield capacity and efficiency at airports nationwide, as well as the safety of critical airfields and other airport infrastructure.

2. What Is The Program?

The Airport Improvement Program (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 general aviation 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 plan included in the NPIAS. The latest NPIAS, which was published in 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.

GRANTS-IN-AID FOR AIRPORTS

Grants-in-Aid for Airports (AATF)
($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2010 Actual	**3,378,106**	**0**	**0**
Discretionary Increases/Decreases			
1. Grants-in-Aid for Airports	(1,099,356)		
Increases/Decreases	**(1,099,356)**	**0**	**0**
FY 2012 Request	**2,278,750**	**0**	**0**

GRANTS-IN-AID FOR AIRPORTS

Grants-in-Aid for Airports (Mandatory General Fund)
($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2010 Actual	**0**	**0**	**0**
Discretionary Increases/Decreases			
1. Grants-in-Aid for Airports	3,100,000		
Increases/Decreases	**3,100,000**	**0**	**0**
FY 2012 Request	**3,100,000**	**0**	**0**

GRANTS-IN-AID FOR AIRPORTS

($ in Thousands)

Total FY 2012 Request	**5,378,750**	**0**	**0**

Detailed Justification for Grants-in-Aid for Airports

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

FY 2012 Grants-in-Aid for Airports Budget Request ($000)

Program / Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 – FY 2012
Grants-in-Aid for Airports, (AATF)	$3,378,106	$2,278,750	($1,099,356)
Grants-in-Aid for Airports, (Mand. General Fund)	$0	$3,100,000	$3,100,000
Total Grants-in-Aid for Airports	**$3,378,106**	**$5,378,750**	**$2,000,644**

For FY 2012, FAA requests $5.379 billion, which includes $3.1 billion from the President's infrastructure proposal, to fund the Grants-in-Aid for Airports program (AIP). This is an increase of $2 billion (59 percent) above the FY 2010 enacted level.

The Budget proposes to lower funding for the ongoing airport grants to $2.28 billion, a reduction of $1.1 billion, by eliminating guaranteed funding for large and medium hub airports. The proposal 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, 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 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.

In addition, FAA requests a one-time appropriation of $3.1 billion in mandatory General Fund resources for the Grants-in-Aid program. 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 will be able to compete for the additional $3.1 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 FY2012, Runway Safety Area (RSA) improvements, noise mitigation for impacted communities, and other high priority projects designated by the Secretary. The Department will transmit authorization language at a later date to implement program reforms for large and medium hub airports, PFC increases, and one-time funding from the President's infrastructure proposal.

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 enhancing 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 allow 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 501 RSAs, and by 2012, 88 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 NAVAIDs from RSAs or making them frangible. By the end of FY 2011, FAA will correct FAA-owned NAVAIDS at 161 of 485 RSAs (33 percent).

In FY 2012, 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. 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. The FAA expects to issue approximately 2,950 new AIP grants to airport sponsors and will continue to administer the AIP to ensure the timely, 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.

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 2012, 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. The FAA staff will continue to apply new streamlining provisions of Vision 100 in order to facilitate the completion of designated airport projects. While one or more Vision 100 streamlining projects may be underway, we do not envision that any of those project reviews will be completed in FY 2012.

After the identification of the impacted areas, often through AIP-funded studies, funding will be used to 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. The AIP funding plan contributes to mitigating the harmful effects of aircraft noise for those living, working or going to school inside the significant aviation noise footprint.

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 2012 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; 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. The AIP helps ensure that at least 95 percent of the population of the U.S. lives within 20 miles of a federally-funded airport providing access to the National Aviation System.

<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; support airport

greening initiatives and developing sustainability best practices; implementing Environmental Management Systems to ensure that FAA operations protect the environment and meet statutory and regulatory environmental requirements; and reducing the number of people exposed to significant noise.

Anticipated accomplishments for the AIP grant program in 2012 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 3,300 airports in the NPIAS are maintained in excellent, good or fair condition;
- 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 15,000 people (including residents and students) 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
- Direct $6,000,000 in AIP funding in FY2012 to conduct surveys and/or infrastructure needs in support of Wide Area Augmentation Systems (WAAS)/ Localizer Performance with Vertical guidance (LPV) approaches.

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 the 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 more than 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 35 largest airports account for about 75 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, 15 new runways, 1 runway extension, and 1 airfield reconfiguration have opened with another airfield reconfiguration two-thirds completed, allowing 1.9 million more annual operations. Currently, four major airports have airfield projects (one new runway, one taxiway, one runway extension, and the third project in Phase 1 of the Chicago O'Hare Modernization) under construction. These projects will be commissioned through 2012, providing these airports with the potential to accommodate 111,000 more annual operations and reduce runway crossings.

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 safety. In FY 2009, the increasing trend in runway incursions was reversed. The number of runway incursions continued to decrease in FY 2010 down to a total of 944 from 951 in FY 2009. In particular, serious runway incursions (category A and B) were down significantly. There were 12 Category A or B incursions in fiscal year 2009, which ended Sept. 30, with only two involving commercial carriers. This was a drop of 50 percent compared to 25 such events in fiscal year 2008, with nine involving commercial carriers. Another 50% drop in Category A and B incursions was achieved in FY 2010, down to a six incursions involving commercial aircraft. As of February 2, 2011, in FY 2011 there were a total of 285 runway incursions including 1 category A and 1 category B serious incursions. In 2000 there were 67 serious runway incursions, with 34 involving commercial carriers. The reduction in total and 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 Teterboro, New Jersey, in October 2010 when an overrunning corporate jet was safely arrested.

Since FY 2000, FAA has improved 501 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 44 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.

Economic Competitiveness
Since FY 2000, 22 airfield projects have opened at 19 of the 35 Operational Evolution Plan (OEP) airports. These include 16 new runways, 3 taxiways, 1 runway extension, 1 airfield reconfiguration, and 1 airfield reconfiguration two-thirds completed. The projects have provided these airports with the potential to accommodate about 1.9 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 100,000 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 30 VALE projects through the AIP program since 2005. A total of $68 million has been invested in VALE clean airport technology. The federal share of $51 million has been matched by $17 million from the participating commercial service airports. Over the long-run, VALE initiatives will reduce ozone forming pollutants (Nitrous Oxides and Volatile Organic Compounds) at airports by 3,400 tons. The smog-reducing benefits of VALE projects are equivalent to removing over 9,400 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 submits 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 2010, identified over $52 billion in capital needs over the 5-year period from 2011-2015. The FY 2012 request of $5.379 billion would fulfill just 10 percent of these identified capital projects needed. The American Recovery and Reinvestment Act (ARRA) provided an additional $1.1 billion to accelerate 362 projects originally planned for FY 2010-2013.

A reduction in the AIP level requested would inhibit FAA's ability to fund capital needs that support system safety, capacity, and environmental projects. 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. As stated above, the published NPIAS has identified over $49 billion in capital needs over a five year period. This is an approximate average of $10 billion per year. 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 2010 enacted level)	**2,000,644**	**0**
Overview: For FY 2012, the Associate Administrator for Airports request $5,378,750,000 to meet the mission of planning and developing a safe and efficient national airport system. This represents an increase of $2,000,644,000 from the FY 2010 Enacted level.		
Discretionary increases/decreases		
Grants-in-Aid for Airports The Budget proposes to lower funding for the ongoing airport grants program to $2.4 billion, a reduction of $1.1 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.	-$1,099,356	
Grants-in-Aid for Airports With the FY 2012 request we will continue our focus on safety-related development projects, including runway safety area improvements, runway incursion reduction, safety management systems, and improving infrastructure conditions. Eligible airports in all size categories will be able to compete for the $3.1 billion included in the President's infrastructure proposal which will be used, in part, to fund commitments made under Letters of Intent (LOI) issued prior to FY2012,Runway Safety Area (RSA) improvements, noise mitigation for impacted communities, and other high priority projects designated by the Secretary.	$3,100,000	

GRANTS-IN-AID FOR AIRPORTS

Personnel and Related Expenses

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2010 Actual	**93,422**	**551**	**523.5**
Unavoidable Adjustments			
1. Adjustments to Base	1,618		7.5
2. Non-Pay Inflation	96		
3. One Less Compensatory Day	(285)		
Total Unavoidable Adjustments	**1,429**	**0**	**7.5**
Discretionary Increases			
1. Adjustments to Base	4,149	18	11.5
2. Airport SMS Training Development	300	0	0.0
3. Improve Safety/Joint Use at Part 139 Airports	500	0	0.0
4. Engineering Support	90	1	0.5
5. Data and Trend Analysis	90	1	0.5
6. Field Operations	555	6	3.0
7. ISS and Privacy	465	0	0.0
Total Discretionary Increases	**6,149**	**26**	**15.5**
FY 2012 Request	**101,000**	**577**	**546.5**

Detailed Justification for Personnel and Related Expenses

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

FY 2012 Personnel and Related Expenses Budget Request ($000)

Program / Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 – FY 2012
Personnel and Related Expenses	$93,422	$101,000	$7,578

For FY 2012, the Associate Administrator for Airports requests $101 million, 577 positions and 546.5 FTE to cover the administrative expenses for the Office of Airports, an increase of $7.6 million over the FY 2010 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. The remaining administrative request covers the following discretionary increases:

- ARP Safety Management System (SMS) Training;
- Improve Safety at Part 139 Airports[1] by Improving Joint Use Agreements;
- Data Trend Analysis;
- Engineering Support;
- Field Operations Program/Portfolio Management/Inspectors; and
- ARP Information Systems Security (ISS) and Privacy.

ARP SMS Training – Funding of $300,000 is requested for the Office of Airports to integrate Safety Management Systems into our operations. The FAA is implementing SMS in order to harmonize with international conventions to continue enhancing aviation safety by establishing an analytical, proactive approach to identifying and mitigating safety risks. For the Office of Airports, this includes both an internal component and an external component, which addresses the requirement for airport operators to implement SMS as well as FAA. We need to develop and provide training for the staff to include SMS analysis to identify and mitigate risks associated with projects that require a federal action such as Airport Layout Plan approvals, airport planning and development projects, development of new or changed Advisory Circulars, or development and review of modifications to standards and policies contained within FAA orders and directives. This is in direct support of the DOT Safety Goal.

Improve Safety at Part 139 Airports by Improving Joint Use Agreements – Funding of $500,000 is requested to conduct a contracted analysis and review of all existing joint use agreements. These are agreements between the airport sponsor and a Department of Defense (DOD) joint use facility. Many of these agreements are outdated and do not provide the necessary clarity to ensure access to DOD joint use facilities by FAA airport safety inspectors.

Data Trend Analysis – Funding of $90,000 is requested for one position (program analyst) and 0.5 FTE. The Office of Safety and Standards is committed to continuing the reduction in the aviation accident rate and the runway incursion rate which requires proactive analysis and data mining. A program analyst will collect runway incursion data and conduct analysis to determine causes and recommend actions to prevent future occurrences.

Engineering Support – Funding of $90,000 for one position (engineer) and 0.5 FTE is requested to address increased workload as we introduce new radar and other surveillance systems into operational use. These system types include Foreign Object Debris (FOD) radar detection, bird radar, Low Cost Surveillance Systems (both radar and multilateration) and vehicle detection and tracking systems. This requires

[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.

extensive coordination with the Office of Air Traffic and airports, and an additional engineer is needed to address the additional responsibilities.

This is a safety critical position. The FAA is developing and implementing new technology to improve runway safety. The work is being done in the Airport Safety and Standards office. Most of these new systems are radar type surveillance systems or use radar systems to trigger lighting systems such as runway status lights. The Office of Safety and Standards has only one airport lighting engineer and no electronic or radar experienced engineers. We cannot effectively work with airports, manufacturers or Air Traffic to fully implement these systems without an engineer with current radar and radar implementation and integration expertise. This is essential for integrating such new systems as Foreign Object Debris radar (FOD). FOD radar offers a significant new safety surveillance system. It was a piece of FOD that caused the Concorde aircraft crash in Paris. Bird radar also has promise but more work needs to be done on integrating Bird Radar into the ATC tower environment. Low cost surveillance systems promise the ability to provide surveillance of ground movement at airports not scheduled to receive ASDE-X radar. These low cost surveillance systems could also be used to make runway status lights possible at non ASDE-X airports. An electronic engineer/radar engineer is critical to effectively deploy and integrate these new systems.

<u>Field Operations Program/Portfolio Management/Inspectors</u> – Funding of $555,000, 6 field operations positions and 3.0 FTEs are requested. The positions and FTE are split between Portfolio Management (4 positions and 2 FTE) and Safety and Certification (2 positions and 1 FTE). Increases in 2012 are requested to continue to increase grant oversight and initiate field efforts to integrate new safety management system requirements into the planning process. These additional positions will reverse a trend of increasing reliance on federally obligated airports to self monitor and focus on growth of strategic capabilities enabling an integrated future environment for Airports decision processes and increased safety through enhanced enforcement staffing and tools.

These additional FTEs, particularly in the "Field Operations Program/Portfolio Management/Inspectors" category, are required to implement safety-related reforms that are being called for internationally and also meet established fiscal oversight expectations. These positions represent the Agency's front line in reviewing and evaluating the safety aspects of proposed capital improvement projects at more than 3,300 public-use airports nationwide.

A 2009 staffing study analysis of Airports workload over an eight year period from 2000 to 2008 shows a 96 percent increase in total number of airport grants, while staffing increased only 8 percent during the same timeframe. Annual increases in both grant dollars from $1,925.3 million in 2000 to $3,470.9 million in 2008 and numbers of grants from 1,151 to 2,465 increased program management and oversight responsibilities, as new grants are added to the existing portfolio of active grants.

In 2011, a new Safety Management System (SMS) Order was integrated into field operations resulting in an increased workload. Airports regional and district offices are now responsible for conducting safety risk management analysis on projects for changing airport infrastructure or procedures. One of the core components of SMS involves Safety Risk Management (SRM), a systematic and analytical approach to identifying and mitigating risks associated with proposed capital improvement projects at airports. This review must be undertaken during the planning process, with the active guidance and involvement of the planners, program managers and engineers who make up the "Field Operations Program/Portfolio Management/Inspectors" category of our personnel.

The staff personnel who will implement the SMS are already heavily committed. Of greater importance, because this function has been understaffed for several years, different regions and district offices have adopted different means of prioritizing the requirements, with the result that we are now substantially inconsistent in how we meet and document critical safety reviews, ranging from the review of engineering plans and specifications, construction safety phasing plans and other processes.

The FAA is actively reviewing every phase of the AIP and other program areas to identify opportunities to re-engineer required processes, maximize efficiency and leverage resources.

The additional FTEs are critical for the "Field Operations Program/Portfolio Management/Inspectors," to continue, without disruption, the implementation of Safety Risk Management. The additional personnel will be able to function in a proactive mode identifying and mitigating risks before lives or property are put at risk.

In addition, FAA has had to rely increasingly on sponsor self-certification for a broad range of issues including procurement, plans and specifications and project/grant administration. Under increased pressure from oversight agencies, FAA is preparing to increase the number of on-site field inspections and the level of document review to protect against improper payments and other concerns.

<u>ARP Information Systems Security (ISS) and Privacy</u> – Funding of $465,000 is requested to protect the integrity, confidentiality, and availability for all FAA employees and the public who have personally identifiable information (PII) on FAA infrastructure. To meet the requirements of privacy laws, the Office of Airports is required to develop a PII Implementation Plan and Strategy. Fulfilling the requirements of FAA Privacy Orders and laws will require contract support and a comprehensive implementation of security-related technologies and applications.

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*).

In FY 2010, ARP established regulations for safe operation of commercial service airports and regularly inspects certificated airports for compliance. In FY 2012, 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 2012 accomplishments include:

- Administer the $5.4 billion AIP by issuing approximately 2,950 new grants and continuing to administer existing grants at airports nationwide in support of safety, capacity, efficiency and environmental objectives;
- Publish 20 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 2012 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.

ARP requests an increase in staffing levels in order to meet existing program requirements and new program requirements driven by safety and financial oversight considerations. During FY 2009, an independent contractor examined FAA's Office of Airports staffing and workload from 2000 to 2008. Key workload drivers included a 96 percent increase in total number of airport grants and associated processes, while staffing increased only 8 percent during the same timeframe. This and follow up analysis identified safety-critical functions that are not being performed consistently. This shortfall is increasing due to new and emerging requirements, including Safety Management Systems, an internationally recognized standard promulgated by the International Civil Aviation Organization; wildlife hazard mitigation at general aviation airports, an NTSB recommendation particularly driven by recent bird strike incidents; and increasing requirements for internal financial controls in accordance with legislative requirements as well as OMB guidance and OIG findings. Provided below are impacts if requested funding amounts are not received.

ARP SMS Training – if funds are not received, ARP will not be able to perform timely and recurrent training to airport safety inspectors and airport program managers, all of whom will have to perform SMS functions including participating on Safety Risk Management Panels, quantifying and mitigating risks, preparing Safety Risk reports, and tracking implementation of mitigation measures. Our airport inspectors will also require initial and recurrent training on how to carry out their oversight responsibilities to ensure certificated airports are properly fulfilling their responsibilities for SMS.

Improve Safety at Airports by Improving Joint Use Agreements – if funds are not received, ARP would have difficulty conducting a timely review of all the existing joint use agreements. The development of a standardized joint use agreement would be delayed, and we would continue having difficulties ensuring that military units at joint use airfields are providing proper aircraft rescue and firefighting services.

Data Trend Analysis **–** if funding is not received, ARP would not have sufficient staff to conduct data mining of existing incident databases to be able to properly analyze root causes of incidents and develop proactive measures to improve runway safety.

Engineering Support – if funds are not received, the ARP Engineering Division will not have sufficient staff to adequately keep up with the expanded workload associated with developing, evaluating, and implementing new airport surveillance technology to improve runway safety. Examples include introduction of low cost surveillance systems, vehicle transponders and tracking systems, bird radar systems, and Foreign Object Debris (FOD) Radar Systems. These systems require development of performance specifications and integration with existing airport equipment.

Field Operations Program/Portfolio Management/Inspectors – if funds are not received, ARP field operations would not be able to fully address the staffing shortfalls and would increase reliance upon airport sponsors to complete grant documentation and maintain compliance with grant assurances. Resources are needed at both headquarters and in the field for field level implementation of the program and headquarters' oversight of field operations to ensure compliance and consistency with program requirements

ARP Information Systems Security (ISS) and Privacy – if funds are not received, ARP would not be able to: (1) fully reduce, respond to and control the amount of damage caused by security incidents; (2) implement the security controls needed to protect information technology resources and data from cyber security threats; (3) prevent viruses and other malicious software from infecting IT infrastructure and destroying its IT assets and data; (4) execute its Protection of Personally Identifiable Information (PII) Implementation Plan; and (5) protect user's Privacy data (social security numbers, credit card numbers, date of birth, family information, etc.) from compromise.

Explanation of Funding Changes for Personnel & Related Expenses

	Dollars ($000)	**FTE**
Personnel and Related Expenses (Net change from FY 2010 enacted level)	**7,578**	**23.0**

Overview:

For FY 2012, the Associate Administrator for Airports requests $101,000,000, 577 positions and 546.5 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 $7,578,000 from the FY 2010 enacted level.

Unavoidable Adjustments		
Adjustments to Base This adjustment provides for unavoidable cost increases not funded under prior year budgets.	1,618	7.5
Non-Pay Inflation This increase is needed to provide for inflationary cost increases consistent with OMB guidance that uses the FY 2012 GDP price index (year over year) of 0.5 percent.	96	
One Less Compensatory Day This adjustment factors in one less compensable day in FY 2012.	(285)	
Discretionary Increases		
Adjustments to Base This adjustment provides for discretionary cost increases not funded under prior year budgets.	4,149	11.5
ARP SMS Training Funding of $300,000 is requested for the Office of Airports to integrate Safety Management Systems into our operations. The FAA is implementing SMS in order to harmonize with international conventions to continue enhancing aviation safety by establishing an analytical, proactive approach to identifying and mitigating safety risks. For the Office of Airports, this includes both an internal component and an external component, which addresses the requirement for airport operators to implement SMS as well as FAA. We need to develop and provide training for the staff to include SMS analysis to identify and mitigate risks associated with projects that require a federal action such as Airport Layout Plan approvals, airport planning and development projects, development of new or changed Advisory Circulars, or development and review of modifications to standards.	300	
Improve Safety at Part 139 Airports by Improving Joint Use Agreements Funding of $500,000 is requested to conduct a contracted analysis and review of all existing joint use agreements. These are agreements between the airport sponsor and a Department of Defense (DOD) joint use facility. Many of these agreements are outdated and do not provide the necessary clarity to ensure access to DOD joint use facilities by FAA airport safety inspectors.	500	

Data Trend Analysis A funding increase of $90,000 is requested for one position (program analyst) and 0.5 FTE. The Office of Safety and Standards is committed to continuing the reduction in the aviation accident rate and the runway incursion rate, which requires proactive analysis and data mining. A program analyst will collect runway incursion data and conduct analysis to determine causes and recommend actions to prevent future occurrences.	90	0.5
Engineering Support Funding of $90,000 for one position (engineer) and 0.5 FTE is requested to address increased workload as we introduce new radar and other surveillance systems into operational use. These system types include Foreign Object Debris (FOD) radar detection, bird radar, Low Cost Surveillance Systems (both radar and multilateration) and vehicle detection and tracking systems. This requires extensive coordination with the Office of Air Traffic and airports, and an additional engineer is needed to address this requirement.	90	0.5
Field Operations Program/Portfolio Management/Inspectors Funding of $555,000, 6 field operations positions and 3.0 FTEs are requested. The positions and FTE are split between Portfolio Management (4 positions and 2 FTE) and Safety and Certification (2 positions and 1 FTE). Increases in 2012 are requested to continue to increase grant oversight and initiate field efforts to integrate new safety management system requirements into the planning process. These additional positions will reverse a trend of increasing reliance on federally obligated airports to self monitor and focus on growth of strategic capabilities enabling an integrated future environment for Airports decision processes and increased safety through enhanced enforcement staffing and tools.	555	3.0
ARP Information Systems Security (ISS) and Privacy Funding of $465,000 is requested to protect the integrity, confidentiality, and availability for all FAA employees and the public who have personally identifiable information (PII) on FAA infrastructure. To meet the requirements of privacy laws, the Office of Airports is required to develop a PII Implementation Plan and Strategy. Fulfilling the requirements of FAA Privacy Orders and laws will require contract support and a comprehensive implementation of security-related technologies and applications.	465	

GRANTS-IN-AID FOR AIRPORTS

Airport Technology Research

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2010 Actual	**22,472**	**23**	**22.5**
Unavoidable Adjustments			
1. Adjustments to Base	190	0	0.5
2. Non-Pay Inflation	96	0	0.0
3. One Less Compensatory Day	-13	0	0.0
Total Unavoidable Adjustments	**273**	**0**	**0.5**
Discretionary Increases			
1. Adjustment to Base	4,562	1	0.5
2. Noise	1,500	0	0.0
3. Safety & Pavement	443	1	0.5
Total Discretionary Increases	**6,505**	**2**	**1.0**
FY 2012 Request	**29,250**	**25**	**24.0**

Detailed Justification for Airport Technology Research

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

FY 2012 Airport Technology Research Budget Request ($000)

Program / Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 – FY 2012
Airport Technology Research	$22,472	$29,250	$6,778

For FY 2012, the Associate Administrator for Airports requests $29.25 million, 25 positions and 24 FTE to fund the Airport Technology Research program. This is an increase of $6.8 million (30 percent) over the FY 2010 enacted level. 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 initiate a 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 2012 ATR Research Projects ($000)			
Research Project	**FY 2010 Actual**	**FY 2012 Request**	**Increase / Decrease**
Advanced Airport Pavement Design	468	300	-168
Pavement Design & Evaluation Methodology	936	1,000	64
National Airport Dynamic Tests	2,850	3,000	150
Heavy vehicle simulator	0	500	500
Field Instrumentation & Testing	750	750	0
Improved Paving Materials and Lab	1,550	2,000	450
Non-Destructive Pavement Testing	1,537	1,500	-37
Center of Excellence	312	250	-62
Airport Planning	364	500	136
Airport Design	728	700	-28
Operation of New Large Aircraft (NLA)	800	700	-100
Composite Materials Firefighting	453	500	47
Airport Wildlife Hazards Abatement	2,500	2,550	50
Airport visual guidance/runway incursions reduction	1,200	3,900	2700
Airport Visual Guidance test bed	2,000	1,100	-900
Aircraft Braking friction	1,607	3,250	1643
Aircraft Noise Annoyance Data and Sleep Disturbance Around Airports	0	1,500	1500
Surface Operations	312	300	-12
Rescue and Fire Fighting	624	700	76
Subtotal—Contracts	**18,991**	**25,000**	**6,009**
In-House (FTEs,)	3,481	4,250	769
TOTAL	**22,472**	**29,250**	**6,778**

A new initiative on the Aircraft Braking and Friction performance was started in FY 2010 under the general heading of Surface Operations. This area covers runway surface maintenance during summer and winter months, improvements in the very successful arresting systems research and development (R&D), and investigating the braking performance of aircraft on contaminated runways. In FY 2012 we are requesting $3.25 million in the area of Aircraft Braking and Friction performance. This is a collaborative effort with the U. S. Air Force and several private engineering firms to 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.

This R&D effort was necessitated by the National Transportation Safety Board (NTSB) safety recommendations, dated October 16, 2007, in response to a commercial airplane accident which occurred at Chicago Midway International Airport (MDW) on December 8, 2005. The accident involved a Southwest Airlines (SWA) Boeing 737-7H4 airplane that ran off the runway during landing. The actual landing distance of the airplane significantly exceeded the estimated landing distances calculated by the SWA On-Board Performance Computer (OPC). This accident illustrates the current lack of accurate data for predicting landing performance of large airplanes with ASBS on runways covered with water, ice, or snow.

The research effort will be conducted to develop a Math Modeling Simulation which accurately predicts the performance of current generation ASBS in decelerating large commercial airplanes on contaminated runways. Data and performance characteristics extracted from Dynamometer Testing and Simulator Testing and Evaluation will be used in the validation of the Math Modeling Simulation. The Math Modeling Simulation will identify performance parameters required to predict airplane landing distances.

The objective of this initiative is to identify measurable airplane performance parameters which can be utilized to accurately predict airplane landing distances on contaminated runways. It is anticipated that these parameters would be measurable using existing airplane instrumentation or recorded by the Flight Data Recorder, and communicated through data transmission systems. These parameters could be translated into estimated landing distances and conveyed to pilots approaching the particular runway.

An increase of $1.5 million is requested for a new initiative 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.

[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/*

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.

This request includes $5 million in the area of visual guidance/visual guidance test bed work to investigate new lighting technologies on our visual guidance test bed. This multiyear initiative is to develop a state of the art visual guidance technology test bed that would enable visual guidance engineers an opportunity to design, install, test, monitor, and report on what it will take to create a visual guidance infrastructure that will take full advantage of state of the art technologies in Signs, Lighting and Markings to provide a more efficient infrastructure and the best visual cues to the airport user.

The research conducted utilizing this test bed will provide FAA and our nation's airports a better understanding of what is needed to properly design and operate various airport lighting systems that use new state of the art lighting devices. The results will be published and may also be adopted into an FAA AC. Conducted properly, this effort will bring FAA to the forefront of airport visual guidance technology and better align our airports so that they can support demands expected with the NextGen of aviation.

The trend in aircraft industry is to produce aircraft with extended range capability, which results in high gross weight and tire pressures. The effects of high tire pressure are localized and concentrated in the surface layers (like HMA). 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.

The Heavy Vehicle Simulator (HVS) will be used to perform the testing. It will be easier and economical to insulate and heat the test pavement under the HVS. Also, heating is applied from the top which is more representative of an in situ pavement. For testing pavement rehabilitation techniques, the structurally failed pavement under NAPTF test vehicle during a construction cycle can be rehabilitated with different techniques (reflective cracking resistant HMA mixes, concrete overlays, etc.) and then tested with HVS. This request includes $500,000 to continue such testing.

Funding in FY 2012 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;
- Initiate a new initiative 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;
- Conduct research to study the effects of high tire pressures on the pavement surface 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 fire fighting to address double decked aircraft carrying up to 800 passengers; and
- Modify the habitats of increasing numbers of wildlife on or near airports.

2. What Is The Program?

Research will be conducted 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 to update ACs, manuals, and technical specifications that airports rely on when expending AIP funds.

The Airport Technology Research Program supports DOT's Safety goal (*Reduction in transportation related injuries and fatalities*), State of Good Repair (*Increased proportion of transportation infrastructure assets in good condition*) and Environmental Sustainability (*Reduced transportation related pollution and impact on ecosystems*).

<u>Safety</u>
The safety research conducted to improve airport safety and marking, airport lighting, aircraft rescue and firefighting, and wildlife hazard mitigation, leads to updates in ACs and airport equipment specifications that directly improve airport design, procedures and emergency response equipment.

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.

Environmental Sustainability

As stated above, an increase of $1.5 million is for a new initiative 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 2012 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; and
- Start full scale testing of "green" paving materials with Accelerated Pavement Test (APT) machine.

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 Foreign Object Debris (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 2012. 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 2010 enacted level)	**6,778**	**1.5**
Overview: For FY 2012, the Associate Administrator for Airports requests $29.25 million, 25 positions and 24 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		
Adjustments to Base This adjustment provides for unavoidable cost increases not funded under prior year budgets.	190	0.5
Non-Pay Inflation This increase is needed to provide for inflationary cost increases consistent with OMB guidance that uses the FY 2012 GDP price index (year over year) of 0.5 percent.	96	
One Less Compensatory Day This adjustment factors in one less compensable day in FY 2012.	(13)	
Discretionary Increases		
Adjustments to Base This adjustment provides for discretionary cost increases not funded under prior year budgets.	4,562	0.5
Safety & Pavement Research The requested increase of $1.5 million will fund Noise Studies near representative U.S. airports. The studies will allow us to collect 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. 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.	1,500	
Safety and Pavement Research The remaining $443,000 is a net increase to various research projects captured in the "FY 2012 ATR Research Projects" table on page 26. The increase is split between contract dollars and an increase of one position (0.5 FTE) in FY 2012.	443	0.5

GRANTS-IN-AID FOR AIRPORTS

Airport Cooperative Research

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2010 Actual	**15,000**	**1**	**1.0**
Unavoidable Adjustments			
1. Adjustments to Base	75		
2. Non-Pay Inflation	75		
3. One Less Compensatory Day	-1		
Total Unavoidable Adjustments	**149**	**0**	**0.0**
Discretionary Increases			
1. Adjustments to Base	86	1	0.5
2. Decrease in contracts	-235		
Total Discretionary Increases	**-149**	**1**	**0.5**
FY 2012 Request	**15,000**	**2**	**1.5**

Detailed Justification for Airport Cooperative Research Program

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

FY 2012 Airport Cooperative Research Program ($000)

Program / Component	FY 2010 Actual	FY 2012 Request	Change FY 2010 – FY 2012
Airport Cooperative Research Program	$15,000	$15,000	$0

For FY 2012, FAA requests $15 million, 2 positions and 1.5 FTE which is .5 FTE over the FY 2010 enacted level. Position increases and inflationary costs will be absorbed within the requested level.

Funding in FY 2012 will support the following key outputs and outcomes:

- Environmental research is conducted with an objective to reduce community exposure to noise, reduce aviation emissions, and address water quality; and
- ACRP will select approximately 30 research topics to fund in FY 2012. 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 is administering 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:

- Innovative Approaches to Addressing Aviation Capacity in Coastal Mega-Regions;
- Enhancing Land Use Compatibility; and
- Airport Sustainability.

Anticipated FY 2012 accomplishments include:

- ACRP awards contracts that are selected for funding;
- ACRP Board of Governors will meet to select projects to fund; and
- TRB appoint project technical panels to monitor previous research projects awarded.

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.
A reduction would mean that the program would fund one to three fewer research studies being funding in FY 2012.

Explanation of Funding Changes for Airport Cooperative Research Program (ACRP)

	Dollars ($000)	FTE
Airport Cooperative Research Program (Net change from FY 2010 enacted level)	**0**	**0.5**
Overview: For FY 2012, we maintain the Airport Cooperative Research Program at the FY 2010 enacted level of $15,000,000. There is a discretionary reduction in contracts to offset the position increase and inflationary costs.		
Unavoidable Adjustments		
Adjustments to Base This adjustment provides for unavoidable cost increases not funded under prior year budgets.	75	
Non-Pay Inflation This increase is needed to provide for inflationary cost increases consistent with OMB guidance that uses the FY 2012 GDP price index (year over year) of 0.5 percent.	75	
One Less Compensatory Day This adjustment factors in one less compensable day in FY 2012.	(1)	
Discretionary increases/decreases		
Adjustments to Base This adjustment provides for discretionary cost increases not funded under prior year budgets.	86	0.5
ACRP Discretionary Decrease in contracts There is a discretionary reduction in contracts to offset inflationary costs and an FY 2012 new hire.	(235)	

AIRPORT IMPROVEMENT PROGRAM
Grants-in-Aid to Airports Planned Distribution
$000

	FY 2010 Enacted	FY 2012 Request
Formula Grants		
Primary Airports	849,424	586,609
Cargo Service Airports	118,444	0
Alaska	21,345	21,345
States (General Aviation)	676,821	454,406
Carryover (from Formula Grants)	622,545	527,064
Subtotal, Formula Grants	2,288,579	1,589,424
Discretionary Grants		
Discretionary Set-Aside: Noise Compatibility	207,311	250,000
Discretionary Set-Aside: Reliever	3,909	0
Discretionary Set-Aside: Military Airport Program	23,693	0
Discretionary Set-Aside: Small/NonHub/GA Advanced	0	0
C/S/S/N (Capacity/Safety/Security/Noise)	268,053	0
Discretionary -- AATF	83,352	439,326
Discretionary -- General Fund Mandatory	0	3,100,000
Subtotal, Discretionary Grants	586,318	3,789,326
Small Airport Fund [1]	503,209	0
Total Grants	**3,378,106**	**5,378,750**

[1] Reorganized AIP program eliminates funding to Small Airport Fund.

Passenger Facility Charge (PFC) Approved Locations

As of January 1st, 2011
(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	$16,712,010	4y10m	12/1/2003	10/1/2008
Birmingham	AL	Birmingham - Shuttlesworth International	BHM	S	$4.50	$173,984,319	22y9m	10/1/2008	7/1/2031
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	$7,689,876	6y11m	3/1/2005	2/1/2012
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	$57,200,000	14y9m	10/1/2000	7/1/2015
Fairbanks	AK	Fairbanks International	FAI	S	$3.00	$4,345,172	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	$1,520,391	2y4m	10/1/1998	2/1/2001
Juneau	AK	Juneau International	JNU	N	$4.50	$15,202,248	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	$1,100,000	4y11m	7/1/2007	6/1/2012
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	$744,600	4y2m	5/1/2008	7/1/2012
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	N	$4.50	$3,585,510	4y3m	11/1/2008	2/1/2013
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
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	$2,407,035	9y8m	11/1/2007	7/1/2017
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	3y	3/1/2009	3/1/2012
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	$564,071	2y9m	7/1/2008	4/1/2011
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	5y1m	4/1/2006	5/1/2011
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	$94,488,421	7y11m	1/1/2008	12/1/2015
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	$536,747	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	12y1m	4/1/2007	5/1/2019
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
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	$79,977,000	11y2m	11/1/2015	1/1/2027
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
Mammoth Lakes	CA	Mammoth Yosemite	MMH	CS	$3.00	$166,632	10y	9/1/1995	9/1/2005
Mammoth Lakes	CA	Mammoth Yosemite	MMH	CS	$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	$5,606,756	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	$4,657,650	5y7m	5/1/2006	12/1/2011
Oakland	CA	Metropolitan Oakland International	OAK	M	$3.00	$49,145,326	6y9m	9/1/1992	6/1/1999
Oakland	CA	Metropolitan Oakland International	OAK	M	$3.00	$79,000,792	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	$791,104,000	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	N	$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	$1,124,627	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	$160,918,497	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	$126,841,350	6m	2/1/2003	9/1/2003
Sacramento	CA	Sacramento International	SMF	M	$4.50	**	7y6m	9/1/2003	3/1/2011
Sacramento	CA	Sacramento International	SMF	M	$4.50	$603,497,524	16y11m	3/1/2011	2/1/2028
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	$1,423,191,241	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	$160,353,927	8y7m	9/1/1992	4/1/2001
San Jose	CA	Norman Y. Mineta San Jose International	SJC	M	$4.50	**	2y	4/1/2001	4/1/2003
San Jose	CA	Norman Y. Mineta San Jose International	SJC	M	$4.50	$878,173,946	26y1m	4/1/2003	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	**	11y10m	9/1/2002	7/1/2012
San Luis Obispo	CA	San Luis County Regional	SBP	N	$3.00	$1,040,111	3y	7/1/2012	7/1/2015
San Luis Obispo	CA	San Luis County Regional	SBP	N	$4.50	$3,681,070	6y6m	7/1/2015	1/1/2022
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	$9,499,365	4y10m	1/1/1998	11/1/2003
Santa Barbara	CA	Santa Barbara Municipal	SBA	S	$4.50	**	2y3m	11/1/2003	2/1/2006
Santa Barbara	CA	Santa Barbara Municipal	SBA	S	$4.50	$26,889,000	33y5m	2/1/2006	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	3y9m	5/1/2008	2/1/2012
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	$453,764	2y	9/1/2009	9/1/2011
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	$5,993,117	7y7m	1/1/2005	8/1/2012
Colorado Springs	CO	City of Colorado Springs Municipal	COS	S	$3.00	$74,410,357	23y3m	3/1/1993	6/1/2016
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
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	$1,055,884	8y5m	8/1/2004	1/1/2013
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	$8,330,000	16y11m	9/1/2006	8/1/2023
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	CS	$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	$1,133,590	5y5m	5/1/2006	10/1/2011
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	$18,975,346	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	$548,149,249	12y3m	10/1/2005	1/1/2018
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	$189,288,169	11y11m	9/1/2006	8/1/2018
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	8y1m	1/1/2003	2/1/2011
Jacksonville	FL	Jacksonville International	JAX	M	$3.00	$72,695,093	9y1m	4/1/1994	5/1/2003
Jacksonville	FL	Jacksonville International	JAX	M	$4.50	$263,676,115	20y5m	5/1/2003	10/1/2023
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	$3,773,922	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
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	$1,164,484,979	12y8m	4/1/2007	12/1/2019
Orlando	FL	Orlando International	MCO	L	$3.00	$277,118,000	5y10m	12/1/2019	10/1/2025

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	10y7m	12/1/2003	7/1/2014
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	**	4y11m	5/1/2004	4/1/2009
Panama City	FL	Panama City - Bay County International	PFN	N	$4.50	$41,968,634	1y1m	4/1/2009	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	$4,051,039	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	$3,323,450	2y9m	2/1/2009	11/1/2011
Tallahassee	FL	Tallahassee Regional	TLH	S	$3.00	$11,219,936	9y8m	2/1/1993	10/1/2002
Tallahassee	FL	Tallahassee Regional	TLH	S	$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	S	$3.00	$34,407,710	1y5m	1/1/2001	6/1/2002
Valparaiso	FL	Eglin AFB	VPS	S	$4.50	**	16y2m	6/1/2002	8/1/2018
Valparaiso	FL	Eglin AFB	VPS	S	$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
Athens	GA	Athens/Ben Epps	AHN	CS	$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	$2,361,816,252	14y5m	10/1/2008	3/1/2023
Augusta	GA	Augusta Regional @ Bush Field	AGS	N	$3.00	$31,482,000	1y10m	9/1/1999	7/1/2001
Augusta	GA	Augusta Regional @ Bush Field	AGS	N	$4.50	**	29y	7/1/2001	7/1/2030
Augusta	GA	Augusta Regional @ Bush Field	AGS	N	$4.50	$2,007,000	2y1m	7/1/2030	8/1/2032
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	$864,065	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	2y	2/1/2010	2/1/2012
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	$49,908,639	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	$14,528,743	3y6m	5/1/2010	11/1/2013
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
Agana	GU	Guam International	GUM	S	$3.00	$238,370,758	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
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	hmm interesting question	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	$2,013,132	8y9m	6/1/2005	3/1/2014
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	$1,171,746	9y9m	10/1/2006	7/1/2016
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	4y3m	7/1/2007	10/1/2011
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	$2,135,160	5y5m	10/1/2005	3/1/2011
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	$1,539,990,549	41y	11/1/2012	11/1/2053
Chicago	IL	Chicago O'Hare International	ORD	L	$3.00	$1,701,450,995	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	$4,735,675,237	32y	2/1/2006	2/1/2038
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
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		$3.00	$115,517	2y9m	10/1/1994	7/1/1997
Quincy	IL	Quincy Regional-Baldwin Field	UIN		$3.00	$298,153	7y7m	11/1/1997	6/1/2005
Quincy	IL	Quincy Regional-Baldwin Field	UIN		$3.00	*	2y2m	11/1/2005	1/1/2008
Quincy	IL	Quincy Regional-Baldwin Field	UIN		$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	$1,173,000	6y2m	10/1/2005	12/1/2011
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	FWA	N	$4.50	**	10y10m	12/1/2005	10/1/2016

		International							
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	26y11m	11/1/1994	10/1/2021
Burlington	IA	Southeast Iowa Regional	BRL		$3.00	$521,304	4y2m	7/1/1997	9/1/2001
Burlington	IA	Southeast Iowa Regional	BRL		$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	$55,880,789	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	$2,049,653	14y5m	5/1/2001	10/1/2015
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	$379,500	10y8m	8/1/2003	4/1/2014
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
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	$1,212,207	8y10m	5/1/2003	3/1/2012
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		$4.50	$823,720	15y7m	8/1/2007	3/1/2023
Wichita	KS	Wichita Mid-Continent	ICT	S	$3.00	$25,595,806	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

Lexington	KY	Blue Grass	LEX	S	$3.00	$11,889,520	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	$17,846,255	1y6m	12/1/2013	6/1/2015
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	N	$3.00	$37,469,799	12y10m	12/1/1992	10/1/2005
Baton Rouge	LA	Baton Rouge Metropolitan, Ryan Field	BTR	N	$4.50	**	13y4m	10/1/2005	2/1/2018
Baton Rouge	LA	Baton Rouge Metropolitan, Ryan Field	BTR	N	$4.50	$43,889,437	12y5m	2/1/2018	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
Lafayette	LA	Lafayette Regional	LFT	N	$4.50	$3,771,733	4y9m	8/1/2008	5/1/2013
Lake Charles	LA	Lake Charles Regional	LCH	N	$3.00	$1,377,234	4y2m	3/1/2001	5/1/2005
Lake Charles	LA	Lake Charles Regional	LCH	N	$4.50	**	4y5m	5/1/2005	10/1/2009
Lake Charles	LA	Lake Charles Regional	LCH	N	$4.50	$420,000	2y2m	10/1/2009	12/1/2011
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	$437,578,178	22y10m	8/1/2003	6/1/2026
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
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	BWI	L	$4.50	**	5m	6/1/2002	11/1/2002

		Marshal							
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	$150,000	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	$289,932,941	5y	2/1/2011	2/1/2016
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
Alpena	MI	Alpena County Regional	APN	CS	$4.50	$193,958	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	$2,253,182,360	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	$911,150,476	8y3m	5/1/2026	8/1/2034
Escanaba	MI	Delta County	ESC	CS	$3.00	$149,319	5y2m	2/1/1993	11/1/1997
Escanaba	MI	Delta County	ESC	CS	$3.00	$197,877	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	2y4m	10/1/2016	2/1/2019
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	**	1y4m	7/1/2005	11/1/2006
Hancock	MI	Houghton County Memorial	CMX	N	$4.50	$719,220	6y3m	11/1/2006	2/1/2013
Iron Mountain Kingsford	MI	Ford	IMT	CS	$3.00	$204,029	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	$1,500,000	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	$6,422,640	8y9m	10/1/1993	7/1/2002
Lansing	MI	Capital Region International	LAN	N	$4.50	**	6y	7/1/2002	7/1/2008
Lansing	MI	Capital Region International	LAN	N	$4.50	$24,073,460	5y4m	7/1/2008	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
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	$7,552,127	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	20y10m	4/1/2008	2/1/2029
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	$4,071,280	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	$1,835,720	22y1m	7/1/2001	8/1/2023
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	$3,561,375	6y7m	4/1/2005	11/1/2011
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	CS	$3.00	$338,299	7y1m	6/1/1996	7/1/2003
Hibbing	MN	Range Regional	HIB	CS	$4.50	**	3y10m	7/1/2003	5/1/2007

Hibbing	MN	Range Regional	HIB	CS	$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	5y8m	11/1/2005	7/1/2011
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	$1,121,742,107	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	$4,104,638	6y8m	8/1/2008	4/1/2015
St. Cloud	MN	St. Cloud Regional	STC	N	$3.00	$1,147,578	2y5m	2/1/2000	7/1/2002
St. Cloud	MN	St. Cloud Regional	STC	N	$4.50	**	11y6m	7/1/2002	1/1/2014
Thief River Falls	MN	Thief River Falls Regional	TVF	CS	$4.50	$636,828	20y	6/1/2003	6/1/2023
Rota Island	MP	Rota International	GRO/ROP	N	$4.50	$1,775,542	11y8m	1/1/2005	8/1/2016
Saipan Island	MP	Francisco C. Ada/Saipan International	GSN/SPN	S	$4.50	$29,533,680	11y8m	1/1/2005	8/1/2016
Tinian Island	MP	Tinian International	TNI/TIQ	N	$4.50	$1,703,326	11y8m	1/1/2005	8/1/2016
Columbus	MS	Golden Triangle Regional	GTR	N	$3.00	$1,749,635	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	$1,971,835	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	$88,495	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	$175,041	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	$325,379,031	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	$783,625,489	19y9m	5/1/2002	2/1/2022
Billings	MT	Billings Logan International	BIL	S	$3.00	$16,535,709	17y8m	4/1/1994	12/1/2011
Bozeman	MT	Gallatin Field	BZN	N	$3.00	$9,144,326	15y7m	8/1/1993	3/1/2009
Bozeman	MT	Gallatin Field	BZN	N	$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	$8,501,340	20y4m	7/1/2002	9/1/2018
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	$5,875,760	8y7m	9/1/1992	4/1/2001
Missoula	MT	Missoula International	MSO	N	$4.50	**	1y11m	4/1/2001	3/1/2003
Missoula	MT	Missoula International	MSO	N	$4.50	$14,231,248	14y8m	3/1/2003	11/1/2017
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	$545,219	12y6m	5/1/2001	11/1/2013
Kearney	NE	Kearney Regional	EAR	N	$4.00	$0	1y10m	11/1/2005	9/1/2007
Kearney	NE	Kearney Regional	EAR	N	$4.50	$231,600	3y10m	9/1/2007	7/1/2011
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	$49,500,000	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	$3,400,000	5m	7/1/2007	12/1/2007
Reno	NV	Reno/Tahoe International	RNO	M	$4.50	$32,878,000	5y10m	12/1/2007	10/1/2013
Lebanon	NH	Lebanon Municipal	LEB	CS	$3.00	$530,630	7y	8/1/1995	8/1/2002
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	$140,625	4y	10/1/2007	10/1/2011
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	$3,711,406	7m	8/1/2015	3/1/2016
Manchester	NH	Manchester	MHT	S	$3.00	$50,771,446	4y10m	3/1/2016	1/1/2021
Manchester	NH	Manchester	MHT	S	$4.50	$19,803,043	1y11m	1/1/2021	12/1/2022
Atlantic City	NJ	Atlantic City International	ACY	S	$3.00	$10,494,508	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	$10,933,281	2y2m	4/1/2009	6/1/2011
Newark	NJ	Newark Liberty International	EWR	L	$3.00	$916,488,255	13y6m	10/1/1992	4/1/2006
Newark	NJ	Newark Liberty International	EWR	L	$4.50	**	4y11m	4/1/2006	3/1/2011
Newark	NJ	Newark Liberty International	EWR	L	$4.50	$191,631,217	2y11m	3/1/2011	2/1/2014
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	$160,504,404	20y	7/1/1996	7/1/2016
Farmington	NM	Four Corners Regional	FMN	N	$3.00	$661,102	7y11m	6/1/2003	5/1/2011
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	$659,582	5y9m	3/1/2008	12/1/2013
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	$4,147,648	6y5m	5/1/2008	10/1/2014
Buffalo	NY	Buffalo Niagara International	BUF	M	$3.00	$145,371,195	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	$15,370,095	1y4m	11/1/2012	3/1/2014
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	$3,221,221	7y5m	5/1/2008	10/1/2015
Islip	NY	Long Island MacArthur	ISP	S	$3.00	$27,535,501	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	$970,763,000	13y6m	10/1/1992	4/1/2006
New York	NY	John F. Kennedy International	JFK	L	$4.50	**	4y11m	4/1/2006	3/1/2011
New York	NY	John F. Kennedy International	JFK	L	$4.50	$255,794,990	2y11m	3/1/2011	2/1/2014
New York	NY	LaGuardia	LGA	L	$3.00	$688,134,804	13y6m	10/1/1992	4/1/2006
New York	NY	LaGuardia	LGA	L	$4.50	**	4y11m	4/1/2006	3/1/2011
New York	NY	LaGuardia	LGA	L	$4.50	$121,561,393	2y11m	3/1/2011	2/1/2014
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	$732,355	2y11m	1/1/2009	12/1/2012
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	$4,248,443	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	$15,546,546	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	$34,300,018	9y3m	5/1/2004	8/1/2013
Asheville	NC	Asheville Regional	AVL	N	$3.00	$5,622,844	7y10m	12/1/1994	10/1/2002
Asheville	NC	Asheville Regional	AVL	N	$4.50	$4,916,517	4y1m	10/1/2002	11/1/2006

Asheville	NC	Asheville Regional	AVL	N	$4.50	$478,051	5m	4/1/2007	9/1/2007
Asheville	NC	Asheville Regional	AVL	N	$4.50	$3,521,375	3y10m	10/1/2007	8/1/2011
Charlotte	NC	Charlotte/Douglas International	CLT	L	$3.00	$874,329,196	15y8m	11/1/2004	7/1/2020
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
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	$2,054,185	11y1m	7/1/2001	8/1/2012
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	$2,117,969	4y6m	2/1/2009	8/1/2013
New Bern	NC	Coastal Carolina Regional	EWN	N	$3.00	$10,681,398	6y9m	2/1/1997	11/1/2003
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	$21,050,536	19y1m	7/1/2004	8/1/2023
Grand Forks	ND	Grand Forks International	GFK	N	$3.00	$621,965	3y6m	2/1/1993	8/1/1996
Grand Forks	ND	Grand Forks International	GFK	N	$3.00	$1,707,243	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	8y3m	4/1/2003	7/1/2011
Akron	OH	Akron-Canton Regional	CAK	S	$3.00	$7,299,414	10y	9/1/1992	9/1/2002
Akron	OH	Akron-Canton Regional	CAK	S	$4.50	$46,391,178	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	$323,998,360	14y11m	8/1/2004	7/1/2019
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	$149,317,185	8y3m	10/1/2004	1/1/2013
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	$5,501,283	6y1m	1/1/2004	12/1/2011
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	$312,696	4y1m	4/1/2007	5/1/2011
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
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	$1,269,888	6y	11/1/2007	11/1/2013
Oklahoma City	OK	Will Rogers World	OKC	S	$3.00	$132,958,661	12y9m	7/1/1997	4/1/2010
Oklahoma City	OK	Will Rogers World	OKC	S	$4.50	**	10y4m	4/1/2010	8/1/2020
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	N	$3.00	$6,537,176	7y7m	11/1/1993	6/1/2001
Eugene	OR	Mahlon Sweet Field	EUG	N	$4.50	$14,975,418	10y9m	6/1/2001	3/1/2012
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	**	4y6m	8/1/2001	2/1/2006
North Bend	OR	Southwest Oregon Regional	OTH	N	$4.50	$2,557,363	15y	2/1/2006	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	$124,102,421	4y3m	5/1/2016	8/1/2020
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
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	$597,596	1y5m	8/1/2003	1/1/2005
Erie	PA	Erie International/Tom Ridge Field	ERI	N	$4.50	$12,091,829	19y7m	7/1/2005	2/1/2025
Harrisburg	PA	Harrisburg International	MDT	S	$3.00	$6,904,614	5y11m	2/1/1997	1/1/2003
Harrisburg	PA	Harrisburg International	MDT	S	$4.50	$129,212,500	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	N	$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	$1,692,031	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	$14,363,506	17y3m	5/1/2001	8/1/2018

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	$187,153,159	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	$499,314,667	23y2m	6/1/2008	8/1/2031
San Juan	PR	Luis Munoz Marin International	SJU	M	$3.00	$19,713,152	1y7m	8/1/2031	3/1/2033
Providence	RI	Theodore Francis Green State	PVD	M	$3.00	$104,029,700	12y7m	2/1/1994	9/1/2006
Providence	RI	Theodore Francis Green State	PVD	M	$4.50	**	1y11m	9/1/2006	8/1/2008
Providence	RI	Theodore Francis Green State	PVD	M	$4.50	$79,529,011	8y3m	8/1/2008	11/1/2016
Charleston	SC	Charleston AFB/International	CHS	S	$4.50	$7,933,920	1y9m	3/1/2010	12/1/2011
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	$1,380,509	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	$700,448	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	$30,481,183	27y1m	5/1/2007	6/1/2034
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		$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	$223,072,964	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	$91,948,976	4y11m	9/1/2010	8/1/2015
Nashville	TN	Nashville International	BNA	M	$4.50	$15,577,500	1y3m	8/1/2015	11/1/2016
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
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	16y2m	4/1/2005	6/1/2021
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	$5,182,363	15y2m	5/1/2003	7/1/2018
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	$3,491,666	9y	1/1/2004	1/1/2013
Corpus Christi	TX	Corpus Christi International	CRP	S	$3.00	$49,700,114	9y1m	3/1/1994	3/1/2003
Corpus Christi	TX	Corpus Christi International	CRP	S	$4.50	**	23y10m	3/1/2003	1/1/2027
Dallas	TX	Dallas Love Field	DAL	M	$3.00	$345,323,728	2y	2/1/2008	2/1/2010
Dallas	TX	Dallas Love Field	DAL	M	$4.50	**	12y1m	2/1/2010	3/1/2022
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	$3,590,824	1y7m	12/1/2007	7/1/2009
Harlingen	TX	Valley International	HRL	S	$4.50	$12,955,000	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	$5,080,476	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	**	3y2m	6/1/2009	1/1/2013
Laredo	TX	Laredo International	LRD	N	$4.50	$7,852,765	9y5m	1/1/2013	6/1/2022
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	8y8m	9/1/2002	5/1/2011
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	$14,974,087	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	S	$3.00	$15,544,825	15y6m	4/1/1998	10/1/2013
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	$342,989,450	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	$1,437,855	3y2m	8/1/2008	10/1/2011
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	10y	1/1/2002	1/1/2012
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
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	$364,874,130	10y11m	7/1/2001	6/1/2011
St George	UT	St George Municipal	SGU	N	$3.00	$23,568	4y4m	5/1/1998	9/1/2002
St George	UT	St George Municipal	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	$17,298,103	4y3m	12/1/2009	3/1/2014
Charlotte Amalie	VI	Cyril E. King	STT	S	$3.00	$3,808,574	2y5m	3/1/1993	8/1/1995
Charlotte	VI	Cyril E. King	STT	S	$3.00	$7,792,000	7y	12/1/1995	12/1/2002

Amalie									
Charlotte Amalie	VI	Cyril E. King	STT	S	$3.00	$13,500,000	7y9m	8/1/2004	4/1/2012
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
Arlington	VA	Ronald Reagan Washington National	DCA	L	$3.00	$297,807,356	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	$302,245,676	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	**	4y3m	5/1/2001	8/1/2005
Chantilly	VA	Washington Dulles International	IAD	L	$4.50	$2,173,226,652	33y4m	8/1/2005	12/1/2038
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$2.00	$243,908	1y1m	9/1/1992	10/1/1993
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$3.00	$5,108,738	9y9m	4/1/1995	1/1/2005
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$4.50	**	1y1m	1/1/2005	2/1/2006
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$4.50	$3,368,484	3y11m	2/1/2006	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	$185,940	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	$2,684,770	10y6m	6/1/2002	12/1/2012
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	$18,910,908	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
Staunton	VA	Shenandoah Valley Regional	SHD	CS	$3.00	$87,482	5y	12/1/2001	12/1/2006
Staunton	VA	Shenandoah Valley Regional	SHD	CS	$4.50	$244,810	10y9m	6/1/2007	3/1/2018
Bellingham	WA	Bellingham International	BLI	N	$3.00	$1,594,527	5y1m	7/1/1993	8/1/1998
Bellingham	WA	Bellingham International	BLI	N	$3.00	*	10m	3/1/1999	1/1/2000
Bellingham	WA	Bellingham International	BLI	N	$3.00	$1,400,000	2y6m	1/1/2000	7/1/2002
Bellingham	WA	Bellingham International	BLI	N	$4.50	**	2y11m	7/1/2002	6/1/2005
Bellingham	WA	Bellingham International	BLI	N	$4.50	$5,241,939	5y1m	6/1/2005	7/1/2010
Bellingham	WA	Bellingham International	BLI	N	$4.50	$30,250,000	17y3m	10/1/2010	10/1/2027
Friday Harbor	WA	Friday Harbor	FRD/	N	$3.00	$517,077	15y5m	2/1/2001	7/1/2016

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Moses Lake	WA	Grant County International	MWH	CS	$3.00	$470,000	6y8m	3/1/1999	11/1/2005
Moses Lake	WA	Grant County International	MWH	CS	$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	$678,185	7y3m	10/1/2005	1/1/2013
Seattle	WA	Seattle-Tacoma International	SEA	L	$3.00	$76,701,322	8y11m	11/1/1992	10/1/2001
Seattle	WA	Seattle-Tacoma International	SEA	L	$4.50	**	1y5m	10/1/2001	1/1/2003
Seattle	WA	Seattle-Tacoma International	SEA	L	$4.50	$1,256,538,985	15y8m	1/1/2003	9/1/2018
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	$52,318,633	7y5m	5/1/2005	10/1/2012
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	$1,125,087	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	$6,006,037	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	$19,632,586	15y2m	4/1/2003	6/1/2018
Clarksburg	WV	North Central West Virginia	CKB	CS	$3.00	$79,103	2y1m	3/1/1994	10/1/1995
Clarksburg	WV	North Central West Virginia	CKB	CS	$4.50	$101,489	1y10m	4/1/2001	8/1/2002
Clarksburg	WV	North Central West Virginia	CKB	CS	$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	$1,122,712	4y4m	5/1/2009	9/1/2013
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
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	$5,709,707	11y5m	10/1/2001	3/1/2013
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	$329,482,764	27y3m	5/1/1995	8/1/2022
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	$1,397,617	6y11m	1/1/2004	12/1/2011
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
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	**	8m	7/1/2001	3/1/2002
Cody	WY	Yellowstone Regional	COD	N	$4.50	$76,373	3y1m	3/1/2002	4/1/2005
Cody	WY	Yellowstone Regional	COD	N	$4.50	$697,934	7y4m	9/1/2005	1/1/2013
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
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	$661,604	9y10m	7/1/2005	5/1/2015
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	$70,500	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.									

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FACILITIES AND EQUIPMENT, RECOVERY ACT

Program and Financing
(in millions of dollars)

Identification code: 69-1304-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
	Direct program:			
0001	Power systems	21	. . . . .	. . . . .
0002	Modernize aging en route air traffic control centers	10	. . . . .	. . . . .
0003	Replace air traffic control towers (ATCT/TRACONS)	79	. . . . .	. . . .
0004	Install airport lighting, navigation and landing equipment	7	. . . . .	. . . . .
0900	Total new obligations	117	. . . . .	. . . . .
	Budgetary resources available for obligation:			
1000	Unobligated balance carried forward, end of year	111	. . . . .	. . . .
1021	Recoveries of prior year unpaid	8	. . . . .	. . . . .
1050	Unobligated balance carried forward, end of year	119	. . . . .	. . . . .
	Change in obligated balances:			
3020	Obligated balance, start of year:	87	124	72
3030	Obligations incurred, unexpired accounts	117	. . . . .	. . . . .
3040	Total outlays (gross)	-72	-52	-52
3080	Recoveries of prior year unpaid obligations, unexpired accounts	-8	. . . . .	. . . . .
3100	Obligated balance, end of year	124	72	20
	Outlays (gross), detail:			
4011	Outlays from discretionary balances	72	52	52
4080	Outlay, net (discretionary)	72	52	52
	Net budget authority and outlays			
4180	Budget authority	. . . . .	. . . . .	. . . . .
4190	Outlays (total)	72	52	52

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.

Object Classification
(in millions of dollars)

Identification code: 69-1304-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Direct obligations:			
1252	Other services	39	. . . . .	. . . . .
1260	Supplies and materials	1	. . . . .	. . . . .
1310	Equipment	4	. . . . .	. . . . .
1320	Land and structures	73	. . . . .	. . . . .
9999	Total new obligations	117	. . . . .	. . . . .

GRANTS-IN-AID FOR AIRPORTS, RECOVERY ACT

Program and Financing
(in millions of dollars)

Identification code: 69-1306-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
	Direct Program:			
0001	Grants-in-aid for airports	37	.....	.....
0002	Administrative Oversight	1	.....	.....
0900	Total new obligations	38	.....	.....
	Budgetary authority, Policy Outlays:			
1000	Unobligated balance brought forward, Oct 1	21		
1021	Recoveries of prior year unpaid obligation	17	.....	.....
1050	Unobligated balance (total)	38	.....	.....
	Change in obligated balances:			
3020	Obligated balance, start of year (net)	900	195	2
3030	Obligations incurred, unexpired accounts	38	.....	.....
3040	Total outlays (gross)	-726	-193	-2
3080	Recoveries of prior year unpaid obligations, unexpired	-17		
3090	Unpaid Obligations, end of year (gross)	195	2	
3100	Obligated balance, end of year	195	2	.....
	Outlays (gross), detail:			
4011	Outlays from discretionary balances	726	193	2
4080	Outlays, net (discretionary)	726	193	2
	Net budget authority and outlays:			
4180	Budget authority	.....	.....	.....
4190	Outlays, net (total)	726	193	2

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 are being allocated to qualified airports as discretionary grants, and will be distributed based on a project priority system that addresses airport safety and security, infrastructure, runway safety, increased capacity, and mitigation of environmental impacts.

Object Classification
(in millions of dollars)

Identification code: 69-1306-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Direct obligations:			
	Personnel compensation			
1115	Other personnel compensation	1	.....	.....
1410	Grants, subsidies, and contributions	37	.....	.....
9999	Total new obligations	38	.....	.....

AVIATION INSURANCE REVOLVING FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4120-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
08.01	Program administration	13	18	18
09.00	Total new obligations	13	18	18
	Budget resources:			
	Unobligated balance:			
10.00	Unobligated balance brought forward, Oct. 1	1,311	1,450	1,587
10.21	Recoveries of prior year unpaid obligations	2	. . . . .	. . . . .
10.50	Unobligated balance total	1,313	1,450	1,587
	Budget authority:			
	Spending authority form offsetting collections, mandatory:			
18.00	Collected	150	155	157
18.50	Spending auth from offsetting collections, mand (total)	150	155	157
19.00	Budget authority (Total)	150	155	157
19.30	Total budgetary resources available	1,463	1,605	1,744
	Memorandum (non-add) entries:			
19.41	Unexpired unobligated balane, end of year	1,450	1,587	1,726
	Change in obligated balance:			
	Obligated balance, start of year (net):			
30.00	Unpaid obligations, brought forward, Oct. 1 (gross)	7	5	5
30.20	Obligated balance, start of year (net)	7	5	5
30.30	Obligations incurred, unexpired accounts	13	18	18
30.40	Outlays (gross)	-13	-18	-18
30.80	Recoveries of prior year unpaid obligations, unexpired	-2	. . . . .	. . . . .
	Obligated balance, end of year (net):			
30.90	Unpaid obligations, end of year (gross)	5	5	5
31.00	Obligated balance, end of year	5	5	5
	Budget authority and outlays net:			
	Mandatory:			
40.90	Budget authority, gross	150	155	157
	Outlay, gross:			
41.00	Outlays from new mandatory authority	13	13	13
41.01	Outlays from mandatory balances	. . . . .	5	5
41.10	Outlays, gross (total)	13	18	18
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
41.21	Interest on Federal securities	-38	-38	-33
41.23	Non-Federal sources	-112	-117	-124
41.30	Offsets against gross budget authority and outlays (total)	-150	-155	-157
41.60	Budget authority, net (mandatory)	. . . . .	. . . . .	. . . . .
41.70	Outlays, net (mandatory)	-137	-137	-139
41.80	Budget authority, net (total)	. . . . .	. . . . .	. . . . .
41.90	Outlays, net (total)	-137	-137	-139
	Memorandum (non-add) entries:			
50.00	Total investments, SOY: Federal securities: Par value	1,271	1,452	1,569
50.01	Total investments, EOY: Federal securities: Par value	1,452	1,569	1,722

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 the Department of Defense.

The Homeland Security Act of 2002 (P.L. 107-296) added a provision requiring the Secretary to provide additional federal 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 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 all FAA 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: 69-4120-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Reimbursable obligations:			
21.11	Personnel Compensation: Full time permanent..........................	1	1	1
24.20	Insurance claims and indemnities..	5	12	12
24.40	Refunds	7	5	5
29.90	Subtotal, obligations, reimbursable obligations	13	18	18
99.99	Total new obligations	13	18	18

Employment Summary

Identification code: 69-4120-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
20.01	Reimbursable Civilian full-time equivalent employment.....	5	5	5

ADMINISTRATIVE SERVICES FRANCHISE FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4562-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
08.01	Accounting Services	55	57	59
08.04	Information Services	115	115	118
08.05	Duplicating Services	6	6	6
08.06	Multi Media	2	2	2
08.07	CMEL/Training	12	12	13
08.08	International Training	4	4	4
08.10	Logistics	275	273	280
08.11	Aircraft Maintenance	66	65	68
08.12	Acquisition	10	11	11
09.00	Total new obligations	545	545	561
	Budgetary Resources:			
10.00	Unobligated balance brought forward, Oct 1	174	130	137
10.21	Recoveries of prior year unpaid obligations	38	.....	.....
10.50	Unobligated balance (total)	212	130	137
	Budget authority:			
	Spending authority from offsetting collections, discretionary:			
17.00	Collected	458	552	563
17.01	Change in uncollected payments, federal sources	5	.....	.....
17.50	Spending auth from offsetting collections, disc (total)	463	552	563
19.30	Total budgetary resources available	675	682	700
	Memorandum (non-add) entries:			
19.41	Unexpired unobligated balance, end of year	130	137	139
	Change in obligated balances:			
	Obligated balance, start of year (net):			
30.00	Unpaid obligations, brought forward, Oct 1 (gross)	166	187	209
30.10	Uncollected pymts, Fed sources, brought forward, Oct 1	-18	-23	-23
30.20	Obligated balance, start of year (net)	148	164	186
30.30	Obligations incurred, unexpired accounts	545	545	561
30.40	Outlays (gross)	-486	-523	-662
	Change in uncollected customer payments, Federal sources,			
30.50	unexpired	-5	.....	.....
30.80	Recoveries of prior year unpaid obligations unexpired	-38	.....	.....
30.90	Unpaid obligations, end of year (gross)	187	209	108
30.91	Uncollected pymts, fed sources, end of year	-23	-23	-23
31.00	Obligated balance, end of year (net)	164	186	85
	Budget authority and Outlays, net:			
	Discretionary:			
40.00	Budget authority, gross	463	552	563
	Outlays gross:			
40.10	Outlays from new discretionary authority	373	375	383
40.11	Outlays from discretionary balances	113	148	279
40.20	Outlays, gross (total)	486	523	662
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
40.30	Federal sources	-458	-552	-563
	Additional offsets against gross budget authority only:			
40.50	Change in uncollected pmts, Fed sources unexpired	-5	.....	.....
40.60	Additional offset against budget authority only (total)	-5	.....	.....
40.80	Outlays, net (discretionary)	28	-29	99

41.80	Budget authority, net (discretionary)	. . . . .	. . . . .	. . . . .
41.90	Outlays, net (total)	28	-29	-99

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 reimbursable 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, payroll, travel, duplicating services, multi-media services, information technology, materiel management (logistics), and aircraft maintenance.

Object Classification
(in millions of dollars)

Identification code: 69-4562-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Reimbursable obligations:			
21.11	Personnel compensation: Full-time permanent	125	132	137
21.21	Civilian personnel benefits	33	37	38
22.10	Travel and transportation of persons	6	6	6
22.20	Transportation of things	4	4	4
22.33	Communications, utilities, and miscellaneous charges	16	22	23
22.40	Printing and reproduction	1	1	1
22.52	Other services	248	219	228
22.60	Supplies and materials	91	94	94
23.10	Equipment	21	30	30
29.90	Subtotal, Obligations, Reimbursable obligations	545	545	561
99.99	Total new obligations	545	545	561

Employment Summary

Identification code: 69-4562-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
2001	Reimbursable civilian full-time equivalent employment	1,649	1,666	1,676

AVIATION USER FEES

Special and Trust Fund Receipts
(in millions of dollars)

Identification code: 69-5422-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Balance, start of year:			
01.00	Balance, start of year	30	31	33
01.99	Balance, start of year	30	31	33
	Receipts:			
02.00	Aviation User Fee, Overflight Fee[021-00-542240-0]	51	52	54
04.00	Total Balances and collections	81	83	87
	Appropriations:			
05.00	Aviation User Fees[021-12-5422-0]	-50	-50	-50
07.99	Balance, end of year	31	33	37

Program and Financing
(in millions of dollars)

Identification code: 69-5422-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Budgetary Resources:			
	Budget authority:			
	Appropriations, mandatory:			
12.01	Appropriations (special fund)	50	50	50
12.20	Transferred to other accounts [69-5423]	-50	-50	-50
12.60	Appropriations, mandatory (total)	.....	.....	.....
	Budget authority and outlays net:			
41.80	Budget authority, net (total)	.....	.....	.....
41.90	Outlays, net (total)	.....	.....	.....

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 $54 million in overflight fees will be collected in 2012.

AIRPORT AND AIRWAY TRUST FUND

Program and Financing
(in millions of dollars)

Identification code: 69-8103-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Memorandum (non-add) entries:			
92.01	Total investments, start of year: Federal securities: Par value	7,829	7,045	6,805
92.02	Total investments, end of year: Federal securities: Par value	7,045	6,805	5,701

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.

The status of the fund is as follows:

Status of Funds
(in millions of dollars)

Identification code: 69-8103-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Unexpended balance, start of year:			
01.00	Balance, start of year	8,780	9,428	9,107
	Adjustments:			
01.91	Kerosene tax adjustment	10		
01.99	Total balance, start of year	8,790	9,428	9,107
	Cash Income during the year:			
	Current law:			
	Receipts			
12.00	Excise Taxes, Airport and Airway Trust Fund [021-00-810310-0]	10,612	10,127	10,250
	Offsetting receipts (intragovernmental):			
12.40	Interest, Airport and Airway Trust Fund [021-00-810320-0]	195	198	200
12.41	Interest, Airport and Airway Trust Fund [021-00-810320-0]			-8
	Offsetting collections:			
12.80	Grants-in-aid for Airports (Airport and Airway Trust Fund) [021-12-8106-0]	1	1	1
12.81	Facilities and Equipment (Airport and Airway and Airport Trust Fund [021-12-8107-0]	11	48	48
12.82	Facilities and Equipment (Airport and Airway and Airport Trust Fund [021-12-8107-0]	76	94	92
12.83	Research, engineering and development (Airport and Airway Trust Fund) [021-12-8108]	9	16	16
12.99	Income under present law	10,904	10,484	10,599
32.99	Total cash income	10,904	10,484	10,612
	Cash outgo during year:			
	Current law:			
45.00	Payments to Air Carriers [021-12-8304-0]	-130	-139	-134
45.01	Grants-in-aid for Airports [021-12-8106-0]	-3,283	-3,419	-3,811
45.02	Facilities and Equipment (Airport and Airway Trust Fund) [021-12-8107-0]	-2,697	-3,019	-3,132
45.03	Research, Engineering and Development (Airport and Airway Trust Fund) [021-12-8108-0]	-156	-228	-238
45.04	Trust Fund Share of FAA Activities (Airport and Airway Trust Fund) [021-12-8104-0]	-4,000	-4,000	-4,958
45.99	Outgo under current law (-)	-10,266	-10,805	-12,273
65.99	Total Cash outgo (-)	-10,266	-10,805	-12,076
	Unexpended balance, end of year:			
87.00	Uninvested balance (net), end of year	2,383	2,302	1,929
87.01	Airport and Airway Trust Fund	7,045	6,805	5,701
87.99	Total balance, end of year	9,428	9,107	7,630

TRUST FUND SHARE OF FAA ACTIVITIES (AIRPORT AND AIRWAY TRUST FUND)

Program and Financing
(in millions of dollars)

Identification code: 69-8104-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
	Obligations by program activity:			
00.01	Payment to operations	4,000	4,000	4,958
09.00	Total new obligations	4,000	4,000	4,958
	Budgetary resources:			
	Appropriations, discretionary:			
11.02	Appropriations (trust fund)	4,000	4,000	4,958
11.60	Appropriations, discretionary: (total)	4,000	4,000	4,958
19.30	Total budgetary resources available	4,000	4,000	4,958
	Change in obligated balance:			
	Obligated balance, start of year (net):			
30.30	Obligation incurred, unexpired accounts	4,000	4,000	4,958
30.40	Outlays (gross):	-4,000	-4,000	-4,958
	Budget authority and outlays, net:			
	Discretionary:			
40.00	Budget authority, gross	4,000	4,000	4,958
	Outlays, gross:			
40.10	Outlays from new discretionary authority	4,000	4,000	4,958
40.70	Budget authority, net (discretionary)	4,000	4,000	4,958
40.80	Outlays, net (discretionary)	4,000	4,000	4,958
41.80	Budget authority, net (total)	4,000	4,000	4,958
41.90	Outlays, net (total)	4,000	4,000	4,958

For 2012, the Budget proposes $9,823 million for FAA Operations, of which $4,958 million would be provided from the Airport and Airway Trust Fund.

Object Classification
(in millions of dollars)

Identification code: 69-8104-0-402		FY 2010 Actual	FY 2011 CR	FY 2012 Estimate
19.40	Direct obligations: Financial Transfers	4,000	4,000	4,958

FAA Administrative Provisions in FY 2012 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 2012, 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 2012.
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.	This provision has historically been included in the appropriations language under the Operations account heading. 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 including this provision as a GP that would apply to all FAA accounts. FAA also recommends keeping this provision for FY 2012 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. This provision has historically been included in the appropriations language under the Operations account heading. FAA recommends including this provision as a GP that would apply to all FAA accounts.
Sec. 115. 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 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	
2002	[1]6,886,000,000	2002	[2]6,886,000,000
		2002	[3]200,000,000
		2002 Rescission	[4]-5,681,000
2003	[5] [6]7,481,970,000	2003	[7] [8] [9]7,019,170,377
2004	[10]7,590,648,000	2004	[11] [12]7,479,206,153
2005	[13]7,849,000,000	2005	[14] [15]7,706,537,000
2006	[16] [17]8,201,000,000	2006	[18] [19]8,104,140,000
2007	[20]8,366,000,000	2007	[21]8,374,374,217
2008	[22]8,725,783,000	2008	[23]8,740,000,000
2009	[24]8,998,461,700	2009	[25]9,046,167,000
2010	[26]9,335,798,000	2010	[27] [28]9,351,400,000
2011	[29]9,793,000,000	2011	[30]TBD
2012	[31]9,823,000,000		

[1] Includes $5,777,219,000 from the Airport and Airway Trust Fund.
[2] Includes $5,773,519,000 from the Airport and Airway Trust Fund.
[3] Emergency Supplemental Funding included in P.L. 107-117, FY 2002 Department of Defense Appropriations Bill.
[4] Reflects Administrative and Travel Rescission per P.L. 107-206;$5,542,000 from General Fund and $139,000 from Trust.
[5] FY 2003 includes $404,768,000 for CSRS/Health benefit accruals proposed by the Administration.
[6] Includes 3,799,278,000 from Airport and Airway Trust Fund.
[7] Includes $3,774,582,693 from Airport and Airway Trust Fund and $3,248,064,934 from General Fund.
[8] Reflects 0.65 percent across-the-board rescission per P.L. 108-7 and Working Capital Fund cut of $3.9M.
[9] Excludes Midway Island Airfield earmark for $3,500,000—reduced to $3,477,250 by 0.65 rescission.
[10] Administration proposes $6,000,000,000 from Airport and Airway Trust Fund.
[11] Reflects 0.59 percent across-the-board rescission per P.L. 108-199; Working Capital Fund cut by $7.3M.
[12] Includes $4,469,000,000 from Airport Airway Trust Fund.
[13] Includes $6,002,000,000 from Airport and Airway Trust Fund with $2M for Bureau of Transportation Statistics.
[14] Reflects 0.80 percent across-the-board rescission per P.L. 108-447 and Working Capital Fund cut of $6.3M.
[15] Includes $$4,878,728,416 from Airport and Airway Trust Fund.
[16] Includes $6,500,000,000 from the Airport and Airway Trust Fund.
[17] Includes $150,000,000 for Flight Service Station A-76 Competition.
[18] Reflects 1.0 percent across-the-board rescission per P.L. 109-148.
[19] Includes $5,541,000,000 from Airport and Airway Trust Fund.
[20] Includes $5,445,000,000 from Airport and Airway Trust Fund.
[21] Includes $5,627,900,000 from Airport and Airway Trust Fund
[22] 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.
[23] Includes $6,397,061,000 from Airport and Airway Trust Fund.
[24] 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.
[25] Includes $5,238,005,000 from Airport and Airway Trust Fund. Also includes $3.7 million transfer from the U.S. Department of State.
[26] Includes $6,207,798,000 from Airport and Airway Trust Fund.
[27] Includes $4,000,000,000 from Airport and Airway Trust Fund.
[28] Includes $1,300,000 transfer from the U.S. Department of State
[29] Includes $6,064,000,000 from Airport and Airway Trust Fund
[30] FAA is operating under continuing resolution through March 4, 2011 per P.L. 111-322.
[31] Includes $4,958,000,000 from Airport and Airway Trust Fund

FEDERAL AVIATION ADMINISTRATION

FACILITIES AND EQUIPMENT (AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2002	2,914,000,000	2002	2,914,000,000
		2002	[32] -15,000,000
		2002	[33] 108,500,000
		2002 Rescission	[34] -1,726,000
2003	[35] 2,981,022,000	2003	[36] 2,961,645,357
		2003 Rescission	[37] -20,000,000
2004	2,916,000,000	2004	[38] 2,892,831,000
		2004 Rescission	[39] -30,000,000
2005	2,500,000,000	2005	[40] 2,519,680,000
		2005 Supplemental (P.L.108-324)	[41] 5,100,000
2006	2,448,000,000	2006	[42] 2,514,600,000
		2006	[43] 40,600,000
2007	2,503,000,000	2007	2,517,520,000
2008	[44] 2,461,566,000	2008	2,513,611,000
2009	[45] 2,723,510,000	2009	2,742,095,000
		2009 Supplemental (P.L.111-5)	[46] 200,000,000
2010	2,925,202,000	2010	[47] 2,928,315,000
2011	2,970,000,000	2011	[48] TBD
2012	[49] 3,120,000,000		

[32] Rescission of unobligated balances per P.L. 107-87.
[33] Emergency Supplemental Funding included in P.L. 107-117, FY 2002 Department of Defense Appropriations Bill.
[34] Administrative and Travel rescission per P.L. 107-206.
[35] FY 2003 request excludes $18,551,000 for CSRS/Health benefit accruals proposed by the Administration.
[36] Reflects 0.65 percent across-the-board rescission of per P.L. 108-7.
[37] Rescission of unobligated balances.
[38] Reflects 0.59 percent across-the–board rescission per P.L. 108-199.
[39] Rescission of unobligated balances.
[40] Reflects 0.80 percent across-the-board rescission per P.L. 108-447.
[41] American Recovery and Reinvestment Act Supplemental per P.L. 111-5, from the General Fund.
[42] Reflects 1.0 percent across-the-board rescission, per P. L. 109-148.
[43] Hurricane Supplemental fund per P.L. 109-148
[44] 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.
[45] 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.
[46] American Recovery and Reinvestment Act Supplemental per P.L. 111-5, from the General Fund.
[47] Reflects $7,888,000 rescission of prior year authority per P.L. 111-117.
[48] FAA is operating under continuing resolution through March 4, 2011 per P.L. 111-322.
[49] Includes $250,000,000 of mandatory General Fund from the Administration's Infrastructure proposal.

FEDERAL AVIATION ADMINISTRATION

RESEARCH, ENGINEERING, AND DEVELOPMENT

ESTIMATES		APPROPRIATIONS	
2002	187,781,000	2002	195,000,000
		2002	[50]50,000,000
		2002 Rescission	[51]-161,000
2003	126,744,000	2003	[52]147,485,075
2004	100,000,000	2004	[53]118,734,310
2005	117,000,000	2005	[54]129,879,584
2006	130,000,000	2006	[55]136,620,000
2007	130,000,000	2007	130,234,000
2008	[56]140,000,000	2008	146,828,000
2009	[57]171,028,000	2009	171,000,000
2010	180,000,000	2010	190,500,000
2011	190,000,000	2011	[58]TBD
2012	190,000,000		

[50] Emergency Supplemental Funding included in P.L. 107-117, FY 2002 Department of Defense Appropriations Bill.
[51] Administrative and Travel rescission per P.L. 107-206.
[52] Reflects a 0.65 percent across-the-board rescission per P.L. 108-7.
[53] Reflects a 0.59 percent across-the-board rescission per P.L. 108-199.
[54] Reflects a 0.80 percent across-the-board rescission per P.L. 108-447.
[55] Reflects a 1.0 percent across-the-board rescission of 1.0 percent per P.L. 109-148.
[56] Includes $122,867,000 from the Airport and Airway Trust Fund.
[57] Includes $156,003,000 from the Airport and Airway Trust Fund.
[58] FAA is operating under continuing resolution through March 4, 2011 per P.L. 111-322.

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	[59] -301,720,000
		2002	[60] 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)	[61] 1,100,000,000
2010	3,000,000,000	2010	3,000,000,000
2011	3,550,000,000	2011	[62] TBD
2012	3,600,000,000		

[59] Rescission of Contract Authority per P.L. 107-87.
[60] Emergency Supplemental Funding included in P.L. 107-117, FY 2002 Department of Defense Appropriations Bill.
[61] American Recovery and Reinvestment Act Supplemental, per P.L. 111-5, from the General Fund.
[62] FAA is operating under continuing resolution through March 4, 2011 per P.L. 111-322.

FEDERAL AVIATION ADMINISTRATION

GRANTS-IN-AID FOR AIRPORTS
LIMITATION ON OBLIGATIONS
(AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2002	(3,300,000,000)	2002	[63](3,474,944,000)
2003	(3,400,000,000)	2003	[64](3,377,900,000)
2004	(3,400,000,000)	2004	[65] (3,379,940,000)
		2004	[66](1,988,200)
2005	(3,500,000,000)	2005	[67](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	[68]TBD
2012	(2,424,000,000)		

[63] 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.
[64] Reflects 0.65 percent across-the-board rescission per P.L. 108-7.
[65] Reflects 0.59 percent across-the-board rescission per P.L. 108-199.
[66] Direct appropriation from General Fund for Ft. Worth Alliance Airport, pursuant to Division H, Section 167, P.L. 108-199.
[67] 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.
[68] FAA is operating under continuing resolution through March 4, 2011 per P.L. 111-322.

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 the development of 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 Office of Research and Technology Development, 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 RE&D issues and provides a link between the 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 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 six 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 members who hold two-year terms. The REDAC meets with FAA senior managers two times a year and annually reviews the Agency's R&D budget submission.

RESEARCH, DEVELOPMENT & TECHNOLOGY
DEPARTEMENT OF TRANSPORTATION
BUDGET AUTHORITY
($ in Thousands)
EXHIBIT IV-1

		FY 2010 Actual	FY 2012 Request	FY 2012 Applied	FY 2012 Development
A. Research, Engineering and Development		**190,500**	**190,000**	**190,000**	
A11	**Safety**	**93,572**	**94,249**	**94,249**	
a.	Fire Research and Safety	7,799	8,157	8,157	
b.	Propulsion and Fuel System	3,105	3,611	3,611	
c.	Advanced Structural/Structural Safety	4,935	2,605	2,605	
d.	Atmospheric Hazards/Digital System Safety	4,482	5.404	5.404	
e.	Continued Airworthiness	10,944	12,589	12,589	
f.	Aircraft Catastrophic Failure Prevention Research	1,545	1,502	1,502	
g.	Flightdeck/Maintenance/System Integration Human Factors	7,128	6,162	6,162	
h.	System Safety Mgmt/Aviation Safety Risk Analysis	12,698	10,027	10,027	
I.	Air Traffic Control Airway Facilities Human Factors	10,302	10,634	10,634	
j.	Aeromedical Research	10,378	11,617	11,617	
k.	Weather Program Safety	16,789	16,366	16,366	
l.	Unmanned Aircraft System	3,467	3,504	3,504	
m.	NextGen Alternative fuels for General Aviation	-	2,071	2,071	
A12	**Economic Competitveness**	**48,543**	**54,406**	**54,406**	
a.	JPDO	14,407	14,067	14,067	
b.	Wake Turbulence	10,631	10,674	10,674	
c.	NextGen: Air Ground Integration - Flightdeck/Maintenance System Integration	5,688	10,545	10,545	
d.	NextGen: Self-Separation	8,247	9,934	9,934	
e.	NextGen Weather in the Cockpit	9,570	9,186	9,186	
A13	**Environmental Sustainability**	**42,031**	**35,850**	**35,850**	
a.	Environment and Energy	15,522	15,327	15,327	
b.	NextGen Environmental Research Aircraft Technologies Fuels and Metrics	26,509	20,523	20,523	
A14	**Mission Support**	**6,354**	**5,495**	**5,495**	
a.	System Planning and Resource Management	1,766	1,718	1,718	
b.	William J. Hughes Technical Center Laboratory Facility	4,588	3,777	3,777	
B. Facitilities and Equipment		**170,418**	**177,485**		**150,785**
a.	Advanced Technology Development and Prototype	28,100	19,000		19,000
b.	Plant (F)*	18,500	28,400	N/A	N/A
c.	CAASD	23,944	22,785		22,785
d.	NextGen Demonstrations and Infrastructure Development	33,774	-		-
f.	NextGen System Development	66,100	109,000		109,000
C. Airport Improvement Program, Airport Technology		**37,472**	**44,250**	**44,500**	
a.	Airport Technology Research	22,472	29,250	29,250	
b.	Airport Cooperative Research	15,000	15,000	15,000	
D. Operations*		**13,563**	**8,827**		**8,827**
E. Commercial Space Transportation		**145**	**566**		**566**
	Subtotal, Research and Development	**393,598**	**394,428**	**234,250**	**160,178**
	Subtotal , Facilities (F)	**18,500**	**28,400**	**N/A**	**N/A**
	TOTAL FAA	**412,098**	**422,828**		

*** These items will not be included in the FY2011 National Aviation Research Plan (NARP)**

EXHIBIT IV-2
FEDERAL AVIATION ADMINISTRATION
FY 2012 RD&T Budget Request by DOT Goal
($000)

RD&T Program	*Safety*	*State of Good Repair*	*Economic Competitiveness*	*Environmental Sustainability*	*Org. Excel.*	**FY 2012 Request**
Federal Aviation Administration						
Fire Research & Safety	8,157					8,157
Propulsion & Fuel Systems	3,611					3,611
Advanced Structural/Structural Safety	2,605					2,605
Atmospheric Hazards – Aircraft Icing/ Digital System Safety Research	5,404					5,404
Continued Airworthiness	12,589					12,589
Aircraft Catastrophic Failure Prevention Research	1,502					1,502
Flightdeck/Maintenance/System Integration Human Factors	6,162					6,162
System Safety Mngmt/Aviation Safety Risk Analysis	10,027					10,027
ATC/Technical Operations	10,634					10,634
Aeromedical Research	11,617					11,617
Weather Research	16,366					16,366
Unmanned Aircraft Systems	3,504					3,504
NextGen Alternative Fuels for General Aviation	2,071					2,071
JPDO			14,067			14,067
NextGen Wake Turbulence			10,674			10,674
NextGen – Air Ground Integration			10,545			10,545
NextGen – Self Separation			9,934			9,934
NextGen – Weather Technology in the Cockpit			9,186			9,186
Reduce Environmental Impact of Aviation				15,327		15,327
NextGen – Environmental Research Aircraft Technologies, Fuels and Metrics				20,523		20,523
System Planning & Resource Management	851		533	334		1,718
Technical Laboratory Facilities	2,380		1,397			3,777
Engineering Development Test & Evaluation (ATD&P)	19,000					19,000
Plant					28,400	28,400
CAASD			22,785			22,785
NextGen System Development			109,000			109,000
Airport Technology Research	15,725	12,025		1,500		29,250
Airport Cooperative Research Program	5,000		5,000	5,000		15,000
Operations			8,827			8,827
Commercial Space Transportation	566					566
Total FAA	**137,771**	**12,025**	**201,948**	**42,684**	**28,400**	**422,828**

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NextGen Generation Air Transportation System (NextGen)

Executive Summary

The FAA continues to make critical progress implementing Next Generation Air Transportation System (NextGen) capabilities. Expanded satellite-based surveillance has increased. We have improved airport runway access, and continue to maintain and improve safety with each step. Implementation of the Automatic Dependent Surveillance-Broadcast (ADS-B) to control air traffic in the Gulf of Mexico is a significant improvement.

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 everyone 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. Added advantages include saving time and decreasing carbon emissions and noise pollution. We are working even more closely with all stakeholders to ensure coordination in all efforts including the Continuous Lower Emissions, Energy, and Noise program (CLEEN) where 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

The FAA's $1,237 million total request for NextGen programs and activities in Fiscal Year 2012 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 request consists of $1,037 million in discretionary spending plus an additional $200 million in mandatory spending from the President's $50 billion infrastructure initiative. 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, the 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 everyday. Through the Office of Policy, International Affairs and Environment (APL), the 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 2012 will be the beginning 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, in wide use today through demonstration projects, 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 attainment of initial operating capability (IOC) for the Automatic Dependent Surveillance-Broadcast (ADS-B) system for airspace over the Gulf of Mexico in January 2010. This IOC, and others at Louisville in November 2009, Philadelphia in March 2010 and Juneau in April 2010, was important steps forward. 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 are equipped with technology that 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.

We published our response to the Task Force recommendations in January 2010. In the months following, we developed action plans to carry out many of the Task Force's recommendations and incorporated these initiatives into our 2010 update to the NextGen Implementation Plan, which we published in March 2010.

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.

NextGen Benefits

According to our latest estimates, NextGen will reduce total flight delays about 35 percent by 2018 while providing $23 billion in cumulative benefits to the traveling public, aircraft operators, and the FAA. Aircraft owners will save about 1.5 billion gallons of fuel during this period, reducing carbon dioxide emissions by 13.9 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 predeparture 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.

FY 2012 Funding Profile

This budget supports the continued on-time delivery of the NextGen effort. The entire FY 2012 NextGen portfolio totals $1,237 million distributed among F&E programs ($1,135 million), Research, Engineering, & Development ($77 million), and Operations activities ($24 million). Of these amounts, $1,037 million is requested in discretionary spending and $200 million is requested in mandatory spending from the President's $50 billion infrastructure initiative. Line item detail for each account is shown in the table on the following page.

NextGen Programs
($ in Thousands)

	FY 2010 Enacted	FY 2012 Discretionary Request	FY 2012 Mandatory Request	FY 2012 Total Request
Facilities and Equipment (F&E)				
NextGen Network Enabled Weather (NNEW)	20,000	27,350	-	27,350
Data Communications for Trajectory Based Operations	46,700	143,000	7,200	150,200
Demonstrations and Infrastructure Development	34,602	16,900	8,100	25,000
NextGen – System Development	66,100	90,000	19,000	109,000
NextGen – Trajectory Based Operations	63,500	9,300	13,700	23,000
NextGen – Reduced Weather Impact	35,600	14,600	18,400	33,000
NextGen – High Density Arrivals/Departures	51,800	14,300	13,700	28,000
NextGen – Collaborative ATM	44,641	28,000	25,000	53,000
NextGen – Flexible Terminals and Airports	64,300	36,300	21,800	58,100
NextGen – Safety, Security and Environment	8,200	5,000	3,000	8,000
NextGen – Networked Facilities	24,000	9,000	1,000	10,000
NextGen – Future Facilities [1]	-	19,500	-	19,500
Joint Planning & Development Office (JPDO)	-	3,000	-	3,000
System-Wide Information Management	56,548	66,350	-	66,350
ADS-B NAS Wide Implementation – Segment 1b	201,350	285,100	-	285,100
NAS Voice Switch	26,600	19,800	-	19,800
Collaborative ATM Technologies	18,100	41,500	-	41,500
Time-Based Flow Management (TBFM)	-	38,700	-	38,700
Aeronautical Information Management - Segment 2&3 (AIM) [2]	-	8,000	2,600	10,600
En Route Automation Modernization (ERAM) - D-Position Upgrade & System Enhancei	-	-	64,500	64,500
Colorado ADS-B/Wide Area Multilateration (WAM) [2]	-	3,800	2,000	5,800
Activity 5 F&E PCBT - NextGen RNAV/RNP	26,250	26,250	-	26,250
Activity 5 F&E PCBT - NextGen RNAV/RNP (AVS 40 EOY/20 FTE)	-	3,300	-	3,300
Performance Based Navigation - RNAV/RNP	-	26,200	-	26,200
SubTotal F&E	**788,290**	**935,250**	**200,000**	**1,135,250**
Research, Engineering and Development (RE&D)				
NextGen – Wake Turbulence	7,605	10,674	-	10,674
NextGen – Air Ground Integration	5,688	10,545	-	10,545
NextGen – Self Separation	8,247	9,934	-	9,934
NextGen – Weather in the Cockpit	9,570	9,186	-	9,186
NextGen Environmental Research – Aircraft Technologies, Fuels and Metrics	26,509	20,523	-	20,523
NextGen – JPDO	14,407	14,067	-	14,067
NextGen Alternative Fuels - General Aviation	-	2,071	-	2,071
NextGen – Advanced Systems and Software Validation	-	0	-	0
SubTotal RE&D	**72,026**	**77,000**	**0**	**77,000**
Operations				
NextGen Environmental/Noise/Congestion Studies	1,665	1,675	-	1,675
NextGen Staffing	5,000	10,000	-	10,000
NextGen – Environmental Performance	725	725	-	725
Technologies, Models & Metrics (APL 3 FTE)	-	3,019	-	3,019
NextGen Technology Advancement (AVS 30 EOY/15 FTE) [3]	-	9,000	-	9,000
SubTotal Operations	**7,390**	**24,419**	**0**	**24,419**
Total NextGen Programs	**867,706**	**1,036,669**	**200,000**	**1,236,669**

Note:

1. The funding for this newly-created FY 2012 NextGen implementation BLI was originally in the solution set NextGen High Density Arrivals /Departures.
2. These newly-added legacy BLIs begin NextGen initiatives in FY 2012.
3. These items are newly-requested FY 2012 NextGen OPS initiatives.

Staffing

The development and implementation of NextGen will require FAA to hire new employees over the next several years. 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 several offices in the ATO such as NextGen and Operations Planning, En Route and Oceanic, Terminal, System Operations, and Technical Operations as well as other lines-of-business such as 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 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 their recommendations.

The FY 2012 budget requests funding to support a total of 370 positions dedicated to NextGen. This is an increase of 82 positions over the FY 2010 Enacted level and reflects 52 positions requested in prior years, plus an additional 30 new positions in Operations. These new positions will support the certification and oversight of NextGen systems and procedures. The new policies, standards, and guidance produced by these staff will facilitate the transition of maturing NextGen research and development towards implementation. The budget also transfers 40 positions to F&E from Operations in FY 2012 to support Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP).

NextGen Staffing Summary

	FY 2010 Enacted			FY 2012 Request			FY 2012 Change		
	FTP Positions	FTP EOY	Total FTE	FTP Positions	FTP EOY	Total FTE	FTP Positions	FTP EOY	Total FTE
Facilities and Equipment	175	175	175	215	215	195	40	40	20
Research, Engineering & Development	28	28	27	37	37	37	9	9	10
Operations	85	85	48	118	118	102	33	33	54
Total, NextGen Staffing	**288**	**288**	**250**	**370**	**370**	**334**	**82**	**82**	**84**

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 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)

		Discretionary	Mandatory	Total
1A05	NextGen Network Enabled Weather	$27,350,000	$0	$27,350,000
1A06	Data Communications for Trajectory Based Operations (NextGen)	$143,000,000	$7,200,000	$150,200,000
1A07	Next Generation Transportation System Technology Demonstration	$16,900,000	$8,100,000	$25,000,000
1A08	Next Generation Transportation System – System Development	$90,000,000	$19,000,000	$109,000,000
1A09	Next Generation Transportation System – Trajectory Based Operations	$9,300,000	$13,700,000	$23,000,000
1A10	Next Generation Transportation System – Reduce Weather Impact	$14,600,000	$18,400,000	$33,000,000
1A11	Next Generation Transportation System – High Density Arrivals/Departures	$14,300,000	$13,700,000	$28,000,000
1A12	Next Generation Transportation System – Collaborative ATM	$28,000,000	$25,000,000	$53,000,000
1A13	Next Generation Transportation System – Flexible Terminals and Airports	$36,300,000	$21,800,000	$58,100,000
1A14	Next Generation Transportation System – Safety, Security and Environment	$5,000,000	$3,000,000	$8,000,000
1A15	Next Generation Transportation System – System Network Facilities	$9,000,000	$1,000,000	$10,000,000
1A16	Next Generation Transportation System – Future Facilities	$19,500,000	$0	$19,500,000
1A17	Joint Planning and Development Office (JPDO)	$3,000,000	$0	$3,000,000
1A18	Performance Based Navigation (PBN) – RNAV/RNP	$26,200,000	$0	$26,200,000
2A02	En Route Automation Modernization (ERAM) – D-Position Upgrade and System Enhancements	$0	$64,500,000	$64,500,000
2A13	System-Wide Information Management (SWIM)	$66,350,000	$0	$66,350,000
2A14	ADS-B NAS Wide Implementation	$285,100,000	$0	$285,100,000
2A17	Collaborative Air Traffic Management Technologies	$41,500,000	$0	$41,500,000
2A18	Colorado ADS-B WAM Cost Share	$3,800,000	$2,000,000	$5,800,000
2A20	Tactical Flow Time Based Flow Management (TBFM)	$38,700,000	$0	$38,700,000
2B13	National Airspace System Voice Switch (NVS)	$19,800,000	$0	$19,800,000
4A09	Aeronautical Information Management Program	$8,000,000	$2,600,000	$10,600,000
5A01	Personnel and Related Expenses – NextGen (ATO 175 FTE)	$26,250,000	$0	$26,250,000
5A01	Personnel and Related Expenses – NextGen (AVS 40 FTE)	$3,300,000	$0	$3,300,000
	Total, Facilities and Equipment			**$1,135,250,000**

Research, Engineering, and Development (R,E&D)

		Discretionary	Mandatory	Total
A11M	NextGen Network Alternative Fuels- General Aviation	$2,071,000	$0	$2,071,000
A12A	NextGen – JPDO	$14,067,000	$0	$14,067,000
A12B	NextGen – Wake Turbulence	$10,674,000	$0	$10,674,000
A12C	NextGen – Air Ground Integration	$10,545,000	$0	$10,545,000
A12D	NextGen – Self Preparation	$9,934,000	$0	$9,934,000
A12E	NextGen – Weather in the Cockpit	$9,186,000	$0	$9,186,000
A13B	NextGen Env. Research – Aircraft Tech, Fuels and Metrics	$20,523,000	$0	$20,523,000
	Total, Research, Engineering, and Development			**$77,000,000**

Operations

	Discretionary	Mandatory	Total
NextGen Environmental/Noise Studies (APL 5 FTE)	$1,675,000	$0	$1,675,000
NextGen Staffing (ATO 75 FTE)	$10,000,000	$0	$10,000,000
NextGen –Environmental Performance (APL 5 FTE)	$725,000	$0	$725,000
NextGen Technologies, Models, and Metrics (APL 3 FTE)	$3,019,000	$0	$3,019,000
NextGen Technology Advancement (AVS 30 EOY/15FTE)	$9,000,000	$0	$9,000,000
Total, Operations			**$24,419,000**

Total, NextGen Programs	**$1,236,669,000**

Detailed Justification for - 1A05 Next Generation Network Enabled Weather (NNEW)

What Do I Need To Know Before Reading This Justification?

- In order to realize early NextGen functionality the NNEW Program will be delivering a limited operational capability in 2013. This will provide an essential contribution to the full operational capability for Segment 1 in 2015. Segment 2 will improve weather dissemination capability and provide improved infrastructure to better handle future NextGen requirements.
- NNEW currently has a lower funding requirement for FY 2012 when compared with the Capital Investment Plan (CIP). This is due to Initial Operating Capability for NNEW Segment 1 moving to 2015. In turn, acquisition costs originally planned for 2012 have been pushed to later years.

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

FY 2012 – Next Generation Network Enabled Weather (NNEW)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Network Enabled Weather (NNEW)	$20,000	$27,350	$0	$27,350

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
2013 Limited Operational Capability		
1. Baseline Software for Reference Implementation	---	$3,500.0
2. Baseline IT Security Network Enabled Environment	---	800.0
3. Fund Acquisition Activities	---	4,750.0
Segment 1		
4. Investment Analysis	---	1,250.0
5. Refine Software for Reference Implementation	---	3,500.0
6. Refine Security Development Network Enabled Environment	---	1,700.0
7. Acquire Hardware, Software, and Communications	---	1,500.0
Segment 2		
8. Initiate CRD Activities	---	750.0
9. Initiate Planning/Development Efforts for Segment 2 Concepts	---	8,000.0
10. NextGen System Engineering	---	1,350.0
11. Independent Operational Test and Evaluation	---	250.0
Total	Various	$27,350.0

For FY 2012, $27,350,000 is requested to provide for a 2013 limited operational capability as an initial contribution to Segment 1 development; to refine software development for the reference implementations; refine security development in the network enabled environment, to acquire hardware, software and communications in Segment 1; to initiate Segment 2 concept requirement definition activities, and to initiate planning and development efforts to examine Segment 2 concepts. Additionally, funding is requested for Program Management and NextGen Systems Engineering, and Independent Operational Test & Evaluation (OT&E).

2. What Is This Program?

The NextGen Network Enabled Weather (NNEW) program will establish the capability to disseminate aviation weather information in a network enabled, multiagency environment. 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.

NNEW will develop the FAA's portion of the 4-Dimensional (4-D) Weather Data Cube. Access to aviation weather information is required by both human users and automated systems. NNEW will enable standardized access to weather data sets by all NextGen users. By making aviation weather information available in a network enabled manner, legacy and new systems as well as human users will be able to acquire the weather information appropriate to their missions without acquiring additional telecommunications lines to existing individual or multiple weather systems. Should the weather requirements of an existing system change, acquiring the new or different weather information can be accomplished without new telecommunications.

The 4-D Wx Data Cube consists of (1) weather data published in various databases within FAA, National Oceanic and Atmospheric Administration (NOAA), and Department of Defense (DoD), as well as commercial weather data providers that may participate; (2) registries/repositories needed to locate and retrieve published data; (3) the capability to translate among various standards that will be employed to provide data in user required units and coordinate systems; and (4) the capability to support retrieval requests for data volumes (such as along a flight trajectory). A subset of the data published to the 4-D Wx Data Cube will be designated the Single Authoritative Source (SAS). The SAS identifies the preferred data source that should be used to support collaborative air traffic management decisions and ensures that decisions are based on consistent data. This is commonly referred to as the Common Operating Picture because using the SAS will cause air traffic management and a pilot to use the same sources of weather information for making decisions.

NNEW is responsible for establishing the information management capabilities necessary for the operations of the network-enabled 4-D Weather Data Cube. There will be testing and demonstration efforts to resolve key technical questions and reduce implementation risk of a network-enabled weather environment to the FAA and external system users. This will include assurance that NNEW is fully compatible and consistent with the evolved System-Wide Information Management (SWIM) infrastructure. This will also serve to define open standards and requirements necessary for overall NextGen weather dissemination compatibility.

FY 2012 Key Milestones and Deliverables:

- Finalize data/exchange standardization
- Final NNEW evaluation and demonstrations
- Finalize definition Initial Operating Capability (IOC) Content
- Finalize Metadata Guidelines for IOC
- Complete Version 4 of WCS/WFS Reference Implementation
- Obtain Initial Investment Decision for NNEW Segment 1
- Finalize documentation for the RFP for NNEW Segment 1
- Conduct evaluations to resolve key technical questions and reduce implementation risk while demonstrating and assessing the operational benefits of a network-enabled weather environment to the FAA, other agencies, and aviation system users

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

Delays in the National Airspace System (NAS) are primarily attributable to weather. Over the last five-year period, over 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, the NNEW Program utilizes open international data standards for digital weather data so that this data can more easily be integrated into Air Traffic Management (ATM) systems.

4. How Do You Know The Program Works?

The NNEW program has entered the Concept and Requirements Definition and this includes the establishment of measurement criteria in support of flight plan objectives. The program is scheduled to establish a baseline at Final Investment Decision (FID), planned for FY 2013. During this timeframe, a 2013 limited operational capability is planned as an initial contribution to NNEW Segment 1 development. It will establish a baseline from which to measure performance as the NNEW improvements are implemented through the NextGen weather IOC timeframe. 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.

As a risk reduction activity the NNEW program is using open international standards to format and exchange digital weather data. Additionally the program is building a prototype for conducting test and evaluations of the developed capabilities to determine how effectively the new capabilities perform. Additionally, NNEW is leading the world with EUROCONTROL in developing the Weather Exchange Model (WXXM) which is the emerging worldwide standard for the exchange of weather data. NNEW provides access to the 4-D Wx Data Cube 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?

NNEW is part of an interagency effort to provide quick, easy, and cost effective access to weather information. The interagency partners, led by National Oceanic and Atmospheric Administration (NOAA), and including the FAA, have program responsibilities and tasks to ensure their collaborative efforts are integrated into a single solution.

$27,350,000 is required to provide for a 2013 limited operational capability as an initial contribution to NNEW Segment 1 development; to refine software development for the reference implementations; refine security development in the network enabled environment, to acquire hardware, software and communications in Segment 1; to initiate concept requirement definition activities, and planning and development efforts for Segment 2. Additionally, funding is requested for Program Management and NextGen Systems Engineering, and Independent Operational Test & Evaluation (OT&E).

A reduction would impact the program's ability to achieve the 2013 limited operational capability as an initial contribution to NNEW Segment 1 development.

Detailed Justification for - 1A06 Data Communications in support of Next Generation Air Transportation System

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

FY 2012 – Data Communications in Support of Next Generation Air Transportation System ($000)

Activity/Component	FY 2010 Enacted	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Data Communications in support of Next Generation Air Transportation System	$46,700	$143,000	$7,200	$150,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Final Investment Decision (FID) Management Planning	---	$2,683.0
2. Systems Engineering	---	13,260.1
3. Operational Integration	---	35,873.9
4. DataComm Air Ground Network Service	---	26,264.8
5. Business Case Analysis	---	4,037.4
6. Business Management	---	2,970.3
7. En Route	---	52,445.5
8. Tower DCL and Revision	---	5,465.0
Total	Various	$143,000.0

Activity Tasks – Mandatory		
9. Automation Engineering	---	7,200.0
Total	Various	$7,200.0

For FY 2012, $143,000,000 is requested for DataComm 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. In addition, DataComm will enhance automation for ATC message generation and exchange.

For FY 2012, $7,200,000 of mandatory funding is requested for automation engineering activities in the En Route environment.

2. What Is This Program?

The DataComm 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. DataComm 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

The DataComm program is divided into three segments. Segment 1 will deliver the initial set of DataComm services integrated with automation support tools, which provides NAS benefits and lays the foundation for a data-driven NAS. Segment 2 will enable more advanced NextGen operations, which would not be possible using the existing voice systems.

Near-term DataComm program efforts focus on:

- Continuation of avionics validation, prototyping and certification
- DataComm Integrated Services (DCIS) contract award
- Final Investment Decision Segment 1b for en route automation enhancements
- Award En route data communications automation integration efforts
- Software development for en route Computer-Human Interface (CHI) upgrades
- Trials and Validations
- Human-in-the-Loop simulations
- Business Case and Program Requirements Finalization
- Industry Outreach Efforts
- Tower Data Link Services (TDLS) hardware and software enhancements to enable data communications over Aeronautical Telecommunications Network (ATN)
- William J. Hughes Technical Center (WJHTC) Integration and Test Planning, Laboratory Development, and test equipment procurement
- Spectrum repacking and band clearing

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The operations and services enabled by DataComm 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 of the three DataComm segments 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. Segment 3 will enable the full transformation to NextGen.

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, DataComm will significantly reduce communications related operational errors and improve the safety of air travel.

DataComm 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 ATM service per aircraft operation) will decrease. DataComm 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, DataComm does not completely replace voice communications, rather it augments these services. Several studies suggest that with 70 percent of aircraft data-link 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. DataComm 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, DataComm will be used in conjunction with the current traffic control strategies as well as planned strategies such as traffic flow management (TFM) reroutes. DataComm 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. DataComm benefits will be realized in en route, TRACON, 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 in Operational Evolution Partnership (OEP) airport towers, will see the most dramatic benefits.

New services enabled by DataComm 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. DataComm, 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.

NAS capacity will be improved by data communications and the operations it enables. Initially, DataComm will be used with the current traffic control strategies to reduce controller workload by automating repetitive exchanges. As controllers become more productive, sector capacity will grow without the need to assign additional resources. DataComm benefits will be realized in En Route, TRACON, tower and ground operations, as controllers' workloads are reduced, enabling them to spend more time moving traffic efficiently. The busiest positions, whether in en route feeder sectors in metro corridors, terminal approach sectors or airport ground control at OEP airports, will see the most dramatic benefits.

4. How Do You Know The Program Works?

The DataComm program is currently in the Final Investment Analysis phase. Final Investment Decision (FID) will occur in fiscal year 2012.

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

$150,200,000 is required for FIA management and planning technical support; En Route Automation Modernization (ERAM) system engineering and specifications development; Protocol Gateway; Tower Data Link Services (TDLS) automation specifications development; systems engineering; standards development; avionics validation, prototype and demonstration support; integration, test planning and laboratory development; operational capability and integration support, and human factors for NextGen Concept of Operations (CONOPS). DataComm will bridge the gap between current voice-only ATC, and the data-intensive NextGen. To ensure the NAS has the capacity to grow, DataComm will implement services that maximize controller productivity, reduce operational errors associated with voice communications, and enable new air traffic services and reduce delays. DataComm 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 accelerate the transition to DataComm 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 this initiative will substantially accelerate the benefits derived from en route data communications services in the future. Current estimate of significant NAS benefit is $18 billion over a 24 year life cycle for Segment 1 and Segment 2, which includes:

- User: $16.5 billion in Airline Direct Operating Cost (e.g., fuel) and Passenger Value of Time
- FAA: $1.3 billion in operations costs and related equipment

Detailed Justification for - 1A07 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 2012 – Demonstrations and Infrastructure Development (DEMO)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FAA Mandatory	FY 2012 Total
Demonstrations and Infrastructure Development	$34,602	$16,900	$8,100	$25,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. International Air Traffic Interoperability	---	$4,500.0
2. Airborne Access to SWIM	---	4,200.0
3. Airborne Execution of Flow Strategies	---	4,200.0
4. GBAS Demonstration Project	---	2,500.0
5. Future Planning	---	1,500.0
Total	Various	$16,900.0

Activity Tasks - Mandatory	Quantity	($000)
1. International Air Traffic Interoperability	---	$500.0
2. RNAV-RNP Terminal Area Demo Report	---	3,100.0
3. Airborne Access to SWIM	---	800.0
4. Airborne Execution of Flow Strategies	---	800.0
5. GBAS Demonstration Project	---	1,000.0
6. Future Planning	---	1,900.0
Total	Various	$8,100.0

For FY 2012, $16,900,000 of discretionary funding will provide for the following:

Demo International Air Traffic Interoperability

- 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 to conduct Oceanic Optimization demonstrations in the Atlantic and Pacific
- Continue to conduct Flight Data Object (FDO) information exchange demonstration in the Pacific (e.g., SWIM, FDO, etc)

Demo Airborne Access to SWIM

- Demonstration Plan
- Test Bed Requirements
- Safety Analysis

Airborne Execution of Flow Strategies

- Develop program plan for linking ground-based ANSP flow strategies with flight operator planning
- Conduct analysis of relationship, including potential impact, to both other flow strategies (for example, airborne metering and interval management) and leveraging of planned, advanced flight information availability (through, for example, flight object or SWIM capabilities)

Ground Based Augmentation System (GBAS) Demonstration Project

- Planning and coordination
  - Develop Concept of Operations (CONOPS) for rapid recovery operations.
  - Coordinate with stakeholders
- Instrument flight procedures
  - Design, develop, and deploy comprehensive, public-use Area Navigation-Required Navigation Performance (RNAV/RNP) AR flight segments at Guam International Airport.
  - Integrate RNP procedures with complementary RNAV arrivals.
  - Consult with the Performance Based Navigation (PBN)user community.
  - Maintain and support flight procedures for the duration of the phase
- Staged deployment at the trial site
- Data collection and analysis to characterize the effects on GBAS accuracy in the equatorial ionosphereic environment.
- Develop recommendations for further improvements to the deployed operations to meet the objectives of the CONOPS

Future Planning

- 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.

For FY 2012, $8,100,000 of mandatory funding will provide for the following:

Demo International Air Traffic Interoperability

- Continue to conduct Gate-to-Gate demonstration over the Atlantic

RNAV/RNP Terminal Area Demonstration

- Integrate RNP procedures with complementary RNAV arrivals
- Consult with the PBN user community
- Design, develop and deploy comprehensive, public -use RNAV and RNP AR flight segments at trial airports
- Develop CONOPS and Coordinate with stakeholders
- Develop recommendations for further improvements to the deployed operations to meet the objectives of the CONOPS
- Maintain and support flight procedures for the duration of the phase
- Measurement of pre-and post-implementation fuel consumption, CO_2 emission, noise, and other relevant metrics

Demo Airborne Access to SWIM

- Memorandum of Agreements

Airborne Execution of Flow Strategies

- Develop engineering assessment of potential alternatives

Ground Based Augmentation System (GBAS) Demonstration Project

- Benefits measurement
  - Measurement of pre- and post-implementation fuel consumption, CO_2 emission, noise, and other relevant metrics.
  - Establish benefits case for rapid recovery GBAS system

Future Planning

- 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.

Area Navigation-Required Navigation Performance (RNAV-RNP) Terminal Area Demonstration

This project is intended to demonstrate the safe and effective integration of public RNP operations in a mixed-equipage traffic environment using Traffic Management Advisor (TMA), an existing software tool, to sequence traffic in a way that can produce immediate and measurable reductions in CO2 emission, fuel burn, and noise. RNP procedures implemented under this proposal will be designed for public use by any authorized operator.

Airborne Access to System Wide Information Management (SWIM)

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 will begin field demonstration of Airborne Execution of Flow Strategies to support development of final procedures and information exchange. Also, this project will demonstrate the use of electronic negotiation to coordinate and execute reroutes of airborne 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. Negotiation may include the ability for the user to substitute flights to meet their business needs. Once the reroute(s) is finalized, demonstrate the capability to transfer the reroute to the flight deck and the downstream controller's workstation. If possible, the reroute will be uploaded to the flight deck via data communications. Other possible procedures include transmission through ATC voice communications or data transmission relayed through the AOC.

Ground Based Augmentation System (GBAS) Demonstration Project

This project is intended to demonstrate use of GBAS to support rapid recovery of Cat I instrument approach capability, the safe and effective integration of public RNP operations in a mixed-equipage traffic environment, the measurable reductions in CO2 emissions, fuel burn, and noise with the implementation of GBAS enable approaches to all runways at the project airport. Additionally, the project will characterize the impact of the equatorial ionospheric environment on GBAS operations. RNP procedures implemented under this proposal will be designed for public use by any authorized operator.

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. Unmanned Aircraft Systems 4D Trajectory Based

- Integration of Automated Dependent Surveillance Broadcast (ADS-B) Point of Service delivery for UAS
- Integration of Four Dimensional Trajectory Flight Management System into the UAS architecture
- Conduct integrated operational expanded demonstration with ADS-B, 4DT FMS and NAS Voice Switch prototype (VOIP)

b. High Density Airport (HAD) Capacity and Efficiency Improvement

- Conduct flight deck human in the loop simulation
- Conduct Air Traffic Control human in the loop simulations
- Complete the 3D Path Arrival Management technical transfer package
- Complete the Tailored Arrivals technical transfer package

c. International Air Traffic Interoperability

- Conduct Gate to Gate demonstration over the Atlantic
- Conduct Oceanic Optimization demonstrations in the Atlantic and Pacific
- Conduct Flight Data Object (FDO) information exchange demonstration in the Pacific (e.g., SWIM, FDO, etc)

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

For FY 2012, $25,000,000 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 - **1A08 Next Generation Transportation System (NextGen) – System Development (SYSDEV)**

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

FY 2012 -- Next Generation Transportation System (NextGen) – System Development (SYSDEV)
($000)

Activity/Component	FY 2010 Enacted	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System (NextGen) – System Development (SYSDEV)	$66,100	$90,000	$19,000	$109,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Human Factors (Efficiency/Air Ground Integration)	---	$8,600.0
2. New ATM Requirements	---	28,000.0
3. Operations Concept Validation Modeling	---	8,600.0
4. Staffed NextGen Towers (SNT)	---	5,200.0
5. Environment and Energy – EMS and Noise Reduction	---	12,900.0
6. Wake Turbulence-Re-categorization	---	2,600.0
7. System Safety Management Transformation	---	15,500.0
8. Operational Assessments	---	8,600.0
Total	Various	$90,000.0

Activity Tasks - Mandatory		
1. Human Factors (Efficiency/Air Ground Integration)	---	$1,400.0
2. New ATM Requirements	---	9,000.0
3. Operations Concept Validation Modeling	---	1,400.0
4. Staffed NextGen Towers (SNT)	---	800.0
5. Environment and Energy – EMS and Noise Reduction	---	2,100.0
6. Wake Turbulence-Re-categorization	---	400.0
7. System Safety Management Transformation	---	2,500.0
8. Operational Assessments	---	1,400.0
Total	Various	$19,000.0

For FY 2012, $90,000,000 of discretionary funding will provide for the following:

Human Factors (Efficiency/Air Ground Integration)

- Continue Human Factors program to support System Development and Enterprise Architecture during Service Analysis

New Air Traffic Management (ATM) Requirements

- Develop an integrated approach between separation assurance and collision avoidance, with special attention to the safety case
  - Develop and execute implementation plan for NextGen Traffic Alert and Collision Avoidance System (TCAS)
  - Develop standards and guidance for advanced safety assurance methods and simulation
- Common Trajectory Requirements and Implementation Strategy
  - Continue analysis to allocate functions to systems, ground and airborne
  - Lab demonstration and fast time modeling of common trajectory

  - Continue risk assessment
- RNAV/RNP via Data Communications
  - Delivery across data communications
  - On the fly development, evaluation and delivery
- New Radar Requirements (Surveillance and Weather)
  - Surveillance & Weather Radar Replacement (SWRR) - Analyze Phase 1 technology maturity and deliver recommendation
  - SWRR - Phase 2 concept demonstrator procurement preparation and contract award
  - SWRR - provide for best practices

Operations Concept Validation Modeling
- Initial set of detailed operational scenarios for the far-term
- Concept Benefits Modeling (230% increase modeled by the end of 2013)
- Simulation and Analysis of Integrated Time Based Flow Management (TBFM)

Sys Dev Staffed NextGen Towers (SNT)
- Business Case Analysis Report
- Implementation Strategy and Planning
- Basis of Estimate
- Risk Metrics for final investment analysis
- Updated Enterprise Architecture products and amendments
- Completion of system safety documentation

Environment and Energy – Environmental Management System (EMS) and Noise Reduction
- Implement enterprise level EMS framework
- Integrate environmental information into key decision processes
- Initiate targeted EMS Communications and outreach initiatives
- Conduct second phase of pilot studies based on outcomes from the first phase
- Initiate NextGen EMS implementation efforts at priority stakeholder organizations with significant near-term environmental issues
- Assess the impacts on NAS wide operations (including environmental performance) of aircraft standards for noise and emissions.
- Significant exploration and demonstration of environmental control algorithms for surface and terminal operational procedures
- Analyze environmental impacts of CLEEN technologies on the NAS and assess approaches to optimize aircraft system environmental performance
- Analyze environmental impacts of alternative fuels on the NAS and assess approaches to optimize aircraft system environmental performance
- Investigate impact on NAS wide operations of market based options, including Cap and Trade and carbon charges, to limit aircraft greenhouse gas emissions

Wake Turbulence Re-categorization
- Engineering and analysis necessary to determine system implementation feasibility of the Leader/Follower wake turbulence mitigation separation processes and procedures that being developed by the project
- Continued data collection of aircraft wake turbulence to achieve statistical confidence in the leader/follower separations being proposed
- Determine best methods for incorporating key weather and aircraft performance parameters into determination of safe and capacity efficient separation processes and procedures

System Safety Management Transformation
- Annual system-level safety assessment capability is productized, and validated.
- Transition to steady state operations for analysis of known risks, safety enhancements, and benchmarks.

Operational Assessments

- Continue Aviation Environmental Design Tool (AEDT) and Aviation Portfolio Management Tool (APMT) enhancements for NextGen local to NAS-wide environmental analysis
- Refine analysis and assessment of NAS-wide NextGen environmental mitigation and cost-beneficial options for decision support
- Continue exploration of options to integrate environmental assessment capability with NextGen NAS models
- Enhance Operational Performance Model to support NextGen Operational Assessments

For FY 2012, $19,000,000 of mandatory funding will provide for the following:

Human Factors (Efficiency/Air Ground Integration)

- Continue Human Factors program to support System Development and Enterprise Architecture during Service Analysis

New Air Traffic Management (ATM) Requirements

- New Radar Requirements (Surveillance and Weather)
  - Complete CRDR artifacts for wind-shear detection services work package 1 (NAS EA DP WxA)
- Development of industry standards/requirements and to evaluate the benefits associated with the current phase
- Availability of ADS-B data matching or exceeding coverage from the five current Long Range Radars along the proposed RNAV routes
- Development of ADS-B only RNAV routes along the East Coast and the Caribbean

Operations Concept Validation Modeling

- Initial version of NextGen end-to-end concept for the far-term (2025) for internal review.

Sys Dev Staffed NextGen Towers (SNT)

- Maintain SNT equipment at Dallas/Ft. Worth (DFW) (field test site)

Environment and Energy – Environmental Management System (EMS) and Noise Reduction

- Perform analysis for EMS Environmental Impacts and Metrics
- Finalize NextGen EMS implementation in initial FAA organizations
- Analyze NEPA compliance within the EMS framework
- Coordinate NextGen data management with NextGen planners and developers
- Significant exploration and demonstration of environmental control algorithms for en route operational procedures to reduce aircraft fuel burn, emissions and noise
- Investigate potential operational changes required to optimize aircraft operations for greenhouse gas reductions

Wake Turbulence Re-categorization

- Develop framework structure for dynamic wake mitigation processes and procedures

System Safety Management Transformation

- Continue to evolve ASIAS ability to automatically monitor for unknown risk based on complex text mining capabilities and seamless data sources.
- The FAA-wide SMS capability is matured with ASIAS and SSA providing operational and data support for interoperability among SMS programs within the FAA, and with stakeholders.

Operational Assessments

- Enhance Safety Model to support NextGen Operational Assessments
- Apply models to assess NAS wide impacts of Task Force recommendations
- Perform NAS-wide environmental assessment of the current aviation system

2. What Is This Program?

The Joint Planning and Development Office's (JPDO) 2004 Integrated Plan identified three key performance targets to achieve the desired capability by 2025. These are: (1) satisfy future growth in demand up to three times current levels; (2) reduce domestic curb-to-curb transit time by 30 percent; and (3) minimize the impact of weather and other disruptions to achieve 95 percent on time performance. Achievement of these targets by 2025 will be a challenge. In addition, an increase in demand of three times the current levels could cause an equivalent increase in the number of accidents, aircraft noise and the volume of emissions, as well as the Air Traffic Control (ATC) workload. This line item provides the research and development required to resolve these potential problems:

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 2012, new ATM requirements will focus on four areas: TCAS, Airborne SWIM, Weather/surveillance radar, and Trajectory modeling.

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, 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.

The FAA plans to deploy Automated Dependent Surveillance-Broadcast (ADS-B) critical services (ATC separation services) in the New York terminal areas and on the surface at LaGuardia, Kennedy, and Newark airports in FY 2011. To support operational validation, this activity will support accelerating the equipage of New York-based JetBlue Airways to validate the Best Equipped/Best Served concept in the New York metro area and along the East Coast. JetBlue will equip aircraft with DO-260B-compliant ACSS ADS-B "In" & ADS-B "Out" avionics, certify the system, and demonstrate the operational benefits in revenue service.

c. Operations Concept Validation Modeling

The Operations Concept Validation Program addresses the development and validation of 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.

Furthermore, 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 will provide an end-to-end NAS Operational Concept and a complete set of scenarios 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. These products will be developed first for the Midterm (2018) and subsequently for the NAS in 2025.

d. Staffed NextGen Towers (SNT)

With demand in air transportation expected to grow significantly in the NextGen timeframe from today's traffic levels, there is a need for new, innovative ways to provide tower services. In response to this challenge, the Joint Planning and Development Office (JPDO) outlined a future air traffic system in which tower services are provided from remote locations without requiring the air traffic provider to have direct visual observation of the airport environment. This concept is referred to as a Staffed NextGen Tower (SNT). SNT plans to address airport capacity problems by increasing the capacity of high-density hub airports in low visibility and night conditions and by improving services at the satellite airports. Through a companion vision for Automated NextGen Towers (ANT), it also plans to increase the capacity of the presently non-towered airports.

SNT is planned for medium and high density airports as these airports are likely to have most aircraft equipped with avionics that will support SNT operations. ANT is planned for non-towered and low density airports. The development of both the SNT and ANT automated tower capability are planned as part of this project. The SNT and ANT concepts will require substantial concept engineering funding as advanced decision support tools will be needed for such events as conformance monitoring using aircraft movement tracking; advanced Data Communications to ensure safe operations at non-towered airports; and use of aircraft derived data (ADD) for identification of off-nominal events.

This project is in the concept engineering phases providing the necessary requirements, specifications and supporting documentation leading to an investment decision on an FAA system that should increase throughput and safety; provide for cost-effective expansion of services to a larger number of airports; and reduce tower construction costs. Requirements, operational procedures, and cost benefit information will be generated and documentation refined in preparation for the initial investment decision.

e. Environment and Energy – Environmental Management System (EMS) and Noise Reduction

Robust aviation growth could cause commensurate increases in aircraft noise, fuel burn, and emissions. Environmental impacts could restrict capacity growth and prevent full realization of NextGen. NextGen environmental goals are to reduce the system wide aviation environmental impacts in absolute terms notwithstanding the growth of aviation. The solution is to reduce the increased environmental impacts of aviation through new operational procedures, technologies, alternative fuels, policies, environmental standards and market based options to allow the desired increase in capacity. The environmental and energy development efforts under this program will lead to assessment of solutions to reduce emissions, fuel burn, and noise towards achieving NextGen environmental goals. The effort specifically focuses on explorations, simple demonstrations as well as methods to integrate these environmental impact mitigation and energy efficiency options with the NextGen infrastructure in a cost-beneficial and verifiable manner.

There are two environmental projects that support this program: Environmental Management System (EMS) and Environment and Energy.

The EMS will manage, mitigate and verify progress towards achieving the environmental goals in an iterative manner based on planning, implementing, measuring the effects of, and adjusting solutions that are based on well developed and demonstrated environmental impacts metrics. The EMS approach will allow optimization of advance options for noise, fuel burn, and emissions reduction to enable the air traffic system to handle growth in demand.

Environment and Energy - Advanced Noise and Emission Reductions: This program will employ proven capabilities as well as NAS-wide implementation of mitigation solutions through advanced aircraft (both engine and airframe) technologies, alternative aviation fuels and improved environmental and energy efficient operational procedures. These are the keys to reduce significant environmental impacts while improving the energy efficiency of the system

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. Recently, work was done to accommodate the A380 class of aircraft and work continues to address introduction of other large aircraft into the NAS. This program builds on that joint work and is accomplishing a more general review to include regional jets, Unmanned Aerial Vehicles (UAVs), micro jets, etc.

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 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 three areas: Systems Analysis, Environmental Analysis, and Safety Assessments.

In the Systems Analysis area, an initial concept of use has been developed and the stakeholder RTCA Trajectory Operations sub-work group has been formed under the RTCA ATMAC (Air Traffic Management Advisory Committee) Requirement and Planning Work Group. This group is to deliver a Concept of Use for Trajectory-Based Operations by April 2010. This Concept of Use will form the starting point from which ATM requirements for trajectory modeling will be derived.

The Environmental Analysis program enables NextGen by providing comprehensive NextGen local to NAS-wide environmental assessment of the aviation system, analyzing the benefits of environmental impacts mitigation options and providing the guidance on environmentally effective and optimally cost-beneficial solutions to reduce the environmental constraints that might otherwise hinder capacity increases.

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.

This Safety Assessments 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 impact 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

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

- Developed Human Error Database Structure and Results of Preliminary Human Hazard Analysis
- Integrated NextGen Workstation – Initial midterm NextGen En route, TRACON and Tower Workstation Requirements

b. New ATM Requirements

- Define Baseline Requirements for Future TCAS Systems
- Define required level of TCAS Independence for Future Systems
- Develop Final Airborne SWIM Concept of Use
- Initial trajectory information and exchange requirements

c. Operations Concept Validation/Modeling

- Refined NextGen Midterm Concept of Operations for the NAS to provide the overall midterm operational framework for NextGen

d. Staffed NextGen Tower (Staffed and Autonomous)

- Complete standards and alternatives development in support of an initial investment decision and OMB Exhibit 300 preparation
- Maintain SNT equipment at DFW (field test site)

e. Environment and Energy EMS and Noise Reduction

- Assess the NAS-wide benefits of CLEEN aircraft technologies and alternative fuels
- Identify opportunities for environmental gains for Taxi/Ramp, Terminal and En route area operations
- Demonstration of environmental control algorithms used in Taxi/Ramp, Terminal, and En route procedures

f. Wake Turbulence Re-categorization

- Provide recommendation package to International Civil Aviation Organization (ICAO) on new wake separation standards (Phase 1)

g. System Safety Management Transformation

- Expand ASIAS to achieve statistically significant coverage of NAS operations

h. Operational Assessments

- Systems Analysis - Deliver NextGen Performance Assessment Annual Report
- Develop a framework and models to support environmental assessment of the NAS-wide system
- Develop a framework and models to support economic assessment of the NAS-wide system.

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

$109,000,000 is required to allow for continued execution of work within the System Development solution set. The FY 2012 work will satisfy future growth in demand up to three times current levels, 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 of three times the current levels could cause an equivalent increase in the number of accidents, aircraft noise and the volume of 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 - 1A09 Next Generation Transportation System – Trajectory Based Operations

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

FY 2012 -- Next Generation Transportation System – Trajectory Based Operations (TBO) ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Trajectory Based Operations (TBO)	$63,500	$9,300	$13,700	$23,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Modern Procedures (D - Side and R - Side)	---	$4,300.0
2. Oceanic Tactical Trajectory Management	---	5,000.0
Total	Various	$9,300.0

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Modern Procedures (D - Side and R - Side)	---	$10,200.0
3. Conflict Resolution Advisories	---	2,500.0
4. NextGen Distance Measuring Equipment	---	1,000.0
Total	Various	$13,700.0

For FY 2012, $9,300,000 of discretionary funding will provide for the following:

Separation Management- Modern Procedures

- Continue evolving EnRoute NextGen Mid-Term Baseline capabilities. Areas of capability research and analysis includes:
  - 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 trail planning on the radar console

Trajectory Management- Oceanic Tactical Trajectory Management

- Automatic Dependent Surveillance-Contract (ADS-C) Climb Descent Procedures (CDP):
  - Functional Requirements
  - Implementation Funding Request Package
  - Funding Approval/Decision Point

- Pre-Departure & Web-Enabled Collaborative Trajectory Planning (CTP):
  - Preliminary Requirements (Pre-Departure)
  - Lab Demonstration (Pre-Departure)
  - Integrate with Oceanic Conflict Advisory Trials (OCAT) (Web-Enabled CTP)
  - Plan for Future Enhancements (Web-Enabled CTP)

- In-Flight Operations:
  - Finalize Benefits Cost Report for Automation for Trajectory Optimization (Vertical, speed, lateral)
  - Initiate Operational Trial for Trajectory Feedback (OCAT)
  - Data collection & Analysis Report for Trajectory Feedback (OCAT)

- Operational Capabilities for Strategic Trajectory Coordination:

- Scenarios and concepts of use
- Trajectory Likelihood Calculation Description
- Initial Benefits Analysis
- Preliminary Operational Requirements

For FY 2012, $13,700,000 of mandatory funding will provide for the following:

Separation Management- Modern Procedures
- Continue evolving EnRoute NextGen Mid-Term Baseline capabilities. Areas of capability research and analysis includes:
  - Automation support for clearances that include vectors
  - Introduce wake vortex separation indicator.

Trajectory Management- Conflict Advisories
- Continue software development for operational use.
- Software development activities include an engineering analysis and prototype development.
- Safety and human factor analyses
- A technology transfer of previous collected work on conflict advisories from MITRE/CAASD
- The completion of a cost/benefit analysis of the technology
- Trajectory based operations separation management ConOps and functional and nonfunctional requirements for automation will be continuously refined

Capacity Management - NextGen Distance Measuring Equipment (DME)

Procure and install five DME systems.

2. What Is This Program?

TBO is a shift from clearance-based 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.

b. Oceanic Tactical Trajectory Management

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. FY 2012 will be used to address the three initial Oceanic TBO initiatives: Automatic Dependent Surveillance (ADS) Climb and Descent Procedures (CDP), Pre-Departure and Web-Enabled CTP, and In-Flight Operations.

Based on the results of the FY 2011 work, FY 2012 will be used to expand these initiatives to other geographical areas, perform operational trials, further refine longer-term objectives, include new initiatives to investigate separation assurance systems using Automatic Dependent Surveillance (ADS) technology, and begin concept development activities for Oceanic Airspace Management, Trajectory Managed, Autonomous, and Mixed Classic Airspace.

c. Conflict Resolution Advisories

This activity includes the analysis, prototyping, pre-implementation activities and software development activities to implement conflict resolution advisories. Conflict resolution advisories will first be implemented using voice and data in a mixed equipage environment, and ultimately will be transmitted solely via data in certain airspace. The implications for changing controller roles and responsibilities will be explored and the requirements for automation, decision support systems and data communications will be identified.

High performance aircraft will directly connect via air-ground data communications to the flight management system, facilitating electronic data communications between the ATC automation and the flight deck automation. As a first step and in mixed performance airspace, the controller will still be responsible for aircraft separation by responding to problems predicted by the ATC automation. Instead of monitoring the sector airspace display to predict potential problems and mentally calculating problem resolutions, the automation will not only predict the problems but determine the best solution. The controller will transmit the solution via voice initially, and then via data link. This level of automation support helps manage controller workload as a means of safely dealing with the predicted increases in traffic volume. This activity will prototype earlier and easier resolutions capabilities (such as pre-probed altitude and speed amendments) that can be transferred verbally by controllers and evaluate the impact these have on the Computer Human Interface (CHI) design and system performance and conduct research into more complex issues for future implementation such as vector advisories as well as the role of the human versus automation in voice clearance, mixed voice and data communications environments, and data communications only.

d. NextGen Distance Measuring Equipment (DME)

This DME program will provide near term support for a trajectory based and performance based operational requirements and will be functionally capable of providing the signal in space to fill the coverage gaps and meet the redundancy requirements for new GPS/RNAV/RNP procedures. This DME will have availability greater than 99.95 percent, a mean time to repair of less than one-half hour, a mean time between failures of 14,231 hours, and a mean time between outages of 15,193 hours. It will be configurable for low, intermediate, and high power with single or dual equipment and will be commissioned accordingly.

The functionality of this DME, while providing a higher transponder capacity, better reliability/maintainability, and the most current solid state technology, is exactly the same as the DMEs currently in the NAS. The most important function of the DME is the reply delay requirement used by the airborne interrogator to obtain slant range. This function has been consistent since the 1950's and will continue to be consistent in this DME.

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 exchange and monitored and that 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 Variable Separation Concept of Operations
- Final Investment Decision for ERAM Post Release 3 (PER3)

b. Oceanic Tactical Trajectory Management

- Deliver Concept of Operations (CONOPS) for In-Flight Operations Re-Profile Alert capability
- Conduct ADS-C Climb & Descent Procedure (CDP) Ops Trial

c. Conflict Resolution Advisories

- Develop and deliver initial CONOPS for Conflict Resolution Advisories
- Develop and deliver safety assessment plan for Conflict Resolution Advisories

d. NextGen DME

- First site delivery is scheduled for August 2012
- Procure and install DME systems to fill coverage gaps in support of en route RNAV/RNP

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

$23,000,000 is required allowing FAA to continue work within the TBO solution set. The FY 2012 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 - 1A10 Next Generation Air Transportation System (NextGen) – Reduce Weather Impact (RWI)

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

FY 2012 -- Next Generation Transportation System (NextGen) – Reduce Weather Impact (RWI) ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System (NextGen) – Reduce Weather Impact (RWI)	$35,600	$14,600	$18,400	$33,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Weather Forecast Improvements	---	14,600.0
Total	Various	$14,600.0

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Weather Observation Improvements	---	$3,000.0
2. Weather Forecast Improvements	---	15,400.0
Total	Various	$18,400.0

For FY 2012, $14,600,000 of discretionary funding will provide for the following:

RWI Weather Forecast Improvements

- Complete NextGen Weather Processor (NWP) document package for Initial Investment Decision
- Develop NWP document package towards Final Investment Decision
- Convective Weather 0-8 hour Forecast GFI package ready for NWP acquisition
- Radar Mosaic GFI package ready for NWP acquisition
- Convective Weather Avoidance Model (CWAM) GFI package ready for NWP acquisition
- Complete NWP Request for Offer (RFO) Package
- Update NWP Project Management Best Practices Documentation
- Analyze 2011 CoSPA operational evaluation and deliver report
- Maintain CoSPA prototype operations at selected ATC facilities to support TFM
- Update NAS EA Weather Roadmap
- Enhance manual QMS to include operational aviation weather products
- Evaluate metrics methodology to monetize avoidable and unavoidable weather impacts
- Validate NextGen Radar Mosaic (I.e., MRMS) quality editing schemes for NAS compliance (DSR, ERAM)
- Finalize requirements for selected set of ATM-Wx translation technologies
- Concept Maturity Assessment Plan, initial ConOps for turbulence product (GTG3/GTGN), and access to EDR data
- Provide for RWI best practices

For FY 2012, $18,400,000 of Mandatory funding will provide for the following:

RWI Weather Observation Improvements:

- Translate sensor gap analysis results into refined NextGen weather observation requirements.
- Demonstrate Collector 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 adaptive sensing system engineering activities
  - Conduct technology studies focused on consolidating and improving the existing sensor capability

RWI Weather Forecast Improvements:

- Complete development of Convective Weather Avoidance Model (CWAM) in support of mid-term DSTs.
- Develop selected set of AMT-Wx translation technologies
- System Engineering support for Segment Bravo
- Conduct CoSPA lab based low-fidelity evaluation for mid-term capability
- Develop functional requirements for automated QMS
- Develop a metrics application to assess improvements in convection observations, analyses and forecasts
- Deliver update release – enhanced metrics capability for Weather Analysis and Visualization Environment (WAVE) tool and the WITI-based Dynamic Airspace Rerouting Tool (DART)
- Demonstrate MRMS mosaic with TDWR and Canadian weather radar data on DSR, ERAM
- Concept Maturity Assessment Plan and initial ConOps for Forecast Icing Product (FIP)
- Conduct maturity assessment and safety management process for turbulence product (GTG3/GTGN)
- Concept Maturity Assessment Plan and initial ConOps for C&V Forecast (CVF)

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 NextGen Network-Enabled Weather (NNEW) transformational program that will interface 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 activities include assessing the current sensor network capabilities and identifying gaps. Technical studies will then be conducted to identify economical methods to consolidate existing legacy capabilities, provide improved capability, and make sensor outputs more universally available. When fielded, this will result in a homogenous network of 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. This includes: 1) integrating weather information tailored for DSTs and systems into NextGen operations; 2) implementing improved forecasts through research transition (RT) 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 which 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 examine 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 sensor technology currently fielded is based on 70s-80s technology and has been in the field since that period. While the current observation network performs adequately, there are many significant gaps that exist between current observation performance and the requirements established for the NextGen environment. Many of these gaps can be filled by a combination of modern sensor technologies and net-centric infrastructure to link all sensors to the NextGen NAS environment. Extensive research has shown that more observations are needed both in time and space in order to produce forecasts accurate enough to ensure aircraft safety and still support increased capacity in the NextGen environment. Additionally 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, and safety.

Current weather forecast infrastructure and abilities are inadequate to meet real-time needs of DSTs, operational decision-makers and NextGen. Existing 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 air traffic management (ATM) DSTs such as icing and turbulence indices that impact 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 standalone weather displays at facilities in the NAS that provide conflicting information.

4. How Do You Know The Program Works?

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.

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

$33,000,000 is required to continue work within the RWI solution set. As stated above, RWI provides improved weather observations, 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 2012 work supports 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; supports investment decision activities for a consolidated surface observation network that includes weather radar; 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. The FY 2012 work also includes the risk reduction activity associated with the generation of the GFI Package as well as the preparation of the Request for Offer (RFO) Package.

A reduction will impact the initial operating capability of NWP targeted for 2015, investment analysis decision in 2014 for the initial consolidated surface observing network, and the development and evaluation of weather translation techniques which can be used by ATM decision support tools and users in the mid-term.

Detailed Justification for - **1A11 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 2012 – Next Generation Transportation System – Arrivals / Departures at High Density (HD) Airports
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Arrivals / Departures at High Density (HD)Airports	$51,800	$14,300	$13,700	$28,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Surface Tactical Flow	---	$10,000.0
2. Surface Conformance Monitoring	---	2,000.0
3. Time-Based Flow Management (TBFM) Work Package III *(Formerly Integrated Enterprise Solution)*	---	2,300.0
Total	Various	$14,300.0

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
1. Surface Tactical Flow	---	$3,800.0
2. Surface Conformance Monitoring	---	3,800.0
3. Surface Traffic Data Sharing	---	1,100.0
4. Integrated Arrival and Departure Operations	---	5,000.0
Total	Various	$13,700.0

For FY 2012, $14,300,000 of discretionary funding will provide for the following:

a. Surface Tactical Flow
- Continue support to Tower Flight Data Manager (TFDM) program AMS effort
- Continue technical transfer of mature surface capabilities to TFDM
- Continue STBO field evaluations at Memphis and Orlando for the Deice Tool, 2D Taxi Route Generation, and Collaborative Departure Scheduling
- Continue HITL simulations of Collaborative Departure Scheduling and Time-Based Taxi Route Generation tools

b. Surface Conformance Monitoring
- Conduct 1 HITL simulation of Time-Based Surface Conformance Monitoring (2D), update ConUse, Requirements, ATC Procedures
- Conduct 1 field evaluation of Surface Conformance Monitoring (2D) at Orlando, update ConUse, Requirements, ATC Procedures

c. Time-Based Flow Management (TBFM) Work Package III
- Continue to develop and refine concept for the Integrated Enterprise Solution
- Develop documentation to support NASEA DP 44 IID for IES

For FY 2012, $13,700,000 of mandatory funding will provide for the following:

a. Surface Tactical Flow
- Conduct field evaluation of Time-Based Taxi Route Generation tool
- Complete Mid- to Far-Term STBO Requirements Development for Data Communications, Surveillance, Navigation, Weather, and NAS Data Systems

b. Surface Conformance Monitoring
- Conduct 2nd HITL simulation of Time-Based Surface Conformance Monitoring (2D), update ConUse, Requirements, ATC Procedures
- Conduct 2nd field evaluation of Surface Conformance Monitoring (2D) at Orlando, update ConUse, Requirements, ATC Procedures

c. Surface Traffic Data Sharing
- Complete deployment of an Initial Surface Traffic Data Sharing capability.

d. Integrated Arrival & Departure Operations
- Continue airspace design and analysis, transition strategy plans, and procedures development for initial selected locations.
- Initial Automation System Requirements Definition.
- Support to related program IA Activities.
- Automation system requirements definition and studies to analyze design and integration feasibility.

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 the development efforts of the NASA Surface Management System (SMS) 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, TCM concepts can be applied to staffed and automated virtual ATC towers.

The demonstrations and validation activities will:

- Demonstrate and validate procedures for Taxi Conformance Monitoring 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. Trajectory Management – Surface Traffic Data Sharing

Surface Traffic Data Sharing will establish a longer term Service-Oriented Approach to procuring, sharing, and storing select surface data for use by both the Air Navigation Service Provider (ANSP) and external stakeholders, such as NAS users, airport authorities, or other governmental organizations (e.g. DHS). This more robust capability will replace an initial infrastructure established in 2010. The data sharing of aircraft movement data between the ANSP and NAS stakeholders at selected airports will enable improved collaborative decision making, enhanced efficiency, and increased common situational awareness. Additionally, this capability will enable the sharing of surface data with ANSP Decision Support Tools (DST), enabling improvements in DST performance, surface capacity management, and collaborative decision making.

d. Time-Based Flow Management (TBFM) Work Package III

The Time-Based Flow Management Work Package (TBFM) III effort will build upon the previous two segments (see below) to develop new NextGen capabilities and integrate these capabilities into an enterprise-oriented solution. Traffic Management Advisor (TMA), which TBFM builds upon, is a vital part of the NAS and enhances air traffic operations by reducing delays and increasing efficiency of air traffic operations. It 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 twenty Air Route Traffic Control Centers (ARTCC) and adapted for most of the major airports served by those ARTCCs.

The Time Based Flow Management Program is divided into three (3) segments:

- Segment I: Initial TMA platform of capabilities. This segment was completed in April 2009.
- Segment II: Current TBFM Program. This is a continuation of TMA that will fulfill operational user needs and NextGen goals. The TBFM program will incorporate NextGen concepts such as extended metering, weather integration, and metering with RNAV/RNP, while expanding the TMA core capabilities to additional locations in the NAS.
- Segment III: Also known as TBFM Work Package III, this effort will develop and implement additional NextGen capabilities and integrate the TBFM capabilities into an enterprise-wide solution.

e. Capacity Management – Integrated Arrival and Departure Operations

The program improves operational efficiencies in major metropolitan areas by expanding the lateral and vertical boundaries of arrival and departure airspace, and the use of terminal separation standards to this airspace, such as 3-mile separation minima. This change also includes the use of dynamic airspace reconfiguration to accommodate bi-directional arrival/departure routes and improving traffic flow management throughout this expanded airspace area. These operational changes will enable creation of additional area navigation arrival and departure routes that take advantage of improvements in aircraft navigation system accuracy, so airspace around an airport can be used more efficiently. The program also calls for integrating arrival and departure airspace systems into one control service area under the control of one facility. This concept is a step toward the NextGen concept for Super Density Operations.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

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, reduce route spacing and separation requirements, 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. Thus, 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 STO capabilities to the FAA implementing organization.
- First 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 & Orlando

b. Surface Conformance Monitoring

- First Surface Conformance (2D) HITL Simulation.
- Second Surface Conformance (2D) HITL Simulations – using hold short and give way instructions

c. Surface Traffic Data Sharing

- Complete deployment of Initial Surface Traffic Data Sharing capability.

d. Time-Based Flow Management (TBFM) Work Package III

- TBFM Work Package III Final Investment Decision
- Development and deployment of time-based flow management capabilities.

e. Integrated Arrival and Departure Operations

- Development of Concept of Use for Conflict Probe in Integrated Arrival/Departure Control Service environment
- Terminal Flight Data Processing evaluation report
- Automation system requirements definition and studies to analyze design and integration feasibility.

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

$28,000,000 is required to continue work within the Arrivals/Departures at High Density (HD) Airports solution set. The FY 2012 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. With a reduction in funding, 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 will not be realized.

Detailed Justification for - **1A12 Next Generation Transportation System – Collaborative ATM**

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

FY 2012 – Next Generation Transportation System – Collaborative ATM
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Collaborative ATM (CATM)	$44,641	$28,000	$25,000	$53,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Strategic Flow Management Integration	---	$4,000.0
2. Strategic Flow Management Enhancement	---	3,000.0
3. Common Status and Structure Data	---	5,000.0
4. Advanced Methods	---	2,000.0
5. Flight Object	---	7,000.0
6. Integrated NAS Design and Procedure Planning	---	5,000.0
7. Dynamic Airspace	---	2,000.0
Total	Various	$28,000.0

Activity Tasks - Mandatory	Quantity	($000)
1. Strategic Flow Management Integration	---	$4,000.0
2. Strategic Flow Management Enhancement	---	3,000.0
3. Common Status and Structure Data	---	3,000.0
4. Advanced Methods	---	3,000.0
5. Flight Object	---	3,000.0
6. Integrated NAS Design and Procedure Planning	---	4,000.0
7. Dynamic Airspace		2,000.0
8. Collaborative Information Management 2,000.0	---	
Total	Various	$25,000.0

For FY 2012, $28,000,000 of discretionary funding will provide for the following:

a. Flow Control Management – Strategic Flow Management Integration (Integration Execution of Flow Strategies into Controller Tools)
- Conduct studies and analyses as required.

b. Flow Control Management – Strategic Flow Management Enhancement (Enhancing the Strategic Flow Program)
- Conduct requirements analysis, concept development planning leading to a CRD decision for CATMT NextGen capabilities, Decision Point 354 (CATMT Work Package 4 Concept and Requirements Definition Readiness Decision) scheduled for CY 2012

c. Flight and State Data Management – Common Status and Structural Data (Separation, Tactical, Strategic Trajectory Management)
- Collect WAAS Airport Survey from the authoritative source of information.
- Demonstrate ability to receive Special Activity Airspace schedules digitally from the Department of Defense.

d. Flight and State Data Management – Advanced Methods

- Demonstrate the improvements identified in the FY 2011 in a simulation environment
- Analyze and report improvements as a result of demonstration
- Identify opportunities for enhancement

Probabilistic TFM Area Flow Program

- Analyze results of initial demonstration of data-link scenario
- Unified Flight Planning Filing
  Conduct second demonstration that addresses the refined concept
- Advanced Planning
  Identify additional attributes for incorporation into 3D Hypercube demonstration capability

e. Flight and State Data Management – Flight Object

- Building on the End-to-End IFDO system integration activities of FY11, continue demonstration activities, work towards performing End-to-End operational evaluation, and submit IFDO standards petition. The development activities will include the following:
  - Submit IFDO standard petition via continued coordination with international stakeholders
  - Continue coordinating with TBO Oceanic/TA/Surface, ATOP, ERAM, and SWIM

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning

g. Capacity Management – Dynamic Airspace

  - Analyses of DataComm requirements
  - Analyses of voice switch requirements

h. Collaborative Information Management

- Research, analyze, and develop UAS net-enabled applications
- Research, analyze, and develop ADS-B net-enabled applications

For FY 2012, $25,000,000 of mandatory funding will provide for the following:

a. Flight Control Management – Strategic Flow Management Integration (Integration Execution of Flow Strategies into Controller Tools)

- Conduct studies and analyses as required.

b. Flow Control Management – Strategic Flow Management Enhancement (Enhancing the Strategic Flow Program)

- Conduct requirements analysis, concept development planning leading to a CRD decision for CATMT NextGen capabilities, Decision Point 354 (CATMT Work Package 4 Concept and Requirements Definition Readiness Decision) scheduled for CY 2012

c. Flight and State Data Management – Common Status and Structural Data (Separation, Tactical, Strategic Trajectory Management)

- Demonstrate prototype AIM Data Warehouse
- Integrate AIM Mapping Services in AIM One Stop Shop

d. Flight and State Data Management – Advanced Methods

- Integration of Weather into ATM
  - Solicit and incorporate comments on standard exchange formats from FAA and international organizations
- Probabilistic TFM Area Flow Program
  - Prepare draft ConUse of the data-link usage and other integration opportunity with NextGen enabled capabilities
  - Initial demonstration of the data-link scenario in the simulation environment
- Unified Flight Planning Filing

  - Refine the concept of advanced flight planning and filing method based on the initial demonstration
  - Prepare draft ConUse and draft ConOps documents
- Advanced Planning
  - Conduct initial demonstration of 3D Hypercube by implementing the data objects identified in FY11 work
  - Analyze initial demonstration and identify the area that should be improved

e. Flight and State Data Management – Flight Object

- Continue development of system alternatives and allocation
  - Continue fast time modeling/simulation of Flight Object
  - Continue Information modeling of Flight Object
  - Enhance Flight Object exchange model
- Building on the End-to-End IFDO system integration activities of FY11, continue demonstration activities, work towards performing End-to-End operational evaluation, and submit IFDO standards petition. The development activities will include the following:
  - Continue IFDO End-to-End system demonstration
  - Start to perform End-to-End IFDO Operational Evaluation

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning - add description of work

g. Capacity Management – Dynamic Airspace

- Developed Preliminary requirements
- Safety Management System
- Refined airspace configurations and boundaries adjustment
- Analyses of SWIM requirements

h. Collaborative Information Management

- Develop ConOps / Concept of Use for the net-enabled applications
- Develop Web service Description document for the net-enabled applications.
- Conduct feasibility, technical, and operational issues study of net-enabled applications. Develop Demonstration Plan. Develop Demonstration Procedures.
- Conduct demonstration to show NEO benefits to the stakeholders.

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 the En Route Automation Modernization (ERAM) modifications needed to receive/process the Traffic Management Initiatives (TMI) in the ERAM baseline timeframe (releases 2 and 3). 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 Data program will address information and capability gaps within aeronautical information to achieve the NextGen shared situational awareness and trajectory based operations vision. Program activities will focus on five NextGen operational improvements:

- On-Demand NAS Information: Provide real time access to NAS status.
- Assignment of Airspace for Special Use in High Altitude: Better airspace management. Synchronization of airspace status
- Continuous Flight Day Evaluation: Provide performance metrics real time
- Provide full flight plan constraint evaluation with feedback: Provide new flight planning capabilities that consider NAS constraints
- Trajectory Flight Data Management: Real time trajectory management accounting for all aspects of NAS including real time status and constraints

d. Flight and State Data Management – Advanced Methods

NextGen will benefit from a number of infrastructure enhancements, procedural changes, and system improvements that will enhance capacity and alleviate congestion. These include improvements in the flight deck and avionics, vehicle performance, communications, navigation, and air traffic control and management service provider capabilities. In the area of advanced methods for Traffic Flow Management (TFM), tools will be developed in this program; such as common indexing of NAS resources. These tools will help solve the problem of how to guide flights in capacity-constrained scenarios.

e. Flight and State Data Management – Flight Object

An information sharing mechanism, such as the Flight Object, needs to be developed in order to enable information sharing among various users and stakeholders in the NAS this allows for better coordination, situational awareness, and collaborative decision-making. Flight Object supports trajectory based operation objectives to improve capacity, efficiency, safety, and cost. Flight Object will provide standard information to be shared across flight domains and user systems, and is envisioned to support more integrated and coordinated flow planning to ensure collaboration throughout the flight. Key parts of the Flight Object are:

- The information contained in the filed flight plan.
- The converted (expanded) route with applied restrictions, routes, etc.
- Flight plan trajectory (the 4D path the flight intends to follow) includes crossing key aeronautical elements, such as restrictions, and volumes of airspace
- Aircraft actual trajectory (the 4D path the flight has been observed to follow thus far along with maneuvers it might take to get back to flying according to the original, filed intent)
- Mode-S address or beacon code allocated to the flight
- Pairing information (to a track)
- Control information (current Flight Information Region (FIR) controlling, current local sector controlling, stages of handoff/ transfer of control, point-out information.
- Interim altitude assignments, holds, intent information, etc.

f. Flight and State Data Management - Concept Development for Integrated National Airspace Design and Procedure Planning

The Integrated National Airspace Design and Procedure Planning will enable the FAA to develop the infrastructure and framework to assess and develop an integrated airspace and procedure implementation plan based on "Best-Equipped, Best-Served." "Best Equipped Best Served" or "Better Capability, Better Service" (JPDO paper) refers to the concept that better service can accrue to operators and to the NAS as more NextGen capability, enabled by technology, policies and procedures, is introduced. The Integrated National Airspace and Procedure Implementation Plan will align with NextGen mid-term capabilities and FAA strategic plan. The initiative focuses on maximizing benefits and facilitating the development of the business case for industry investment with the goal for the operators to be able to have better access to the NAS by virtue of having the ability to fly in more sophisticated (not necessarily more complex) and efficient ways through the system. This activity will include development of a framework for implementation of national airspace and procedures. It will also include targeted enhancements of existing infrastructure to assess the overall impact to NAS operations. Trade analyses will be applied to assess alternatives (implementation schedules) for the implementation plan. Activities include:

- Defining possible "What and Where" for BEBS operations
- Develop concepts for best-equipped, best-served
- Establishing a User Forum to iterate specific concepts and cost/benefits to better understand willingness to equip, and current state of equipage
- Establishing a rapid prototyping environment for course filter analysis of the concepts, and new fast time M&S tools to evaluate operations, operational benefits and costs
- Moving the most promising concepts and capabilities to a field site or high fidelity demonstration facility for analysis (the Test Bed that simulates a Metroplex area without disrupting current operations)
- Developing and refining functional and operational requirements for implementation

g. Capacity Management – Dynamic Airspace

Flexible Dynamic Airspace will reconfigure airspace for demand/capacity predictions to make as much airspace capacity available as possible, where and when it is required, which is fundamentally different from today's system where the airspace is a rigidly structured network of navigation aids, sectors, and special use airspace. The goal of Flexible/Dynamic airspace configuration research is to better serve users' needs by tailoring the availability and capacity of the airspace by creating a dynamic airspace configuration function that will provide the service provider a new degree of freedom to accommodate the airspace requests of users.

h. Collaborative Information Management

The majority of Aviation Command and Control (C2) systems relies on complex communications to relay information within a terminal area, but do not always lend themselves to transporting this information to remote users. The emphasis of networked enabled operations (NEO) Spiral 3 (SP3) is to examine existing and emerging FAA standards that can be applied to distribute vital information to remote users. In this FAA evolving era of Information Age Transformation, major advancements in sensors and communications are being driven by innovative and novel Web-based technical approaches, through Service Oriented Architecture (SOA) design principles. The FAA business and alternative analysis resulted to be delivered by NEO Project SP3 is to highlight those FAA standards that will provide situational awareness and common shared information shared services (data displays) through the use of SOA approaches to start showing NextGen Strategy by 2015.

NEO SP3 will demonstrate how information sharing and collaboration across multi-agency domains can be accomplished by leveraging existing technology and investments for NextGen transformation. The program will apply lessons learned from NEO SP1 and 2 emerging capability demonstrations that are traceable to the NextGen Baseline Operational Improvement (OI) Roadmap. These transformational concepts are the next building blocks for the NextGen concept. SP3 demonstrations will explore net-centric capabilities and collect additional data to enhance the NEO business case and validate JPDO developed models/simulation for NextGen.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

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

- Develop validation plan and schedule for CONOPS
- Develop CONOPS for Airborne Reroute
- Start the development and implementation of the pre-departure reroute in the NAS

b. Strategic Flow Enhancement

Develop the Traffic Flow Management (TFM) Roadmap. (RTCA Task Force 5 Recommendation)

- Complete the TFM Concept of Operations
- Conduct demonstrations and complete report for evaluations of the business logic for balancing capacity and demand predictions

c. Common Status & Structure Data

- Concept of Operations and Enterprise Architecture for National Special Activity Airspace (SAA)
- Conduct a demonstration of the capability to provide a standardized, consistent, and managed digital SAA definition for external stakeholders and users
- Conduct a demonstration of the decision support tool application for performing flight planning and providing situational awareness, focusing on Standard Operating Procedure / Letters of Agreement (SOP/LOA)

d. Advanced Methods

- Conduct initial Demonstration of 3D hypercube by implementing the data objects identified in FY 2011 work
- High level requirements for integration of weather into the ATM

e. Flight Object

- Planning Plan for the International Flight Object Demonstration
- Develop report for flight and flow information exchange model.
- Complete first draft of the Flight Object requirements document

f. Integrated NAS Design and Procedure Planning

- Establish a portfolio analysis approach for investigating BEBS
- Develop plans for engaging the community best-equipped best-served.
- Create a structure for evaluating specific BEBS operations, including issues related to cost/benefit, related airport operations, integrated airspace and procedures design, concepts and procedures assessments, and development of functional requirements

g. Dynamic Airspace

- Initial ARMS concept of operations document

h. Collaborative Information Management

- Initiate concept of operations or ConUse for applying NetCentric concepts to Unmanned Aircraft Systems: Initiate the development of a ConOps describing Network Enabled Operations (NEO) operations in UAS environment. Issues such as sense and avoid, loss of communications, and loss of link will be discussed, along with emerging NextGen and emerging technologies, capabilities that would help address those issues
- Initiate safety and hazard analysis: Conduct safety and hazard analysis, focusing on demonstration activities to ensure appropriate level of safety (e.g., SRMD or SRMDM) is approved prior to flight demonstrations
- Initiate demonstration strategies and program roadmap: Start the development of 5-year strategies and roadmap to plan for technology insertion and transition into the NAS, especially to program of records
- NEO demonstration: conduct demonstration to illustrate NEO capabilities operating in UAS environment

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

$53,000,000 is required to continue execution of work within the CATM solution set. The FY 2012 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 not be realized.

Detailed Justification for - **1A13 Next Generation Transportation System – Flexible Terminals and Airports**

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

FY 2012 – Next Generation Transportation System – Flexible Terminals and Airports ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Flexible Terminals and Airports	$64,300	$36,300	$21,800	$58,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Wake Turbulence (Departures)	---	$1,300.0
2. Wake Turbulence Mitigation for Arrivals	---	2,000.0
3. Surface/Tower/Terminal System Engineering	---	15,000.0
4. Future Communication Infrastructure	---	2,000.0
5. Approaches, Ground Based Augmentation System	---	5,000.0
6. Closely Spaced Parallel Runway Operations	---	3,000.0
7. Approaches, NextGen Navigation Initiatives	---	1,500.0
8. Approaches, Optimized Navigation Technology	---	1,500.0
9. Trajectory Mgmt - Arrivals	---	3,000.0
10. Reduced Runways Visual Range	---	2,000.0
Total	Various	$36,300.0

Activity Tasks - Mandatory	Quantity	($000)
1. Wake Turbulence (Departures)	---	$1,400.0
2. Wake Turbulence Mitigation for Arrivals	---	1,400.0
3. Surface/Tower/Terminal System Engineering	---	7,000.0
4. Approaches, Ground Based Augmentation System	---	5,000.0
5. Closely Spaced Parallel Runway Operations	---	3,000.0
6. Trajectory Mgmt - Arrivals	---	2,000.0
7. Reduced Runways Visual Range (RVR)	---	2,000.0
Total	Various	$21,800.0

For FY 2012, $36,300,000 of discretionary funding will provide for the following:

1. Wake Turbulence Mitigation for Departures (WTMD) ($1,300,000)

- Accomplish any WTMD rework required based on the ongoing WTMD operational evaluation at IAH.
- Provide WTMD training for SFO personnel.
- Maintain and provide corrective maintenance to the IAH, SFO, and William J. Hughes Technical Center (WJHTC) WTMD systems.
- Complete regional service center engineering and installation of WTMD components in SFO's ATCT.
- Install data links necessary for WTMD operation at SFO.
- Setup data collection equipment, processes and procedures for the SFO operational evaluations.
- Assist SFO in developing modifications to their departure procedures to incorporate the WTMD.

2. Wake Turbulence Mitigation for Arrivals (WTMA) ($2,000,000)

- Completion of more extensive HITL evaluation of the WTMA process and procedures and associated prototype ATC decision support tool software

- Completion of documentation necessary to decide to move forward to develop the WTMA capability as an enhancement to the ATC automation platforms
- Begin planning for the single runway application (WTMSR) of the WTMA developed technology

3. Surface/Tower/Terminal Systems Engineering (TFDM) ($15,000,000)
- Based on the IID decision, initiate RFP Documentation.
- Receive final investment decision to initiate procurement.
- Validate detailed TFDM requirements via prototype demonstrations/evaluation in the field, in support of TFDM acquisition

4. Future Communications Infrastructure ($2,000,000)
- Develop and validate aeronautical mobile airport communications system (AeroMACS) Standard and Recommended Practices (SARPS) at the International Civil Aviation Organization (ICAO) level to support global harmonization and interoperability of the system.
- Develop and validate a method for segregation and reliable delivery of ATS and AOC services on AeroMACS,
- Develop secure and reliable methods for Private Key Management and synchronization across all AeroMACS AAA sites.

5. Approaches, Ground Based Augmentation System (GBAS) ($5,000,000)
- Requirements development – finalize CATIII ground facility specification
- AMS Documentation - In addition the team will complete the preparation for a JRC presentation to seek a program decision.
- Following a favorable JRC decision, the team will proceed with the source selection activities leading to a contract award for Cat III GBAS systems.

6. Closely Spaced Parallel Runway Operations (CSPO) ($3,000,000)
- Update CSPO Program Plan and detailed schedule
- Deliver Test report for FY11 HITL 2-11 test
- Perform data collection and analysis reports to support reduced separation standards in runway spacing
- Develop SMS requirements for approaches at reduced separations standards in runway spacing
- Develop performance requirements for independent and paired approaches

7. Approaches, NextGen Navigation Initiatives ($1,500,000)
- Enhanced Low Vis Ops-Initiate Work at 2 Sites and finish FY10 work.
- Terminal RNAV DME-DME-Initiate at OEP Airport
- Surface Situational Awareness-Finalize Coord of CONOPS

8. Approaches, Optimized Navigation Technology ($1,500,000)
- Complete Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) Light Emitting Diode (LED)/Infrared (IR) lamps prototype design
- Conduct functional configuration audit for Precision Approach Path Indicator (PAPI) LED program

9. Trajectory Management – Arrivals ($3,000,000)
- Complete evaluating the ability of aircraft to accurately meet vertical constraints and required time of arrival
- Complete evaluating DataComm for aircraft messaging for Required Time of Arrival (RTA), reroutes, and waypoint verification data integrity
- Human factors analysis shifting to control by time of arrival through controller-in-the-loop simulations and field trials
- Seek certification approval of initial TBO procedures/scenarios
- Draft Plan for limited implementation (includes new RNAV/RNP route requirements if needed)

10. Trajectory Mgmt - Reduced RVR Minima ($2,000,000)
- Identify project demand for services

For FY 2012, $21,800,000 of mandatory funding will provide for the following:

1. Wake Turbulence Mitigation for Departures (WTMD) ($1,400,000)

- Provide WTMD training for MEM personnel.
- Maintain and provide corrective maintenance to the MEM WTMD system.
- Complete regional service center engineering and installation of WTMD components in MEM's ATCT.
- Install data links necessary for WTMD operation at MEM.
- Setup data collection equipment, processes and procedures for the MEM operational evaluations.
- Assist MEM in developing modifications to their departure procedures to incorporate the WTMD.

2. Wake Turbulence Mitigation for Arrivals (WTMA) ($1,400,000)

- Contractual support to design and develop the software modification to the WJH Technical Center automation test bed to allow the evaluation of the single runway application (WTMSR) of the WTMA technology.

3. Surface/Tower/Terminal Systems Engineering (TFDM) ($7,000,000)

- Support Technology Transfer of advanced TFDM capabilities from R&D
- Define Terminal Architecture enhancements for NextGen

4. Approaches, Ground Based Augmentation System (GBAS) ($5,000,000)

- Operational Implementation - Conduct preliminary planning to field and implement CAT III GBAS.
- Procure Equipment/Solution Development-Complete technical validation necessary to achieve a low technical risk for acquisition. Complete avionics prototype development.

5. Closely Spaced Parallel Runway Operations (CSPO) ($3,000,000)

- Develop final SAPA system description for avionics integration and installation in FAA simulators and flight test aircraft
- Refine NTZ, NOZ and other assumptions via modeling and analyses

6. Trajectory Management – Arrivals ($2,000,000)

- Evaluate ground merging and sequencing tools that will employ control by time of arrival (identify enabling requirements)
- Analysis of human factors and flight deck automation requirements to minimize errors and provide integrity assurance
- 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

7. Trajectory Mgmt - Reduced RVR Minima ($2,000,000)

- Identify project demand for services

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 757 and heavier aircraft. Presently, aircraft must wait a minimum of two minutes to depart after the departure of a 757 or heavier 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 2 to 3 minute wait time following a 757 or heavier 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.

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 the existing airspace 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 will continue 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 heavier aircraft when landing on an airport's set of closely spaced parallel runways (runways less than 2500 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.

The FY 2012 evaluation of WTMA will lead to an FAA decision in FY 2013 to transform the capabilities of the prototype software tool into a functioning decision support tool integrated into the terminal automation system for use by the FAA air traffic controllers. First operational benefit will be realized during FY 2015 when the WTMA controller decision support tool capability is fielded as part of a software release to a FAA terminal automation system.

c. Surface/Tower/Terminal Systems Engineering (TFDM)

The primary goal of this activity is to provide engineering analyses, 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 safely increase capacity, reduce traffic delays, lower costs and reduce impact on the surrounding environment. 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 object, 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 will enhance/optimize airport surface traffic management efficiency, mitigate risk of safety related incidents, and support the overall movement of air traffic in the Terminal environment.

d. Approaches, Ground Based Augmentation System

The Local Area Augmentation System (LAAS) is the United States system that meets internationally accepted standards for a Ground Based Augmentation System (GBAS). GBAS augments the current Global Positioning System (GPS) service for terminal, non-precision, and precision approaches in the NAS. GBAS is the only cost effective alternative to ILS for Category II/III operations because a single facility can serve an entire airport versus multiple ILS facilities (one at each runway end).

The FAA identified GBAS as an "Enabler" for the NextGen. The FAA plans to replace legacy navigation systems with satellite based navigation technology. The strategy to achieve this capability is to initially build a system that uses the existing GPS single civil frequency to provide Category II/III service and improve this architecture when additional civil frequencies become available.

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.

e. 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 ft and 4,300 ft.

f. 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 three main program elements addressing each of these areas.

The first program element supports low visibility enhanced operations by lowering required Runway Visual Range (RVR)-defined minimums during IMC, and is a collaborative effort between Flight Standards and Navigation Services. This work allows a greater number of takeoffs and landings when visibility is limited. Lower takeoff minimums could achieve a 17 percent increase in throughput for San Francisco International Airport (SFO), for example. This effort is in the implementation phase and will have near-term NextGen operational benefits by increasing NAS capacity and throughput. For this program element, work is ongoing to develop the benefit-cost analysis to propose this as a NAS-wide implementation, scheduled in the FY 2011 timeframe. If successful, this program element will be broken out into its own program. The initial program element achieved use of Category I runway procedures using RVR minimums of 1,800 feet, a 25 percent improvement for these runways over the prior 2,400-foot requirement.

The second 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 third 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.

g. Approaches, Optimize Navigation Technology

This program supports developing new technology for existing Navigation systems that improve reliability and lower the cost of operations.

The Navigation systems to be improved include all existing approach lighting systems, other lighted navigation aids, precision and non-precision approach systems, and terminal and en route navigation systems. The new technology efforts will include analyses of the physical, electrical (electronic) and economic characteristics of these systems to determine what type of technology insertion or changes in the system would result in improved efficiency.

Two of the initiatives will focus on the current Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). These lights are required when pilots are making Category I precision approaches in the NAS. The first initiative is to replace the existing incandescent lamps with Light Emitting Diode (LED) technology, without modifying the rest of the MALSR system. The second initiative is to redesign the entire MALSR system to include LED technology, and solid state switching and electrical distribution technology. This technology redesign will provide a more reliable lighting system (with at least two times the mean time between failures) that will consume approximately one-third of the electrical energy that existing MALSR systems with incandescent lamps and mechanical switching and distribution system use.

LED Lamps have been under prototype development for some time. In order to gain the full benefits of modernizing the MALSR, the second initiative for a complete MALSR redesign of the power and control system is needed to optimize efficiency and reliability. Development of a new system is estimated to take approximately three years.

A third initiative is to develop an LED based Precision Approach Path Indicator (PAPI) to replace incandescent based Visual Approach Slope Indicators (VASI) and existing PAPI Systems in the NAS. This redesigned system would improve efficiency and reliability and result in cost savings.

h. 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.

i. 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.

j. Future Communications Infrastructure

The Future Communications Infrastructure contains communications projects in both the C & 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 5000-5030 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

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.

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 prototype system to first site (IAH)
- Deliver WTMD training package for controller to first site (IAH)

b. Wake Turbulence Mitigation for Arrivals
- Readiness for concept and requirements definition decision
- Initial investment decision

c. Surface/Tower/Terminal Systems Engineering
- ICAO 2012 Flight Plan Change Requirements
- TFDM IARD
- TFDM Initial Investment Decision

d. Approaches, Ground Based Augmentation System
- Award Contract to validate CAT III Avionics Standards and interoperability
- Investment Analysis Readiness Decision
- Initial Investment Decision

e. Closely Spaced Parallel Runway Operations
- Conduct further HITL tests to evaluate operational application for Dual ILS/RNAV/PRM/Wake/Blunder/ADS-B

f. NextGen Navigation Initiatives
- Complete Initial Concept of Operations for Navigation Surface Requirements

g. Optimize Navigation Technology
- LED MALSR Contract Award
- LED PAPI Contract Award

h. Trajectory Management – Arrivals
- Perform initial 4D FMS TBO concept validation and analyses of performance capabilities and standards.

i. Trajectory Mgmt - Reduced RVR Minima
- Program has not started

j. Future Communications Infrastructure
- Program has not started

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

$58,100,000 is required to continue the execution of work within the Flexibility in the Terminal Environment (FLEX) solution set. The FY 2012 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.

Detailed Justification for - 1A14 Next Generation Transportation System – Safety, Security and Environment

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

FY 2012 – Next Generation Transportation System – Safety, Security and Environment ($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Next Generation Transportation System – Safety, Security and Environment	$8,200	$5,000	$3,000	$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
Security Integrated Tool Set	---	$5,000.0
Total	Various	$5,000.0
Activity Tasks - Mandatory		
Security Integrated Tool Set	---	$3,000.0
Total	Various	$3,000.0

For FY 2012, $5,000,000 of discretionary funding will provide for the following:

- Obtain Final Investment Decision

For FY 2012, $3,000,000 of mandatory funding will provide for the following:

- Award contract for SITS development
- Initiate development activities

2. What Is This Program?

The Security Integrated Tool Suite (SITS) is a suite of applications designed to provide integrated security solution support for the Federal Aviation Administration (FAA) Air Domain security operation by leveraging Air Navigation System (ANS) capabilities, including personnel, systems, and data, and by integrating these security activities into Air Traffic Management (ATM) operations. SITS automation capabilities will integrate with FAA and interagency systems such as the Department of Defense (DoD), Transportation Security Agency (TSA), and Customs and Border Protections (CBP) to ensure seamless and effective delivery of capabilities. In order to support the increase in air demand in the future while simultaneously sharing information and responsibility for Air Domain security with other agencies, the FAA must ensure the SITS automation includes a robust ability for providing shared situational awareness (SSA), decision support (including risk analysis leveraging interagency resources), information sharing, automated threat detection, monitoring, and post-event analysis and playback. The NextGen timeframe will see a substantial off-loading of routine tasks from the user to automation. SITS will apply this approach while ensuring that there is a "human in the loop" to make crucial security decisions when required. The NextGen environment will have a tremendous amount of information which needs to be processed, consolidated, and presented to stakeholders in an efficient and logical way. For example, managing security airspaces requires the capability to create constrained airspace and limit access to that airspace by aircraft meeting specified criteria. DHS and DOD define the constraints and categories of aircraft that are prohibited from entering the airspace. The FAA implements the plan by identifying which aircraft meet these criteria. The lack of automation support in the current process creates the potential for major disruptions. The SITS CONUSE and the functional analysis identified eight functions integral to SITS:

Manage Security Airspaces based on airspace security constraints provided by DHS and DOD	Coordinate Event and Incident Responses
Manage Flight Security Information	Manage Classes and Rules
Monitor Airspace Tracks and Trajectories	Log, Analyze, and Generate Reports on Security Information
Monitor and Correlate Security Reports and Events	Collaborate and Share Information

3. Why Is This Particular Program Necessary?

The FAA has distinct responsibilities for Air Domain security as the nation's Air Navigation Service Provider (ANSP) and airspace controlling authority including executing constraints defined by DHS or DOD as security events dictate. As a direct result of the changed security environment following the September 11, 2001 terrorist attacks, the FAA's well established Air Domain responsibilities have been significantly impacted. In addition to planning for the substantial air demand increases envisioned in the Next Generation Air Transportation System (NextGen) timeframe, the FAA's Air Traffic Organization (ATO) must establish new capabilities to meet the increasingly complex and expanding security and emergency operations challenges while improving the safety and efficiency of the National Airspace System (NAS). The FAA must balance its support of national defense, homeland security, law enforcement and emergency operations efforts with its core mission to maintain the safety and efficiency of the NAS to include notification of potential security events.

The FAA Air Domain security mission is currently supported by a variety of communications and coordination tools, aircraft situational displays, and security related databases, however, there is limited connectivity among these systems. Analysis and data correlation to determine potential security risk is performed manually, and sharing of information that the FAA has direct responsibility for such as flight plan, flight path, transponder code, radio calls, etc is limited to voice communications. In addition, some tools are prototypes and do not have stable resources for needed improvements, sustainment, or plans for future enhancement. During the past six years, FAA has begun to develop basic automation tools to support the Air Domain security mission, principally by leveraging pre-existing systems used for Air Traffic Management (ATM) services and by implementing interim solutions. However, FAA requires additional automation capability with the robust, integrated tool sets to effectively support this critical mission area. The SITS automation capabilities are intended to close this potentially dangerous gap. The FAA has identified the following capability shortfalls:

- Limited automated shared situational awareness (SSA) and collaboration
- Limited alerting and update capabilities
- Only manual capabilities to assess the impacts of security measures
- Limited tools to support informed decisions
- Limited tools and manual processes to support data correlation and analysis
- Inadequate manual process for implementing tiered security airspace - (While Special Use Airspace (SUA) is one piece of Air Domain Security, future plans include many different levels of security restricted airspace based on individual flight risk profiles and risk levels)
- No locally independent and remote/mobile access capabilities (restriction of required information flows).
- Lack of metrics to analyze security operations effectiveness

4. How Do You Know The Program Works?

The envisioned security environment is comprised of a layered, adaptive approach that will permit timely and effective responses, appropriate risk management to security situations through automation, and decision support systems that inform human decision making.

The operational security environment consists of various security partners, each with a user-defined operational picture (UDOP) based on common information shared rapidly and securely. This SSA capability will improve security operational effectiveness. Digital communication, added to voice communication, will ensure accurate information sharing and timely decision-making.

SITS will provide data correlation, NAS impact analysis of security and emergency actions, and trend analysis capabilities. SITS will also support integrated security-restricted Air Domain development and sharing capabilities. The automation will seamlessly integrate these capabilities with ATM and may support defense, homeland security, disaster recovery, and law enforcement operations. Further, SITS will scale to meet required response and projected air traffic demand.

SITS, through automation, will streamline processes, improve operational security shared situational awareness, and enable the agency to meet the increased demand for security. SITS will improve FAA's ability to coordinate and collaborate with its various security partners. Finally, SITS will provide for the monitoring of any operational radio voice frequencies needed to understand a security event.

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

$8,000,000 is required in order to continue work within the Safety, Security, and Environment (SSE) solution set. The FY 2012 work will continue to develop SITS as part of the FAA's Operational Evolution Partnership (OEP) and efforts to develop NextGen.

With a reduction in the SSE solution set, the SITS program will not be funded. As a result the key benefits contained in this program will be affected. This program will allow for an automated system to identify airborne security threats in the NAS and communicate that information to the appropriate information system or agency. With a loss in SSE funding, the FAA's future ability to support the identification, tracking and mitigation of aviation related national security events will be significantly degraded.

Detailed Justification for - 1A15 Next Generation Air Transportation System (NextGen) – System Networked Facilities (FAC)

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

FY 2012 – System Networked Facilities (FAC)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FAA Mandatory	FY 2012 Total
System Networked Facilities	$3,000	$9,000	$1,000	$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Integration, Development and Operations Analysis	---	$3,000.0
2. Test Bed/Demonstration Sites	---	6,000.0
Total	Various	$9,000.0
Activity Tasks - Mandatory		
1. Test Bed/Demonstration Sites	---	1,000.0
Total	Various	$1,000.0

For FY 2012, $9,000,000 of discretionary funding will provide for the following:

Facilities Integration Development & Operations Analysis

- Continue development of the integration, development, and operations analysis capability.
- Integrate 3 additional capabilities into the NextGen Integration and Evaluation Capability (NIEC) display area:
  - Traffic Flow Management Capability (a.k.a. Mini TPC)
  - ERAM Evaluation System (a.k.a. ERAM in-the-Box)
  - Traffic Management Advisory (TMA) capability

Facilities Test Bed/Demonstration Sites

- Expand NextGen test bed capabilities in Florida
- Establish information exchange capabilities with other NextGen Test Bed and stakeholder sites
- Perform arising NextGen technology integration and demonstration activities in Florida. Initiate initial NextGen interactivity between Florida and NASA's North Texas Facility (NTX)
- Continue coordination with NASA NTX
- Perform site installation and maintenance activities Technology site refresh and maintenance at all three Test Bed sites
- Maintain NextGen Test Bed sites to allow continual NextGen demonstrations
- Continue coordination with William J. Hughes Technical Center (WJHTC) and NASA NTX as well as other NextGen stakeholders.

For FY 2012, $1,000,000 of mandatory funding will provide for the following:

Facilities Test Bed/Demonstration Sites

- Perform technology refreshes to install and evaluate arising NextGen technologies
- Expand telecommunication infrastructure to allow improved live data capabilities. Expand site integration capabilities among all three sites

2. What Is This Program?

The Next Generation Air Transportation System (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. It redesigns the air traffic control systems to make them flexible, scalable, and maintainable. It breaks down the geographical boundaries that characterize air traffic control and leads 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. This includes facilities and the personnel who staff them.

NextGen redesigns the air traffic control systems to make them flexible, scalable, and maintainable. It breaks down the geographical boundaries that characterize air traffic control and leads to a more seamless view of traffic, organized not be 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. 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.

Since requirements for facilities are no longer geo-dependent and do not require proximity of air navigation services being provided to the air traffic being managed, facilities are sited and occupied to provide for air traffic management facility optimization. This may include collocating several facilities (e.g., air route traffic control centers (ARTCCs) and terminal radar approach control (TRACONs) within a single facility).

The Networked Facilities solution set focuses on delivering an infrastructure that supports the transformation of air navigation service delivery unencumbered by legacy constraints. Networked facilities will provide for expanded services; service continuity; and optimal deployment and training of the workforce all supported by cost effective and flexible systems for information sharing and back-up. Traffic is assigned to facilities on both a long-term and daily basis with service continuity a foremost requirement. Business continuity is built into the system and provides for a more resilient infrastructure, better contingency operations, and a higher degree of service.

In addition, 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.

DOT Strategic Goal – Economic Competitiveness

- Maximize economic returns on transportation policies and investments.

Integration, Development, and Operations Analysis

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 low 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 2012, 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.

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 Altitude TBO
- High Density Airports
- Networked Facilities
- Reduced Weather Impact
- Collaborative Air Traffic Management (ATM)
- Flexible Terminal and Airspace
- Safety, Security, Environment.
- 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. The Test Bed is envisioned to be physically distributed in order to allow for gate-to-gate demonstration of NextGen components. Specifically, the following three sites are planned:

- NASA NTX is located near the Dallas/Fort Worth Airport (DFW)
- WJHTC located near Atlantic City, NJ
- Daytona Beach International Airport (DAB) located in Daytona Beach, FL.

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.

Integration, Development, and Operations Analysis

- Full Initial capability of the NextGen Integration and Evaluation Capability Lab (NIEC) completed
- Integrate cockpit simulator into the NIEC
- Continue to integrate additional capabilities into the NIEC display area

Test Bed/Demonstration Sites

- Complete Florida Test Bed Segment 1 Implementation

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

$10,000,000 is required to continue work within the Networked Facilities solution set. The FY 2012 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 - 1A16 Next Generation Air Transportation System (NextGen) – Future Facilities Investment Planning

What Do I Need To Know Before Reading This Justification?

- The NextGen Facilities Special Program Management Office (SPMO) is the responsible organization for Future Facilities Investment Planning to transform the FAA's air traffic facilities by developing and implementing a comprehensive plan for managing this multi-year process. The charter and activities of the SPMO 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 Facilities SPMO plans to obtain its Investment Analysis Readiness Decision (IARD) in September 2010, as well as continue its business case development process in preparation for an Initial Investment Decision (IID) in June 2011 and a Final Investment Decision (FID) in June 2012.
- The SPMO strategy is to fully engage union representatives in the overall planning of the program and is awaiting Article 48 representatives to the program office.

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

FY 2012 – Future Facilities Investment Planning
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Future Facilities Investment Planning	$21,000	$19,500	$0	$19,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Business Case Decision Activities/Products – FID Segment 1 Project 1		$4,000.0
2. Systems Engineering Support – Segment 1 Project 1	---	3,000.0
3. Facility Planning and Design – Segment 1	---	9,500.0
4. Program Management	---	10,000.0
5. Program Management, Contract Evaluation and Award	---	2,000.0
6. Contract Preparation and Evaluation	---	1,000.0
Total	Various	$19,500.0

For FY 2012, $19,500,000 is requested for the critical business case development support, systems engineering services, and engineering/architectural expertise needed to complete the business case artifacts and final Segment 1 Project 1 facility design activities for the approval of the Business Case Final Investment Decision (FID) by the Joint Resources Council (JRC) in June 2012. Contract preparation/evaluation activities will include the development of a Request for Proposal (RFP) and a qualified vendor's list in preparation for a contract award in FY 2013 for the construction for the first Project of Segment 1.

2. What Is This Program?

Future Facilities Investment Planning

The NextGen Facilities SPMO primarily seeks to upgrade and transition 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. It redesigns the air traffic control systems to make them flexible, scalable, and maintainable. 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.

Since requirements for facilities are no longer geo-dependent and do not require proximity of air navigation services to the air traffic being managed, facilities are sited and occupied to provide for air traffic management facility optimization. This may include collocating several facilities (e.g., air route traffic control centers (ARTCCs) and terminal radar approach control (TRACONs) within a single facility.

The SPMO will coordinate with other agency initiatives to evaluate alternatives for new facilities as well as alternatives for retrofitting existing facilities. The SPMO will develop business cases for new facilities and/or alterations to existing facilities, and create transition and implementation plans. The SPMO will design FAA facilities that meet the needs of the future through a program that is consistent with facilities-oriented legislation within anticipated FAA Reauthorization then transfer requirements and standards to enable implementation.

The NextGen Facilities program will be structured into multiple segments, with several projects planned under each segment. The NextGen Facilities SPMO plans to obtain its IARD in September 2010, as well as continue its business case development process of Segment 1 of its proposed plan in preparation for IID in June 2011 and a FID in June 2012.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

Future Facilities Investment Planning

The SPMO will coordinate with other agency initiatives to evaluate alternatives for new facilities as well as alternatives for retrofitting existing facilities. The SPMO will develop business cases for new facilities and/or alterations to existing facilities, and create transition and implementation plans. The SPMO will then transfer requirements and standards to enable implementation.

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. It redesigns the air traffic control systems to make them flexible, scalable, and maintainable. It breaks down the geographical boundaries that characterize air traffic control and leads 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.

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.

Since requirements for facilities are no longer geo-dependent and do not require proximity of air navigation services to the air traffic being managed, facilities are sited and occupied to provide for air traffic management facility optimization. This may include collocating several facilities (e.g., air route traffic control centers (ARTCCs) and terminal radar approach control (TRACONs) within a single facility.

3. Why Is This Particular Program Necessary?

As a result of limitations in the current air traffic system, the number of terminal and En Route air traffic control facilities has grown significantly. 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 161 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, further 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 NextGen facility and infrastructure improvements.

In summary, a recent DOT Inspector General Report ("FAA's Management and Maintenance of Air Traffic Control Facilities," Report Number AV-2009-12, December 15, 2008), 59 percent of the current U.S. air traffic control facilities are over 30 years old.

The NextGen Facilities SPMO must 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. Some smaller airports have limited service due to cost of service; creating a need to increase service in these locations, while reducing costs.

The NextGen Facilities SPMO 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?

With the flexibility offered by geo-independent technological advancements, the FAA can create scalable, economical, environmentally responsible facilities that are designed, located, equipped and staffed to deliver all of the services needed to provide safe, orderly, efficient, and secure air traffic services to aircraft operators for now and years to come. The NextGen Facilities SPMO will manage the transformation effort by dividing it into operational segments that correspond to service volumes in the NAS. The segments will be defined based on objective criteria in accordance with legislative authority and recommended practices.

The NextGen Facilities SPMO will develop a comprehensive process for planning, designing and implementing facility changes 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, 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. The multi-year transformation of FAA air traffic control facilities runs between now (2010) through 2025 and beyond.

Initial research on Business Continuity Benefits has been done in support of this program. In a MITRE study, an estimate of lost airline revenues due to an ARTCC outage was calculated. The estimate of lost revenue (2004 dollars) ranged from just $6 million per day for Salt Lake City to over $40 million per day for New York. The median estimate (for Houston) was estimated to be $20 million per day (source: NextGen Facilities Shortfall Analysis Report 5.5, dated July 17, 2009.)

Beginning in FY 2011, the NextGen Facilities SPMO will further refine the development of critical operational requirements and identify facility-specific operational performance metrics that will help validate the program implementation success.

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

For FY 2012, $19,500,000 is requested for the critical business case development support, systems engineering services, and engineering/architectural expertise needed to complete the business case artifacts and final Segment 1 Project 1 facility design activities for the approval of the Business Case FID by the Joint Resources Council (JRC) in June 2012. Contract preparation/evaluation activities will include the development of a Request for Proposal (RFP) and a qualified vendor's list in preparation for a contract award for the construction for the first Project of Segment 1.

- The SPMO team will develop of the required FID artifacts to fully comply with AMS guidance. This effort entails a high degree of coordination with programs/stakeholders that are part of the NextGen Facilities portfolio and have critical investment interdependencies with each other across the FAA portfolio. The SPMO team will ensure that the NextGen Facilities business case contains a comprehensive corporate perspective and evaluates the relevant FAA-wide investment synergies that are critical for a JRC FID.
- The SPMO engineering/architectural services support will finalize detailed facility layout designs to accommodate equipment and systems in the operational areas, National Airspace System (NAS) equipment areas, operational support areas, and administrative areas. The SPMO develop a draft construction Request For Proposal (RFP) and a qualified vendor list by June 2012 in preparation for a construction contract award in FY 2013.

Any reduction in the required funding will be a delay in realization of FAA's goals for facility improvements.

Detailed Justification for - 1A17 Joint Planning and Development Office (JPDO)

What Do I Need To Know Before Reading This Justification?

NextGen was enacted in 2003 by Congress under VISION 100 – Century of Aviation Reauthorization Act (P.L. 108-176). In this initiative, the Joint Planning and Development Office (JPDO) is responsible for managing a public/private partnership to bring NextGen online by 2025. The JPDO is the central organization that coordinates the specialized efforts of the Departments of Transportation, Defense, Homeland Security, Commerce, FAA, NASA, and the White House Office of Science and Technology Policy.

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

**FY 2012 – Joint Planning and Development Office (JPDO)
($000)**

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Joint Planning and Development Office (JPDO)	$3,800	$3,000	$0	$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Report Progress and Maintain NextGen National Integrated Plan's Enterprise Architecture, Concepts of Operations and Integrated Workplace		$3,000.0

For FY 2012, $3,000,000 is requested to enhance the NextGen planning information in the Enterprise Architecture and Integrated Work Plan. This will include incorporating information on the following activities:

- NextGen trajectory-based flight processing, including air navigation service provider, flight operations center, and flight crew roles and responsibilities
- Integration of networked enabled weather into automation decision making
- Enhanced operational scenarios that describe information sharing and procedures between flight/airline operations

2. What Is This Program?

The JPDO is responsible for defining and facilitating the implementation of NextGen. At this stage in the transformation, outputs are a series of plans and analyses that define a proposed end-state and a path for achieving it. The objective is to drive collaborative decisions—involving government and industry—that will ultimately achieve the transformation.

As the steward of NextGen, JPDO seeks to address long-term imbalances in aviation capacity and demand. At the same time, it seeks to ensure that the future operating environment is safe, well managed, environmentally responsible, and harmonized with international standards. JPDO's mission is to lead the transformation of today's aviation system into that of the future, the scope of which contributes to all of FAA's current strategic goals.

The JPDO is truly a collaborative enterprise. Employees from the National Aeronautics and Space Administration (NASA) and the Departments of Transportation, Commerce, Defense (DoD), and Homeland Security (DHS) actively lead and/or participate in JPDO activities. Similarly, the JPDO Board includes executives from each department/agency, as well as the White House Office of Science and Technology Policy. And the Senior Policy Committee includes Secretaries, Deputy Secretaries, and/or Administrators from the participating organizations, as well as the Director of the Office of Science and Technology Policy.

The private sector is also an integral part of JPDO's work. In FY 2006, the NextGen Institute was established as an alliance of major aviation stakeholder communities.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

In Public Law 108-176 Congress recognized the need to do business differently. To ensure this change occurs, Congress created the Joint Planning and Development Office established by the Department of Transportation within the Federal Aviation Administration will manage the work related to NextGen.

The JPDO provides the multi-agency governance structure that guides the development of the nation's air transportation system of 2025. The JPDO together with partner agencies defines the capabilities and mechanisms that build new capacity to accommodate a wide range of customers and address an even wider spectrum of issues. These include increasing mobility for private, commercial, civil, and military aviation, airport and airspace capacity that is adaptable to unforeseen changes in traveler and shipper needs, and capacity increases that are balanced within safety and security guidelines.

The JPDO maintains the plan and provides biennial reporting on the progress that participating agencies make in transforming the air transportation management system into a space-based system capable of avoiding future capacity gridlock regardless of weather conditions.

4. How Do You Know The Program Works?

VISION 100 directs the Secretary of Transportation to establish a Senior Policy Committee (SPC) to oversee the work of the JPDO. By law, the SPC is chaired by the Secretary of Transportation, and is composed of:

- The Secretary of Transportation
- The Administrator of the Federal Aviation Administrator (or designee)
- The Administrator of the National Aeronautics Administration (or designee)
- The Secretary of Defense (or designee)
- The Secretary of Homeland Security (or designee)
- The Secretary of Commerce (or designee)
- The Director of the Office of Science and Technology Policy (or designee)
- Designees from other Federal agencies that the Secretary of Transportation determines have an important interest in, or responsibility for, other aspects of the system.

The SPC provides high-level guidance, resolves major policy issues, and identifies resource needs

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

A reduction would limit the activities associated with multi-agency architecture federation. A further reduction would limit information sharing information included in the Enterprise Architecture.

Detailed Justification for - **1A18 NextGen Performance Based Navigation (PBN)-Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)**

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

FY 2012 – NextGen Performance Based Navigation (PBN) - Metroplex Area Navigation Performance (RNAV)/Required Navigation Performance (RNP)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
NextGen Performance Based Navigation (PBN)- Metropex Area Navigation (RNAV)/Required Navigation Performance (RNP)	$0	$26,200	$0	$26,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Optimization of Airspace and Procedures for Metroplexes (OAPM)		$19,500.0
2. NextGen Safety		6,700.0
Total	Various	$26,200.0

For FY 2012, $26,200,000 of discretionary funding will provide for the following:

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. Recommendations for the implementation of NextGen within the aviation community were consolidated by the RTCA and are the industry's top priorities for the near- and mid-term NextGen programs. 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 as a proof of concept 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.

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 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.

2. What Is This Program?

The Airspace Optimization Group will begin integrated 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.

DOT Strategic Goal – Economic Competitiveness

- With regards to RTCA Task Force 5 recommendations, develop and implement PBN routes and procedures, including RNP, RNAV, and OPD to expand development in Metroplex and non-Metroplex areas, based on targeted benefits.

3. Why Is This Particular Program Necessary?

Optimization of Airspace and Procedures in the Metroplex is the starting point for 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 we redesign 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.

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. 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?

$26,200,000 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.

Detailed Justification for - 2A02 ERAM D-Position Upgrade and System Enhancements

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

**FY 2012 – ERAM D-Position Upgrade and System Enhancements
($000)**

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
ERAM D-Position Upgrade and System Enhancements	$0	$0	$64,500	$64,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Mandatory	Locations/ Quantity	Estimated Cost ($000)
Program Initiation Activities, Program Management and Data-Position Infrastructure Upgrade	---	$64,500.0

For FY 2012, a total of $64,500,000 of mandatory funding is requested for ERAM D-Position Upgrade and System Enhancements. With this funding, system engineering and initial software development of the D-Position Upgrade will commence. Specific ERAM D-Position Upgrade and System Enhancements capabilities include: completion of the system engineering and design for the D-position upgrade, both hardware and software; finalization of initial software requirements for initial D-Position CHI redesign and new display views, start of initial software development; procurement of developer and test lab replacement D-Position displays and R-Position processors, and planning for development operational testing of D-Position software and planning for deployment of hardware. 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.

From a functionality standpoint, 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 extenally funded by the SWIM and Data Communications programs for new functionality and by ERAM basleine for operational (maintenance) software fixes. This program upgrades the D-side displays, associated computer human interface, and associated processors at all Air Route Traffic Control Centers which currently are near maximum capacity both in viewable area as well as processing abaility. System engineering and software design and development would be accomlished in FY12 and FY13 with hardware purchases starting in FY13; deployment is planned for FY14 and FY15 to be completed in calendar year 2015. Software enhancements such as non-radar control will be accomplished in FY15 and FY16. This program includes 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 will begin in FY 2011 with system engineering tasks associated with scoping and defining the software release projections, issuance of the Screening Information Request (SIR) and negotiation of the contract modifications and detailed work on the initial hardware performance upgrade implementation planning. In addition, the program will undergo acquisition and investment analysis review in FY 2012.

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 2012 and completes in 2019. Hardware upgrades start in 2012 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 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.

Mission Need Statement (MNS) 309 addresses the supportability of en route and oceanic facilities and the architecture needed to support projected air traffic growth. It incorporates 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. MNS-309 also addresses inefficiencies in the current systems that impacts FAA's mission in these areas.

Although many of these inefficiencies are being corrected and goals achieved in the ERAM acquisition baseline was 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 2012, it 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 - 2A13 System-Wide Information Management (SWIM)

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

FY 2012 – System-Wide Information Management (SWIM)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
System-Wide Information Management (SWIM)	$58,548	$66,350	$0	$66,350

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
Segment 1:		
1. Traffic Flow Management Data Publication	---	$3,500.0
2. Terminal Data Distribution System Publication	---	8,700.0
3. Corridor Integrated Weather System Publication	---	100.0
4. Integrated Weather Terminal Weather Publication	---	200.0
5. Weather Message Switching Center Replace Publication	---	2,700.0
6. SWIM Core Services	---	8,900.0
7. ERAM Publication	---	8,000.0
Segment 2:		
8. Analyze Requirements and Develop Specifications	---	5,000.0
9. Analyze Segment 2 Architecture Alternatives	---	6,000.0
10. Prototype Candidate Solutions	---	5,000.0
11 Conduct Acquisition for Integration Contract	---	6,000.0
12 Core Services Development by Contractor	---	12,000.0
13 Independent Test and Evaluation (IOT&E)	---	250.0
Total	Various	$66,350.0

For FY 2012, $66,350,000 is requested for Segment 1 development efforts and Segment 2 follow-on analysis initiatives.

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.

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.

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.

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

$ 32,100,000 is required for the development of Segment 1. Efforts in FY 2012 include development, and test of initial Segment 1 capabilities. For FY 2012, SWIM funding will:

- Conduct OT&E, Key Site and begin the deployment of the Terminal Data Distribution System Capability
- Continue to operate the deployed Corridor Integrated Weather System Publication and Integrated Weather Terminal Weather Publication Services
- Conduct Development Test and Evaluation of the Traffic Flow Management Flow Information Publication and begin work on the Runway Visual Range Capability
- Complete deployment of the Weather Message Switching Center Replace Publication Service and begin operations
- 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 Implement Programs.

$ 34,250,000 is required for Segment 2 to:

- Analyze requirements and develop specification
- Analyze Segment 2 architecture alternatives
- Prototype candidate solutions
- Conduct acquisition for integration contract.
- Begin core services development by integration contractor

Detailed Justification for - 2A14 ADS-B NAS Wide Implementation

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

FY 2012 – ADS-B NAS Wide Implementation
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
ADS-B NAS Wide Implementation	$201,350	$285,100	$0	$285,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. Solution Development	---	$98,000.0
2. Implementation	---	42,200.0
3. In-Service Program/Management	---	144,000.0
4. In-Service Engineering	---	900.0
Total	Various	$285,100.0

In FY 2012, NAS Wide deployment of ADS-B will continue with subscription services operational for surveillance in the Gulf, Louisville/Philadelphia, the East Coast, Alaska, and for weather in the Gulf and Alaska. Additionally Advanced Technologies and Oceanic Procedures (ATOP) automation platform ADS-B software development will occur, merging and spacing conceptual development will be ongoing and may include software development, WAM (Wide Area Multilateration) for surface surveillance implementation will be ongoing. Finally, further development of future applications is planned.

2. What Is This Program?

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 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.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

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 National Airspace System (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.

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, FIB-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 - In Service Decision was approved in 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 all underwent significant testing and evaluation to support the requirements. All sites have achieved operational readiness through Initial Operational Capability (IOC) as of April 2010. The completion of these sites and all separation services enabled the FAA to release the Final Rule for avionics. An In Service Decision for Critical Services is planned for September 2010.

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

In FY 2012 NAS Wide deployment of ADS-B will continue with subscription services operational for surveillance in the Gulf, Louisville/Philadelphia, the East Coast, and Alaska and for weather in the Gulf and Alaska. Additionally ATOP automation platform ADS-B software development will occur, Merging and

Spacing conceptual development will be ongoing and may include software development, WAM (wide area multilateration) for surface surveillance implementation will be ongoing. If funded at less than the $285,100,000 level the program office would have to extend the ADS-B schedule. A reduction would impact the program schedule and cause a slip putting the NextGen program at risk. The ADS-B service is a critical to the implementation of NextGen.

Detailed Justification for - **2A17 Collaborative Air Traffic Management Technologies Work Package 2 and 3**

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

**FY 2012 – Collaborative Air Traffic Management Technologies
($000)**

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Collaborative Air Traffic Management Technologies (CATMT)	$18,100	$41,500	$0	$41,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
1. CATMT WP 2	---	$27,600.0
2. CATMT WP 3	---	13,900.0
Total	Various	$41,500.0

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 will start 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?

$41,500,000 is requested 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.

Detailed Justification for - 2A18 Colorado ADS-B WAM Cost Share

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

FY 2012 – Colorado ADS-B WAM Cost Share
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Colorado ADS-B WAM Cost Share	$0	$3,800	$2,000	$5,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Hardware/Software Design	---	$1,800.0
2. Engineering Support	---	1,400.0
3. Program Management	---	600.0
Total	Various	$3,800.0

Activity Tasks - Mandatory

IOC and ORD – Durango/Telluride
$2,000.0

For FY 2012, $3,800,000 of discretionary funding will be used to support the following activities:

- Finalize Integration of Multilateration (MLAT) and ADS-B Services with ERAM Release 3
- Key site (Montrose) Site Acceptance Testing
- Key site (Montrose) Operator's Test and Evaluation of the Montrose Service Volume (Key site for Colorado Phase 2)
- Finalize Safety Risk Management Document (SRMD) for Colorado Services
- Finalize Security Certification and Authorization Package (SCAP) updates for Colorado Phase 2 services
- Flight Inspection Montrose Service Volume for Initial Operating Capability (IOC)
- Perform Operators Suitability Demonstration (OSD) to support the Operators Readiness Demonstration(ORD)
- Finalize Gunderson Service Volume Implementation (Radio Sighting and Integration Testing)
- Perform Gunderson SV Implementation Site Acceptance Testing.
- Perform OT&E for Gunderson SV
- Perform Flight Inspection for Gunderson IOC
- Perform Gunderson SV OSD to support ORD

For FY 2012, $2,000,000 of mandatory funding will be used to support the following activities:

- All necessary activities to support the IOC and ORD of the Durango Service Volume
- All necessary activities to support the IOC and ORD of the Telluride Service Volume

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, as illustrated on Attachment A map. 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 proposed ADS-B/Multilateration system 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.

The nonrecurring costs will provide for development of an ADS-B/Multilateration surveillance system constituting Phase II of the Colorado Surveillance implementation plan. The system will be an ADS-B 1090 Extended Squitter (ES) surveillance system with integrated multilateration. The multilateration component will provide beacon only surveillance in the near term until the transition to ADS-B is complete. The 1090-ES capability provides surveillance of aircraft equipped to DO-260B avionics. During the aircraft equipage period to DO-260B compliant avionics, the system will provide surveillance of traditional ATCRBS and Mode S equipped aircraft through Multilateration. For those aircraft that are DO-260B equipped, ADS-B surveillance will be provided. In addition, the system will provide ADS-B over the Universal Access Transceiver (UAT) link supporting Flight Information Services-Broadcast (FIS-B) and Traffic Information Services-Broadcast (TIS-B) services using this technology. The surveillance data will be provided to the automation system at Denver ARTCC from a service provider under contract with the FAA. The baseline performance of the system will be equal to that of the existing Air Traffic Control Beacon Interrogator – Model 6 (ATCBI-6) currently employed by the FAA in providing en route air traffic separation.

The Service Provider (SP) selected alternative transfer development, deployment, operation, maintenance, and ownership of the surveillance system from the FAA to a private non-federal contractor. Under the SP option, the SP will integrate the emerging technologies of ADS-B and multilateration under governmental oversight (FAA and the State of Colorado). After the system has successfully completed FAT, SAT, and OT&E, it will then be certified to provide surveillance data to the Denver ARTCC. Under the SP alternative, the SP will install the hardware and provide all necessary infrastructure (site, power, telecommunications and security). After the system is certified by the FAA and is operational, the SP will charge the FAA an annual service fee to provide the surveillance data.

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 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 safety and efficiently. FIS-B products include graphical and textual weather reports and forecasts, Special Use Airspace Information, Notices to Airmen, and other aeronautical information.

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.

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.

The same system is currently operational in two other locations (Juneau, Alaska and Rifle/Hayden, Colorado). The Juneau location is currently in IOC.

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

Funding is requested for the development and implementation of ADS-B /WAM surveillance to support the Denver ARTCC (ZDV) separation services into and out of the Durango, CO; Gunnison, CO; Montrose, CO; and Telluride CO airports to continue with the FAT; SAT; OT&E; and OSD. A reduction would cause the program schedule to slip.

Detailed Justification for - 2A20 Tactical Flow Time Based Flow Management (TBFM)

What Do I Need To Know Before Reading This Justification?

- Under the operation of the Traffic Management Advisor (TMA) currently, deployed and operational at 20 ARTCCs, 27 TRACONs, and 33 ATCTs (27 of the Nation's busies 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.
- Implementation of the System Re-Architecture and NextGen and Operational capabilities – NAS EA DP 195

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

FY 2012 – Tactical Flow Time Based Flow Management (TBFM)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Tactical Flow Time Based Flow Management (TBFM)	$0	$38,700	$0	$38,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
TBFM	Various	$38,700.0

For FY 2012, $38,700,000 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), 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, and displaying convective weather on the TMA display for better decision making.
- 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 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. 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 also 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 reduction in the logistical footprint. 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:

- 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?

$38,700,000 is requested to keep the program on its pace to complete during FY 2015. Funding at this level will enable TBFM to initiate the design and development of 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 by including surface movement data, RNAV/RNP route selection data, international traffic data, and sector capacity data. Also, design and deliver the TMA system to enhance the current operational system to further the efficiency of the TMA system with 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 2012 – National Airspace System Voice System (NVS)
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
National Airspace System Voice System (NVS)	$26,600	$19,800	$0	$19,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Investment Analysis Program Management	---	$5,000.0
2. Screening Information Request Development	---	2,500.0
3. Engineering Analysis	---	2,500.0
4. Documentation	---	2,000.0
5. Contract Award	---	7,800.0
Total	Various	$19,800.0

For FY 2012, $19,800,000 of discretionary funding is requested to complete the activities leading to the Final Investment Decision (FID) and to award a contract.

2. What Is This Program?

The NAS Voice System (NVS) will be a real-time, critical part of the air traffic control (ATC) infrastructure that provides the connectivity for efficient communications among air traffic controllers, pilots, and ground personnel. It connects incoming and out-going communication lines via a switching matrix to the controller's workstation. The controller via a panel on his workstation selects the lines needed to communicate with pilots, other controllers and other facilities. The NVS will replace the service that is currently provided by 17 different voice switch system configurations. The focus will be on designing a replacement switch with standardized components that will reduce maintenance and parts inventory costs.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

3. Why Is This Particular Program Necessary?

The current voice switch system is aging and needs to be modernized to mitigate obsolescence. 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.

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?

$19,800,000 is requested to complete the activities leading to the final investment decision (FID) and to award a contract.

A reduction from the FY 2012 baseline funding would delay the development of the system and the initial program reviews.

Detailed Justification for - 4A09 Aeronautical Information Management Program

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

FY 2012 – Aeronautical Information Management Program
($000)

Activity/Component	FY 2010 Actual	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 Total
Aeronautical Information Management Program	$10,000	$26,300	$2,600	$28,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks - Discretionary	Locations/ Quantity	Estimated Cost ($000)
1. Program Management	---	$3,100.0
2. System Engineering	---	6,900.0
3. Software Design and Development	---	11,000.0
4. Telecommunications	---	500.0
5. System Development and Analysis	---	6,200.0
6. Investment Analysis	---	1,500.0
Total	Various	$26,300.0

Activity Tasks – Mandatory		
1. Modernization/NextGen CSSD, Segment 2	---	$ 1,400.0
2. Management/Integration, Segment 3	---	_1,200.0
Total	Various	$2,600.0

For FY 2012, $26,300,000 of discretionary funding is requested for the following:

- Segment 1, $18,300,000 is requested to improve the delivery of National Airspace System (NAS) status information including Notices to Airmen (NOTAMs), Special Use Airspace (SUA) status, weather information and flight planning services.
- Segment 2, $8,000,000 is requested is requested to build on AIM Modernization Segment 1 and 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.

For FY 2012, $2,600,000 of mandatory funding is requested for:

- Segment 2, $1,400,000 is requested to continue 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.
- Segment 3, $1,200,000 is requested to modernize management and full integration of static aeronautical information within the Air Traffic Organization (ATO). This work will build on AIM Modernization Segment 1 and 2.

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. Digital aeronautical data enables the real-time, or near real-time, processing of data to improve mapping, flight planning, and the timeliness and accuracy of air traffic control instructions. The program will replace the existing Notice to Airmen (NOTAM) and Central Altitude Reservation Function (CARF) systems 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.

The AIM Modernization Segment 1 will:

- Provide a modern information management system for NAS status information including NOTAM, SUA status, weather products and flight planning.
- Provide mission essential, secure support to the NAS operational environment.
- Improve the quality and consistency of aeronautical information by improving information integrity.
- Support current and future customer needs by providing information in computer readable formats.
- Ensure FAA aeronautical information systems are consistent with International Civil Aviation Organization (ICAO) standards and recommended practices.

To accomplish this mission, AIM Modernization 1 has formulated a two segment solution development strategy:

- Segment 1a - NOTAM Modernization: Provides the foundation for a modern AIM information management infrastructure, provide enhanced Notices to Airmen (NOTAM) services and make critical improvements to the FAA's Central Altitude Reservation Facility (CARF).
- Segment 1b - Digital Integrated Briefing: Incrementally adds aeronautical status information capability in the areas of special use airspace management, performance metrics, flight planning support and weather product support.

AIM Modernization Segment 2 will:

- Provide services and systems for pilot briefing using digital technologies
- Provide services and systems for reporting equipment status, and
- Provide airport mapping and status

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.

- Aeronautical Common Services (ACS) will improve capturing, maintaining, and sharing operational information and constraint data from Air Traffic Control Standard Operating Procedures and Letters of Agreement through web services
- 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 support increased shared tactical and strategic awareness of the status of the National Airspace System (NAS) by providing information on actual and predictive facility equipment status and its impact on air traffic.
- ACS will provide a central resource called Airports Geographic Information System (GIS) for critical information about airports including airport mapping and status and a variety of applications for using this data.

Segment 3 will develop and implement the management and full integration of static aeronautical information within the Air Traffic Organization (ATO). Because aeronautical information is created, managed, distributed and used by multiple administrative and operational organizations, careful data management is needed. This segment will provide a centralized, consistent approach to managing aeronautical information by designing NAS Resource (NASR) to be compliant with the Next Generation Air

Transportation System (NextGen) data model (AIXM) and System Wide Information Management (SWIM) standards (Web Services) and employing common adaptation and SWIM standards for the National Airspace System (NAS) Adaptation Services Environment (NASE). Segment 3 program planning through solution implementation will take place from FY 2012 – 2017 and relies on the work accomplished under the Aeronautical Information Process Improvement (AIPI), which takes place in FY 2010 and FY 2011.

Results obtained in FY 2009 include:

- Initiate development of NOTAM policy and systems to support International Civil Aeronautical Organization (ICAO) standards. Provide initial digital NOTAM capability to 5 airports
- Incorporate 100 percent of new NOTAM policy guidelines into NOTAM Entry Systems
- Accomplish Initial Investment Decision and commence Final Investment Decision for AIM Modernization - Segment 1a
- Integrate "AS IS" AIM enterprise architecture into the NAS enterprise architecture
- Improve FAA / DOD compliance with Military Operations (MILOPS) systems
- Ensure compliance of Special Use Airspace (SUA) notifications with NOTAM and Airspace policy
- Continue to promote use of AIM data standards by development and delivery Aeronautical Information Exchange Model (AIXM) Release 5.1
- Begin development of an automated Altitude Reservation (ALTRV) system to address critical system failures of the legacy CARF system
- Complete results of Airport field user benefits study

Based on the projected work plan, products that will be developed in FY 2010 include:

- Deploy new operational sites and deliver NOTAM system disaster recovery site
- Provide NOTAM origination access to all US airports
- Identify transition plans from legacy AIM systems to AIM Modernization – Segment 1a
- Continue Solution Development for AIM Modernization – Segment 1a
- Complete Final Investment Decision (FID) for AIM Modernization – Segment 1a
- Integrate "TO BE" AIM enterprise architecture into NAS Enterprise Architecture
- Ensure 100 percent of new AIM projects are captured by Enterprise Architecture
- Deliver initial Altitude Reservation (ALTRV) automation capability

Based on the projected work plan, products that will be developed in FY 2011 include:

- Continue implementing AIM Modernization - Segment 1a
- Continue transitioning from legacy AIM systems to AIM Modernization - Segment 1a
- Begin phased AIM Modernization Segment 1a deployment
- Achieve final AMS decisions supporting AIM Modernization - Segment 1b

DOT Strategic Goal - Safety

- Reduction in transportation related injuries and fatalities.

3. Why Is This Particular Program Necessary?

Segment 1

- Legacy operations and maintenance cost savings. The existing systems are at end of service life and using an out-modeled architecture. Obsolete or legacy interfaces will be replace with current technology providing improved performance, availability, and better operations. New architecture approaches using virtualization and consolidated servers will result in lower operation, maintenance and recovery costs.

- Airline labor cost savings. Airlines have dedicated personal to process, interpret and investigate legacy text NOTAMS. Digital NOTAM will reduce confusion and increase the ability to directly integrate NOTAM information into pilot briefings. A survey of major airlines indicates an average savings of 7 hours daily.

- General Aviation and Air Taxi labor cost savings. Pilots who request NOTAMs spend considerable time obtaining, reviewing, and interpreting the data. Digital NOTAMs will allow pilots to obtain relevant NOTAMs that are relevant to them and will provide information that is easier to understand. A survey of pilots as well as discussions with FSS personnel indicates an average of 1 to 3 minutes saved per departure depending on the pilot's current method of obtaining the data. This estimate is applicable to the subset of flights where NOTAMs are obtained by the pilot.

- Airport Authority labor cost savings. Airport authorities manually prepare and transmit NOTAMs for entry. These communications are by phone or some other manual method. A survey of airport authorities indicate that up to three minutes could be saved per NOTAM entry. This estimate is applied to a little over half the NOTAMs initiated by airport authorities as not all survey respondents believed they would achieve the savings.

- FS21 labor cost savings. The FAA currently contracts with Lockheed Martin to provide flight service station functions across the CONUS. One function of FS21 personnel is to receive NOTAM information and to enter into the system. With the Digital NOTAM system, the NOTAM originator will enter the data directly into the system rather than first manually communicating to FS21. As a result, it was estimated that FS21 can save 3 minutes for each new NOTAM that is created.

- NOTAM related safety benefits. An investigation of the National Transportation Safety Board (NTSB) database found 38 accidents between 1990 and 2005 where improving the NOTAM system could potentially have avoided the event. A review of these events by subject matter experts concluded that a 40 percent reduction in relevant events could occur as a result of this investment.

4. How Do You Know The Program Works?

On April 20, 2010, at 11:14 AM the first digital NOTAM was issued in Atlantic City at ACY. This milestone demonstrates the AIM Modernization program has momentum to develop and deploy the aeronautical common service. In addition to ACY, 11 additional airports with 24 hour operations will deploy this technology during FY 2010 for field testing.

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

$29,200,000 is requested for AIM Modernization to improve the delivery of NAS status information including Notices to Airmen, Special Use Airspace status, weather information and flight planning services. This includes Continuation of Segment 1 solution development, implementation and deployment of completed, tested and operational system modules and subsystems, Segment 2 to build on AIM Modernization Segment 1 and 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 and Segment 3 to modernize management and full integration of static aeronautical information within the ATO. This work will build on AIM Modernization Segment 1 and 2.

A reduction will delay provision of the system described as AIM Modernization Segment 1 and impact the interdependencies and timing of Segments 2 and 3 functionality.

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 2012 – Personnel and Related Expenses
($000)

Activity/Component	FY 2010 Enacted	FY 2012 Discretionary	FY 2012 Mandatory	FY 2012 President's Budget Total
Personnel and Related Expenses	$470,000	$480,000	$0	$480,000

$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).

2. What Is This Program?

This program sustains the current Facilities and Equipment (F&E) workforce.

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 2012, the agency is requesting an increase of $10,000,000 to sustain the current workforce. The increase includes no pay raise. The requested increase covers inflation in travel of $352,000, and an increase of $4,550,000 to cover increased travel requirements driven by NextGen. This increase will fund needed site visits, simulations (human-in-the-loop modeling, etc.), and essential on-site supervision of F&E construction work. The agency also is requesting an additional $98,000 for inflation in other objects, which covers contractual services, supplies, and common use equipment.

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 2012 – NextGen – Alternative Fuels for General Aviation

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A11.m NextGen – Alternative Fuels for General Aviation	$0	$2,071,000	+$2,071,000

For FY 2012, $2,071,000 is requested for NextGen – Alternative Fuels for General Aviation. Major activities and accomplishments planned with the requested funding include:

- Evaluate the performance of a fleet representative, naturally aspirated engine on ultra-low lead fuels.
- Evaluate the impact on the general aviation (GA) fleet from the reduction and eventual removal of lead from aviation gasolines.
- Evaluate the safety and performance of high compression engines on unleaded, mid-octane aviation alkylate fuel.

Research will focus on the feasibility of reducing high-octane lead additives in aviation gasoline and how that will impact fleet performance and certification. Test data and laboratory analyses of ultra-low lead 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 increased aromatic limits in the low lead fuel for octane enhancement and its impact on other safety critical performance metrics.

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 Aircraft Fuel System Materials Task Force (ASTM TF) work of developing a fuel qualification protocol for aviation and compression ignition fuel and additives qualification to ensure deviations to the current specification properties and fit-for-purpose properties ensure safety of aviation fuels. FY 2012 research will also address development of new engine, rig, and laboratory test methods necessary to evaluate fuels which differ from traditional hydrocarbon, refinery based fuels. Planning will begin for the addition of new test capabilities and tools to the laboratory to conduct full envelope testing of turbocharged aircraft engines. The data from that testing will be used to update the current detonation advisory circular The capability to measure lead emissions from GA engines is also planned to be added.

Additionally, research will also examine technologies that could be used to modify the GA legacy piston engines to run on significantly reduced octane unleaded fuels. Test data will be collected from GA engines on the effects of variations in fit-for-purpose property deviations from current aviation gasoline specification to the fuel qualification protocol from the ASTM TF for Otto Cycle fuels at ASTM International.

2. What Is This Program?

This program will 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 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:

- 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 Exxon Mobil, Conoco Phillips, 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.
- Academia and national laboratories.

Partnerships include:

- CRC Unleaded Aviation Gasoline Development Group – includes Exxon Mobil, Conoco Phillips, 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.
- General Aviation Manufacturers Association - Future Avgas Strategy and Transition Plan (GAMA FAST) – includes engine and airframe original equipment manufacturers; this group is developing a plan for the introduction of unleaded fuel to replace 100LL and assess the impact on the current fleet of aircraft and engines.
- 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 protocol for Aircraft Fuel System Materials (ASTM) specification approval and is researching how changes from current specification and fit-for-purpose properties will impact safety.

Major activities and accomplishments planning include:

- Publish a detailed research plan to address alternative fuels for GA aircraft that is coordinated with EPA, GAMA, CRC, and the GA community and that addresses continued safe operation of aircraft, reduction and eventual elimination in the use of lead as an additive, and alternative fuel certification.

- Begin initial feasibility activities, including economic feasibility, environmental impacts, and assessment of potential for GA aircraft reduced, unleaded, and renewable alternative fuels.
- Begin engine and laboratory testing on ultra-low lead fuels to address the feasibility of near-term reduction in lead levels in aviation gasoline as a temporary measure to reduce leaded aviation emissions.
- Begin engine and laboratory testing on mid-octane, unleaded aviation alkylate as an input to initial safety and performance impact on the legacy fleet from potential for removal of lead from aviation gasoline.
- Begin engine test data and laboratory characterization of high-octane, quasi-drop-in, unleaded fuels to replace 100LL avgas.

Performance Linkages

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 develop 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 support development of qualification and certification methodologies for those fuels. Longer term research includes simulated altitude 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 2012, complete feasibility assessment of near-term reduction in the current lead levels in avgas on GA aircraft and engine safety, performance, certification methodologies as a temporary measure toward full lead removal, assessment of removal of lead from aviation alkylate and use of the remaining mid-octane conventional fuel.
- By FY 2013, complete feasibility assessment of 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 2013, establish capability to measure lead emissions from piston engines operating on ultra-low lead and low lead fuels.
- By FY 2014, complete analyses to extrapolate lead emissions over GA fleet.
- By FY 2014, develop methodology and acquire tools for altitude 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 2015, complete testing to be used to update FAA AC 33.47, regarding detonation testing equipment, analyses, safety margin, and altitude determination.
- By FY 2016, develop engine and fuel test methods to evaluate the performance, safety, durability, and operability of unleaded avgas.
- By FY 2017, complete test engine emission evaluation of existing biomass derived and high-aromatic, high-octane fuels.
- By FY 2017, 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 need to find a replacement for current leaded avgas (100LL). The replacement fuel should perform as well as 100LL in general aviation (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. Research will evaluate and characterize new alternative fuel formulations that will have protected the environment while sustaining growth in air transportation.

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 would result in a decrease in funding to the Next Gen - Alternative Fuels for General Aviation Program and could delay the empirical testing of assessments needed to produce hard data for the determination of certification impact and safety assessment of whether the near term reduction in lead content of aviation gasoline could meet the estimated EPA target.

Detailed Justification for – A12.a Joint Planning and Development Office

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

FY 2012 – Joint Planning and Development Office

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.a Joint Planning and Development Office	$14,407,000	$14,067,000	-$340,000

For FY 2012, $14,067,000 is requested for Joint Planning and Development Office (JPDO). Major activities and accomplishments planned with the requested funding include:

Planning and Agency/Industry Alignment

- Develop NextGen Portfolio Analysis that recommends the alignment of resources within the federal government and U.S. industry to develop and implement the Next Generation Air Transportation System (NextGen) in the most expedient and cost-effective manner.
- Coordinate and facilitate the transfer of technologies from aeronautics research programs and direct research that will result in achieving NextGen.

Systems Integration and Transformation Analysis

- Establish standards and application for Net Enabled Weather information exchange for integration into air transportation management decision making.
- Develop policy recommendation for key architectural decisions including level of automation and aircraft system vs. ground system responsibility for separation assurance.
- Continue to refine research plans, which will describe research and supporting activities required to drive implementation decisions to effect the NextGen transformation.
- Develop Integrated Surveillance governance to facilitate robust multi-agency information sharing requirements, engineering analysis, prototype demonstrations, and implementation planning.

JPDO will continue to:

- Report progress and maintain NextGen National Integrated Plan's Enterprise Architecture, Concepts, and Integrated Work plan.
- Continue to define benefits of NextGen concepts through modeling and simulation.
- Continue to refine Life-cycle cost estimates for NextGen through collaboration with partner agencies and industry.
- Continue to support Senior Policy Committee decision-making by refining NextGen Policy agenda.
- Continue to coordinate and develop multi-agency NextGen Budget Portfolio.
- Continue enhancement of Enterprise Architecture and Multi-agency Integrated Work Plan.

2. What Is This Program?

The JPDO is responsible for defining and facilitating the implementation of NextGen. At this stage in the transformation, outputs are a series of plans and analyses that define a proposed end-state and a path for achieving it. The objective is to drive collaborative decisions—involving government and industry—that will ultimately achieve the transformation.

As the steward of NextGen, JPDO seeks to address long-term imbalances in aviation capacity and demand. At the same time, it seeks to ensure the future operating environment is safe, well managed, environmentally responsible, and harmonized with international standards. JPDO's mission is to lead the transformation of today's aviation system into that of the future, the scope of which contributes to DOT current strategic goal of Economic Competitiveness and Safety.

The JPDO is truly a collaborative enterprise. Employees from the National Aeronautics and Space Administration (NASA) and the Departments of Transportation, Commerce, Defense (DoD), and Homeland Security (DHS) actively lead and/or participate in JPDO activities. Similarly, the JPDO Board includes executives from each department/agency, as well as the White House Office of Science and Technology Policy. The Senior Policy Committee includes Secretaries, Deputy Secretaries, and/or Administrators from the participating organizations, as well as the Director of the Office of Science and Technology Policy.

The private sector is also an integral part of JPDO's work. In FY 2006, the NextGen Institute was established as an alliance of major aviation stakeholder communities

Major activities and accomplishments planning include:

Planning and Agency/Industry Alignment

- Continue to refine research plans, which will describe research and supporting activities required to drive implementation decisions to effect the NextGen transformation.
- Continue modeling planned improvements to test their efficacy in accomplishing NextGen goals.
- Continue enhancement of Enterprise Architecture and Multi-agency Integrated Work Plan in response to the outcome of demonstrations, research, changes in agency budgets, etc.
- Facilitate the transfer of technologies from research programs that are ready for implementation (e.g., NASA and the Department of Defense) to the federal agencies with operational responsibilities and to the private sector, as appropriate.

Systems Integration and Transformation Analysis

- Risk adjusted NextGen 2025 definition including capabilities, benefits, and cost.
- Establish analysis to mitigate research and development risk for 2025. Specifically:
  - Unmanned Aircraft Systems (UAS) and other advanced technologies that will lead to NAS integration.
  - Trajectory Based Operations.
- Develop Information Sharing Standards, Models, Technologies for Aviation Weather Community Interest.
- Establish an Intergovernmental Integrated Surveillance Memorandum of Understanding and implement an initial operational capability by 2012.

<u>Performance Linkages</u>

FY 2012:

- Enhance the NextGen planning information to reflect:
  - Integration of net-enabled weather into automation decision making;
  - Enhanced operational scenarios that describe information sharing and procedures between flight/ airline operations;
  - NextGen trajectory-based flight processing, including air navigation service provider, flight operations center, and flight crew roles & responsibilities.
- Continue development of an interagency, Integrated Surveillance capability including:
  - Initial information sharing operation
  - Enterprise Architecture, Concept of Operations, and funding profile.

- Continue coordination of network–enabled information sharing standards for participating agencies & organizations including multi-agency governance processes.
- Continue to coordinate and conduct demonstrations that will test operational concepts, address operational challenges, and provide alternatives for architectural trade-offs.
- Continue to refine NextGen planning information: Concept of Operations (ConOps), Enterprise Architecture (EA), and Integrated Work Plan (IWP).

FY 2013-2015:

- Continue research and development to support all NextGen capabilities.

FY 2016 and Beyond:

- Continue development to support all NextGen capabilities
- Identify alternatives as a result of needed research that may be immature.

3. Why Is This Particular Program Necessary?

The nation's air transportation system has slowly evolved into one that has become brittle, inflexible to change, and grounded in antiquated policy, technology and business practices. The system is no longer scalable. The United States aviation system must transform itself and be more responsive to the tremendous social, economic, political and technological changes that are evolving worldwide.

In Public Law 108-176 Congress recognized the need to do business differently. To ensure this change occurs, Congress created the Joint Planning and Development Office established by the Department of Transportation within the Federal Aviation Administration will manage the work related to the NextGen.

The JPDO provides the multi-agency governance structure that guides the development of the nation's air transportation system of 2025. The JPDO together with partner agencies defines the capabilities and mechanisms that build new capacity to accommodate a wide range of customers and address an even wider spectrum of issues. These include increasing mobility for private, commercial, civil, & military aviation, airport and airspace capacity that is adaptable to unforeseen changes in traveler and shipper needs, and capacity increases that are balanced within safety and security guidelines.

The JPDO maintains the plan and provides biennial reporting on the progress that participating agencies make in transforming the air transportation management system into a space-based system capable of avoiding future capacity gridlock regardless of weather conditions.

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?

Any current or future reduction would result in a decrease in funding to technology transfer and would reduce activities by one third and also the enterprise architecture by one quarter.

Detailed Justification for – A12.b NextGen - Wake Turbulence

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

FY 2012 – NextGen - Wake Turbulence

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.b NextGen - Wake Turbulence	$10,631,000	$10,674,000	+$43,000

For FY 2012, $10,674,000 is requested for NextGen - Wake Turbulence. Major activities and accomplishments planned with the requested funding include:

- Continue to maintain and add to the world's most extensive aircraft wake transport data base for use in new air traffic control procedure development and assessments of wake encounter risk associated with those new procedures.
- Obtain RTCA agreement on weather observation parameters to be transmitted from aircraft –vital to the development of dynamic wake separation processes.
- Continue to incorporate wake transport and decay as well as aircraft navigation performance analysis results into FAA wake-encounter risk models.
- Initiate development of wake turbulence mitigation processes/procedures to support the NextGen era time based en-route operational environment.
- Continue development of wind forecast algorithm and its information needs for use in the Wake Turbulence Mitigation for Single Runway (WTMSR) air traffic control decision support tool.
- Continue cooperative development with European Organization for the Safety of Air Navigation (EUROCONTROL) of NextGen/SESAR of ground and aircraft based situation display concepts relative to wake separation constraints required for implementation of the NextGen/SESAR concepts for air routes and airport approach/departure paths.
- Evaluate reports of wake turbulence encounters as part of the FAA Safety Management System assurance process for changes to Air Traffic Control (ATC) procedures.
- Continue to conduct experiments, analyses, and aviation community forums to define, in terms of a wake turbulence hazard, what is an unacceptable level of wake turbulence for an encountering aircraft.
- Continue development of modeling tools to evaluate system-wide safety risk associated with the NextGen pair-wise separation concepts.
- Provide engineering and analysis support to develop airport-specific procedure modifications to enable dependent instrument approaches to an airport's closely spaced parallel runway (CSPR).
- Continue development of wake turbulence transport and decay modeling tools for use in evaluating proposed, trajectory-based, operational concepts.
- Provide wake turbulence evaluation support in determining wake separation standards for new aircraft being introduced into the NAS.

In FY 2012, FAA must continue 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 Wake Turbulence Program's 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.

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 ANSP decision support tool that adjusts required wake separations based on wind conditions would allow ATC 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. The research program in FY 2012 will continue work begun in FY 2008 to address the feasibility and benefit of a wake avoidance decision support capability for the flight deck.

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 2012, 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 in instrument meteorological conditions and capacity for more flights in high-usage airspace, and
- Providing more capacity-efficient wake separations to aircraft with the same or reduced safety risk.

The program 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 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:	Stakeholders:
Pilots	Joint Planning and Development Office
ANSP personnel	Commercial pilot unions
Air carrier operations	Other International Civil Aviation Organization (ICAO)
Airport operations	Air navigation service providers
	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 partners:

- 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
- CSSI, Incorporated

Major activities and accomplishments planning include:

- Provide engineering and analysis support to develop airport-specific procedure modifications to enable dependent instrument approaches to an airport's CSPR.
- Continue data collection to determine the characteristics of wake vortices generated by departing and arriving aircraft. Emphasis is on collecting data on wake generated by Boeing 757 and heavier aircraft. Data is being used in development of air navigation service provider decision support tools in reducing the required wake mitigation separation applied to airport single runway arrivals and departures.
- Evaluate reports of wake turbulence encounters as part of the FAA SMS assurance process for changes to ATC procedures.
- Develop initial wake separation standards to be applied to the new Boeing 747-800 series aircraft

<u>Performance Linkages</u>

The NextGen - Wake Turbulence Program supports the DOT strategic goal of Economic Competitiveness by maximizing economic returns on transportation policies and investment on average daily airport capacity.

The following illustrate some target milestones:

- By FY 2012, determine the National Airspace System (NAS) infrastructure requirements (ground and aircraft) for implementing the NextGen Trajectory Based Operation and High Density concepts within the constraints of aircraft-generated wake vortices and aircraft collision risk.
- By FY 2013, develop as requested, airport specific instrument meteorological conditions (IMC) CSPR approach procedures that would insure wake safety and increase IMC capacity of the CSPR.
- By FY 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.

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 program has produced the airport specific procedure and safety analyses to bring a new air traffic control wake mitigation procedure into everyday operation at the Seattle – Tacoma International Airport and an impending implementation at the Memphis airport. Seattle is currently getting up to 8 more arrival operations per hour (when compared to its former wake mitigation procedure) when weather forces it to switch to using only instrument approaches to its runways. The NextGen - Wake Turbulence Program is continuing to facilitate implementations of this procedure at Newark, Cleveland and Boston. These airports will have a similar operational improvement as Seattle.

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.

The requested FY2012 NextGen - Wake Turbulence Program will expand the crosswind based wake mitigation concept from its use on closely spaced parallel runways to an application on single runways – potentially providing an air traffic control decision support tool that will allow more operations at an even greater number of the nation's busiest airports. The Program will also research how the NextGen era aviation system capacity enabling concepts (Trajectory Based, Flexible Terminal) can be implemented without being severely limited by wake mitigation constraints.

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?

A reduction would impact the FAA's progress in developing the Wake Turbulence Mitigation for Single Runways (WTMSR) concept feasibility prototype. It is planned to modify the FAA terminal automation development laboratory platform at the FAA William J Hughes Technical Center to prototype the decision support tool functionality of the WTMSR concept. A reduction in funding slows the pace of the prototype development, delaying its completion by three months.

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 2012 – NextGen – Air Ground Integration Human Factors

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.c NextGen – Air Ground Integration Human Factors	$5,688,000	$10,545,000	+$4,857,000

For FY 2012, $10,545,000 is requested for NextGen – Air Ground Integration Human Factors. Major activities and accomplishments planned with the requested funding include:

Roles and Responsibilities

- Complete 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.
- Develop recommendations for function allocation strategies and policy between pilots(s), controller(s), airline operations centers (AOC) and automated systems to communicate, execute, monitor and resolve conflicts during delegated separation operations.

Human System Integration – Information Needs

- Determine 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.
- Define information needs for pilots to determine acceptability of suggested conflict avoidance maneuvers provided by automated systems or ATC.
- Complete 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.
- Complete 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

- Complete 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, develop 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

- Complete research to develop flight crew training recommendations for flight deck automation supporting NextGen operations for single pilot and two pilot crews.
- Conduct research to support guidance for data communications procedures, training, displays and alerts.

Risk and Error Management

- Develop 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.

- Initiate research to determine the expected nature, frequency and potential impact of pilot errors that may lead to exceeding Required Navigation Performance (RNP) containment criteria for trajectory operations.
- Assess 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.

The program will continue 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. Each of these research areas, although general in nature, will continue 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 will continue to enable safe and effective changes to pilot and ATC roles and responsibilities for NextGen procedures and will also continue 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 will continue 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 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. The program collaborates with the NextGen - Self Separation Human Factors Program to ensure robust examination of NextGen human factors issues. Through use of modeling, simulation, and demonstration, the program assesses interoperability of tools, develops design guidance, determines training requirements, and verifies procedures for ensuring safe, efficient and effective human system integration in transitions of NextGen capabilities.

Outputs 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.

By 2017, demonstrate that NextGen operations, procedures and information can be standard and predictable for users (e.g., pilots, controllers, airlines, passengers) at all types of airports and for all aircraft across the full range of environmental conditions.

Integration of air and ground capabilities poses 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.

The safety factors that primarily have an impact on separation assurance must be jointly approached by both the flight deck and air traffic research communities. The increased levels of automation and new enabling technologies that will likely transform the National Airspace System (NAS) in the future will bring new human factors challenges. As the NAS moves toward a more automated system and roles and responsibilities change in a series of planned steps, intent information as well as positive information on delegation of authority must be clear and unambiguous. This changing environment requires a close examination of new types of human error modes to manage safety risk in the human factors domain. Equipment design methods, training, and procedures must be developed to decrease error likelihood and/or increase timely error detection, for example in the case of blunders on closely spaced parallel approaches.

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 NextGen environment will include an 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 researchers 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

Major activities and accomplishments planning include:

Roles and Responsibilities

- Define a taxonomy for describing the relationship between flight deck and ATC automated systems and human operators within NextGen applications.
- Assess human-automation coordination methods for performance costs and benefits in the context of near-term NextGen applications.

Human System Integration – Information Needs

- Determine which flight procedures and controller tasks are associated with NextGen applications, using task and information needs analysis techniques, and develop guidelines for each type of procedure in NextGen.
- Develop 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.
- Continue 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

- Develop 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.

Human System Integration – System Integration

- Complete research to identify human factors issues and potential mitigation strategies for the use of legacy avionics in NextGen procedures.
- Conduct research to support guidance for data communications procedures, training, displays and alerts.

Risk and Error Management

- Assess human error impact and mitigation in ADS-B applications including oceanic in-trail procedures, flight deck interval management, and closely spaced parallel operations.
- Develop 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.

<u>Performance Linkages</u>

The NextGen – Air-Ground Integration Human Factors Program supports the DOT strategic goal of Economic Competitiveness by leading U.S. transportation interests in targeted markets around the world through NextGen technologies.

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 2012 initiate research to assess pilot performance in normal and non-normal NextGen procedures, including single pilot operations.
  - 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 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 mid-term sees a shift to the management of traffic by trajectories (Trajectory-Based Operations) throughout the operation, including initial flight planning, all phases of the flight, and post-flight analysis. 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 time. 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.

In the mid-term timeframe, a data communications capability between the air and the ground will permit the initial transition to air-to-ground data communications exchanges. Implementation of data communications 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 (4D) 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 ATO 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?

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 NextGen Air Ground Integration Human Factors program would defer until FY 2013 the planned FY 2012 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 2012 – NextGen – Self-Separation Human Factors

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.d NextGen – Self-Separation Human Factors	$8,247,000	$9,934,000	+$1,687,000

For FY 2012, $9,934,000 is requested for NextGen – Self-Separation Human Factors. Major activities and accomplishments planned with the requested funding include:

Surface/Runway Operations Awareness

- Conduct 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.
- Initiate 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.
- Conduct 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

- Conduct 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, initiate 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 includes 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

- Initiate 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).
- Continue 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, continue research to support development of training guidance for NextGen applications and technologies.
- Continue research to develop risk and error management strategies to identify and mitigate human-system errors.
- Initiate research to develop recommendations for location and grouping of NextGen related displays relative to the primary field of view.

The program will continue 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 2017. Research priorities address the implementation of RTCA NextGen Task Force recommendations as described in the NextGen Implementation Plan. Research will continue 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.

Research will continue to:

- Enable reduced and delegated separation in oceanic airspace and en route airspace.
- Support development of training guidance for NextGen applications and technologies.
- Develop risk and error management strategies to identify and mitigate human-system errors.
- Develop recommendations for location and grouping of NextGen related displays relative to the primary field of view.

2. What Is This Program?

The NextGen – Self-Separation Human Factors Research Program 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.

Outputs include:

- Defining the potential impact and human factors issues of new technologies such as enhanced vision, synthetic vision, and electronic flight bags on separation activities.
- Defining human factors technical information needed to support the development of standards, procedures, and training by Flight Standards to implement NextGen applications.
- Developing procedures and training needed to implement new roles and responsibilities for pilots and controllers during trajectory operations.
- Defining human and system performance requirements for separation activities (e.g., spacing, merging, and passing).
- Developing and applying error management strategies, mitigating risk factors, and reducing automation-related errors associated with NextGen operations.
- Developing human factors criteria for the successful use of flight deck performance monitoring and decision support tools as they relate to NextGen operations.

Program researchers 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 research 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).

Major activities and accomplishments planning include:

Surface/Runway Operations Awareness

- Complete initial research to evaluate and recommend minimum display standards for use of enhanced and synthetic vision systems, as well as airport markings and signage, to conduct surface movements across a range of visibility conditions.
- 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.
- Conduct research on existing Synthetic Vision System (SVS) and EFVS to evaluate time required, accuracy, and pilot workload associated with recognizing and reacting to potential ground collisions or conflicts with other aircraft, vehicles and obstructions across a range of visibility and lighting conditions.

Reduced Separation

- For closely spaced parallel operations, continue research to determine CDTI requirements to support multiple simultaneous approaches, and evaluate workload and effects of blunder during the approach.

Delegated Separation

- Develop human performance models to predict errors and their impacts on performance for NextGen delegated separation operations.

Cross-cutting

- Continue development of a repository of NextGen human factors data, incorporating results of human factors research and human factors issues that surface during operational experience with systems and procedures relevant to near to mid-term NextGen applications.
- Evaluate the performance costs and benefits of various methods of decision support to include ability of human operators to understand automated system strengths and weaknesses.

Performance Linkages

The NextGen – Self Separation Human Factor Program supports the DOT Strategic Goal of Economic Competitiveness by leading U.S. transportation interests in targeted markets around the world through NextGen technologies.

Conduct R&D to 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 2012 complete initial research to evaluate and recommend minimum display standards for use of enhanced and synthetic vision systems, as well as airport markings and signage, to conduct surface movements across a range of visibility conditions.
  - By 2014 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 2015, complete research and provide human factors guidance to reduce arrival and departure spacing including variable separation in a mixed equipage environment.
  - By 2012 initiate research to evaluate alternative methods of allocating functions and coordinating between automated systems, pilots, Air Traffic Control (ATC), and Airline Operations Center (AOC) personnel in reduced and delegated separation procedures.
  - By 2014 complete research to identify likely human error modes and recommend mitigation strategies in closely spaced arrival/departure routings, including closely spaced parallel operations.
  - By 2015, enable reduced and delegated separation in oceanic airspace and en route corridors.
  - By 2013 complete initial research to provide recommended guidance for design of cockpit displays and alerts to support delegated separation.
- 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 (VMC) 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 ATO 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?

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?

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. Reduction in funding would delay the capability for 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' displays.

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 2012 – NextGen - Weather Technology in the Cockpit

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A12.e NextGen - Weather Technology in the Cockpit	$9,570,000	$9,186,000	-$384,000

For FY 2012, $9,186,000 is requested for NextGen - Weather Technology in the Cockpit. Major activities and accomplishments planned with the requested funding include:

- Develop preliminary Weather Technology in the Cockpit (WTIC) functional and performance requirements from the adjudicated WTIC mid-term ConOps.
- Develop icing and turbulence products to disseminate signal latency, bandwidth, and quality of service requirements to the flight deck.
- Develop minimum requirements for the flight deck to support the management of meteorological (MET) information communications, storage and retrieval, and data latency.
- Identify the functional and performance requirements for a high-fidelity WTIC simulation, test and evaluation capability.
- Evaluate 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.
- Demonstrate and evaluate the usefulness of the uplinking turbulence eddy dissipation rates (EDR) to flight deck for aircrew mitigation procedures.
- Equip aircraft to support aircrew evaluations of graphical icing and turbulence and cloud tops presentations.
- Implement Turbulence EDR algorithms including joint effort with aircraft manufacturers.

Research will include the expansion of the flight demonstration and evaluation to uplink in-flight display of 30kft and 40kft convective cloud top heights to include flights into the Gulf of Mexico, Caribbean, and South America regions and to Atlantic flights to Europe and Africa; support the development of AIS/MET datalinks Minimum Operation Performance Standards and Minimum Aviation Safety Performance Standards with the commercial industry through RTCA Special Committees and EUROCAE 186/WG-51, 206/WG-76, 214/WG-78, 217/WG-44, 222, and 223; evaluation of the global communications demand, bandwidth, quality of service, security, latency, and coverage requirements to uplink, downlink, and crosslink MET information via broadcast and request and reply datalink services, and the research and development of a conceptual approach to sustain a common weather picture between the ground and onboard weather systems with human-in-the-loop evaluations.

Efforts will include the transitioning of the in-flight display demonstrations and evaluations of cloud tops, graphical turbulence and icing products, and EDR Turbulence to electronic flight bags (EFB) or Multifunctional Displays (MFD). The development of the minimum requirements for the flight deck to support the management of MET information communications, storage and retrieval, and data latency, the minimum requirements for human computer interface, MET information presentation, and intent of use for EFB/MFD, human factors interfaces and automated prototype weather information integration modules for flight deck technologies (e.g., FMS, EFB, etc.); initiate a study to identify the requirements to develop a high-fidelity WTIC simulation, test and evaluation capability; and define a path for further development of airborne network-enabled use of radar-derived weather data capabilities that will advance cockpit systems to meet NextGen objectives (collaboration with NASA).

2. What Is This Program?

One of the weather-related goals of NextGen is to reduce weather delays, allowing more efficient and flexible ATM. The objective of the NextGen - Weather Technology in the Cockpit Program is to enable flight deck weather information and communications management minimum standards and human factors requirements that will provide flight crews with timely, comprehensive weather information from on-board sensors, cross-link from nearby aircraft, and up-link from ground-based processors to support flight re-planning and weather hazard avoidance in flight, as well as airborne sensor observations to nearby aircraft for weather avoidance decisions and ground-based processors for direct and forecast use in ATM decision-support processes.

The initial research will evaluate the overarching NextGen ConOps and requirements for NextGen weather support on the flight deck; identify the current capabilities to meet NextGen requirements, evaluate planned and funded development of new weather support capabilities; identify gaps between NextGen requirement and current developing weather support capabilities; allocate gaps to commercial sector, government, or both and NextGen Solution Sets to derive WTIC functional and performance requirements; and finally develop and execute the WTIC research program plan.

The WTIC program will also identify global datalink requirements and standards to transport meteorological (MET) information to and from the flight deck. The WTIC program requires datalinks to support uplink, downlink, and crosslink advisory and safety critical MET information to Parts 91, 121, and 135 NAS users in various coverage environments. Consequently, the WTIC program will define requirements and standards for bandwidth, security, quality of service, and reliability to the government and non-government operated datalinks to implement the MET datalink information.

In addition, the 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, both on the flight deck and on the ground in hazardous weather. Although, technologically advanced graphical weather information products have entered the general aviation (GA) market in the recent decade, the percentage of accidents that has an attributed the cause to weather or weather-related pilot error has remained fairly stable (NTSB, 2006, 2008, 2009). The HF research will attempt to identify the shortcomings in current capabilities and to identify areas 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 of development aircraft certifications 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, demonstrate that technology and automation, combined with policy, procedures, and regulatory oversight, meets the Next Generation Air Transportation System (NextGen) goal to improve aviation safety in the presence of adverse weather not anticipated during prelight. Demonstrations will show the technology and automation used in the cockpit provides pilots and aircrews with the safest and most efficient route for aircraft traversing areas impacted by adverse weather conditions.

The germane characteristics of the technology generally identified 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. However, in the far term, the technology and automation envisioned in the NextGen ConOps is expected to migrate to automated processing via machine-to-machine interface between ground-based and aircraft systems (e.g., analysis and processing of data and information are performed automatically and recommendations are provided to the human overseeing the aircraft operation). As a result, the NextGen ConOps differs dramatically from current operations regarding weather procedures; therefore, an examination of the NextGen goals and related procedures is warranted.

The NextGen - Weather Technology in the Cockpit 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 NextGen - Weather Technology in the Cockpit 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.

Major activities and accomplishments planning include:

- Develop mid-term ConOps and obtained partner, stakeholder, and user concurrence for weather technology in the cockpit based on foundational elements identified in the NextGen ConOps, including integration of weather-in-flight-deck decision-support tools, weather dissemination management, and GA operations.
- Validate ARP 5740, Cockpit Display of Data Linked Weather Information.
- Determine the incremental weather information needed in cockpit operations for flight replanning and en route avoidance maneuvers, decision support, and situational awareness (for FAR Parts 121, 135, 91).
- Verify and validated NAS datalinks signal latency, bandwidth, and quality of service to disseminate icing and turbulence products to the flight deck within the NAS.
- Demonstrate the usefulness of an in-flight display of uplinked satellite-based product that outlined 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.
- Initiate the demonstration and evaluation of the usefulness of the uplinking turbulence eddy dissipation rates (EDR) to flight deck for aircrew mitigation procedures.

- Equip selected aircraft with certified EFBs to accomplish flight crew evaluations of convective oceanic cloud top flight, graphical turbulence and icing operational evaluation.
- Implement Turbulence EDR algorithms including joint effort with aircraft manufacturers.
- Investigate means for airborne network-enabled use of radar-derived weather data (collaboration with NASA).

Performance Linkages

The NextGen - Weather Technology in the Cockpit 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 2012, simulate and validate data-linked bandwidth, quality of service, security, and latency standards requirements for meteorological information to the cockpit.
- By FY 2012, develop MET Symbology use cases for human-in-the loop demonstrations.
- By FY 2012, demonstrate inflight cockpit display of data-linked hazardous weather for transoceanic aircraft.
- By FY 2013, develop human factors interfaces and automated prototype weather information integration modules for flight deck technologies (e.g., FMS, EFB, etc.).
- By FY 2014, simulate and validate cockpit use of data-linked weather decision support tools, including probabilistic forecasts.
- By FY 2014, high fidelity integrated weather technology in the cockpit simulation, test, and evaluation capability to facilitate new technologies assessments and human-in-the-loop evaluation of NextGen operational concepts.
- By FY 2014, evaluate concepts of use for weather information integrated in NextGen air and ground capabilities for airline operations centers and pilots.
- 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 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.

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)". Between 1994 and 2003, there were 19,562 aircraft accidents involving 19,823 aircraft. Weather was a contributing or causal factor in 4,159 (21.3 percent) of these accidents. Of the 4,159 weather-related accidents, 4,167 aircraft were involved. From 1994 to 2003, the annual number of weather-related accidents has declined. However, the annual number of weather-related accidents has remained roughly constant as a percentage of total accidents. An example of the limits of pilots' ability to cope with severe weather is the crash of an Air France jet last year over the Atlantic Ocean, killing all 216 passengers and 12 crew members. Pilots currently have little information as they fly over remote stretches of the ocean, which is where some of the worst turbulence occurs. Providing pilots with at least an approximate picture of developing storms could help guide them safely around potentially severe weather.

Having access to more weather hazard information in the cockpit does not, however, 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 intent of this program is to identify why the introduction of state-of-the-art weather information products have not dramatically improved the safety of GA operations concerning weather. This information will be leveraged for identifying shortcomings in current capability to support pilot weather decision making and identify areas to focus NextGen technology advancements to optimize the safety and efficiency of flight operations in hazardous weather for Parts 91, 135 & 121. The key is to provide high quality weather decision support tools to enable efficient flight replanning and enroute avoidance maneuvers in the presence of adverse weather not anticipated during preflight with a focus upon NextGen operations.

The WTIC Program research is to insure the adoption of cockpit, ground, and communication technologies, practices, and procedures that will provide pilots with shared and consistent weather information to enhance situational awareness, plus engage the aircrafts as a "network node" that autonomously exchanges weather information with surrounding aircraft and systems. The aircraft industry is moving toward Electronic Flight Bags (EFB) to enable secondary flight data information management and display. The shift in processing from the ground to the air requires significant increase in computing power which potentially can be supported with EFB technologies. The WTIC Program research will address the technologies, standards, requirements, and procedural gaps to enable a WTIC capability to be implemented in NextGen.

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?

A reduction in the WTIC FY 2012 total funding will impact the WTIC Airborne Sensor Technologies effort. A two percent reduction would have a minor impact to define a path for further development of airborne network-enabled utilization of radar-derived weather data capabilities. The impact will require NASA to adjust the FY 2012 planned deliverable schedule.

A further reduction will require NASA to rescope the total effort to develop a network-enabled utilization of airborne radar-derived weather data capabilities. This reduction will impact flight demonstration of the capabilities in the out years (FY 2014 and 2015); therefore, the program will not be able to test the fully network-enabled utilization of airborne radar-derived weather data capabilities.

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 2012 – NextGen Environmental Research – Aircraft Technologies, Fuels, and Metrics

Program Activity	FY 2010 Actual	FY 2012 Request	Change FY 2010-FY 2012
A13.b NextGen Environmental Research – Aircraft Technologies, Fuels, and Metrics	$26,509,000	$20,523,000	-$77,000

For FY 2012, $20,523,000 is requested for NextGen Environmental Research – Aircraft Technologies, Fuels, and Metrics. Major activities and accomplishments planned with the requested funding include:

Major activities and accomplishments planned with the requested funding include:

Technology Maturation

- Fabricate advanced aircraft component level flight test hardware.
- Integrate advanced low NOx combustor on engine demonstrator.
- Begin integration flight management system for flight demonstration.
- Conduct component level engine rig tests.
- Complete preliminary design review of advanced engine configuration for demonstration.
- Advance turbine blades and ceramic matrix composite turbine component for integration and testing.

Alternative Turbine Fuels

- Conduct demonstration testing for renewable alternative fuels.
- Conduct safety assessment for renewable alternative fuels.
- Conduct performance and environmental assessment of additional candidates for "drop-in" renewable alternative fuels.
- Assess production capacity and commercial fleet infusion of aviation alternative fuels.
- Initiate transition plans for alternative fuels.
- Identify additional candidates for "drop-in" aviation alternative fuels.

Metrics, Goals and Targets

- Evaluate noise and emissions impacts metrics for use in Next Generation Air Transportation System (NextGen) environmental analysis.
- Perform integrated NextGen noise and emissions impacts analysis.
- Initiate second phase of Aviation Climate Change Research Initiative (ACCRI) for assessment of aviation climate impacts.
- Refine and assess intermediate targets towards meeting NextGen environmental goals.

In FY 2012, 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 will focus on safety, performance and environmental assessments for qualification of renewable alternative fuels. Activities will also initiate to assess production capacity and fleet infusion as well as to develop transition plans for alternative fuels. On the Metrics, Targets and Goals front, activities will continue to refine and evaluate metrics for NextGen environmental impacts, advance capability for and assessment of environmental noise, air quality and climate impacts. This also includes improved climate impacts assessment under second phase of ACCRI activities. The work will also continue 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 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; and
- 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; and
- 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 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.

Major activities and accomplishments planning include:

Noise, emissions, and fuel burn reduction technologies maturation

- Advance CLEEN systems analyses for most promising technologies.
- Continue CLEEN component-level tests for most CLEEN promising technologies.
- Initiate Round 2 ground rig tests and continued design of CLEEN demonstration experiment.

Alternative turbine engine fuels

- Complete detailed feasibility study, including economic feasibility, environmental impacts, and assessment of potential for gas turbine renewable alternative fuels.
- Develop federally-agreed methodology to conduct environmental impact life cycle analyses for a range of renewable alternative turbine fuels.
- Initiate efforts to experimentally assess environmental impacts and benefits and costs of renewable alternative turbine engine fuels.

NextGen environmental metrics, goals, and targets

- Continue analysis of targets to achieve NextGen environmental goals.
- Continue efforts to determine how projected NextGen operations-generated emissions and noise impact human health and welfare and global climate and identify key uncertainties.
- Continue comprehensive, integrated assessment of NextGen air quality and noise impacts.

<u>Performance Linkages</u>

The NextGen Environmental Research – Aircraft Technologies, Fuels, and Metrics program supports DOT strategic goal of environmental sustainability by increasing the use of environmentally sustainability 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 2016, 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 develop plans for potential second phase of CLEEN program.

Airframe and engine technologies supporting milestones:

- By FY 2012, fabricate advanced aircraft component flight test hardware and complete flight tests.
- By FY 2012, integrate advanced low NOx combustor on engine demonstrator and conduct engine tests.
- BY FY 2012, Begin flight management system (FMS) demonstration.
- BY FY 2012, conduct preliminary design review for advanced engine configuration testing.
- By FY 2012, perform acoustic validation testing and analysis to verify noise reduction predictions.
- By FY 2012, characterize and test aircraft material properties for noise reduction.
- By FY 2013, perform detailed design review of advanced turbine blade cooling configuration and materials.
- By FY 2013, perform testing of exhaust system components.
- By FY 2013, perform detailed design review and component manufacture for advanced engine configuration testing.
- By FY 2013, perform acoustic validation testing and analysis to verify noise reduction predictions.
- By FY 2014, characterize and test aircraft material properties for noise reduction.
- BY FY 2014, perform ground test for advanced engine configurations.
- By FY 2014, complete testing of Flight Management System.
- By FY 2015, perform flight tests for advanced engine configurations.
- By FY 2015, develop plans for analyses and demonstration of evolving technologies in a potential second phase to CLEEN.
- By FY 2016, develop plans for analyses and demonstration of evolving technologies in a potential second phase to CLEEN.

By FY 2015, 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 2012, conduct demonstration testing for renewable alternative fuels.
- BY FY 2012 conduct safety assessment for renewable alternative fuels.
- By FY 2012, conduct performance and environmental assessment of additional candidates for "drop-in" renewable alternative fuels.
- By FY 2012, assess production capacity and commercial fleet infusion of aviation alternative fuels.
- By FY 2012, initiate transition plans for alternative fuels.
- By FY 2012, identify additional candidates for "drop-in" aviation alternative fuels.
- By FY 2013, conduct safety assessment of renewable fuels.
- By FY 2013, conduct significant demonstration of additional drop-in alternative turbine engine fuels.
- By FY 2013, complete renewable alternative turbine engine fuels safety, environmental, and business case assessments.
- By FY 2014, complete transition plans for drop-in alternative fuels.
- By FY 2014, complete renewable fuels safety assessment.
- By FY 2015, complete transition plans for renewable alternative fuels.
- By FY 2016, identify and initiate assessment of non-drop-in fuels.
- By FY 2015, conduct initial feasibility study, including economic feasibility, environmental impacts, and assessment of potential for non-drop-in alternative aviation fuels.
- By FY 2016, conduct a demonstration of the performance characteristics of a non-drop-in alternative aviation fuel.

By FY 2016, investigate metrics, uncertainties on aviation emissions health and welfare and climate impact to facilitate NextGen EMS implementation.

Metrics supporting milestones:

- By FY 2012, initiate the second phase of Aviation Climate Change Research Initiative to reduce uncertainties in aviation climate impacts and refine associated magnitude.
- By FY2012, Evaluate noise and emissions impacts metrics and perform NextGen environmental analyses
- By FY 2013, continue refinements of aviation environmental impacts and metrics.
- By FY 2013, reduce key uncertainties of aviation impacts to levels that better inform appropriate action.
- By FY 2013, refine estimates of interim NextGen environmental targets and perform gap analyses.
- 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.

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 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?

Any reduction in the requested budget will reduce and 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 ACCRI. Delay in advancing progress in these areas will 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.

Operations
Dollars ($000)

NextGen – Environmental/Noise Studies - $1,675

The funding continues to support five FTEs in the Office of Policy, International Affairs, and Environment (APL) 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 (ATO) - $10,000

The funding continues to support 75 FTEs in ATO that are necessary to manage, integrate, and implement complex activities. 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.

NextGen – Environmental Performance (APL) - $725

The funding continues to support five FTEs in the APL organization 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.

NextGen – Technologies, Models and Metrics - $3,019

The funding continues to support three FTEs in the APL organization that are necessary for transition of maturing NextGen environmental and energy research and development to implementation. The three FTEs will continue to support the implementation through adoption into policies, standards, guidance, and operational programs of environmental and energy research and development results/products in areas of new aircraft technologies and operational procedures, alternative fuels, advanced decision support models, evolving health and welfare targets and metrics.

NextGen Technology/ Advancement (AVS) - $9,000

Aviation Safety will play an integral role in several NextGen initiatives, including efficient aircraft designs, revolutionary cockpits, data-link communications, and new interactive instrumentation. AVS NextGen support is a critical element in FAA's goal of reducing the commercial accident rate. The Agency's use of Safety Management Systems is an integral part of the Joint Planning Development Office (JPDO's) strategy to provide greater capacity and safety through implementation of NextGen.

Flight Services, Aircraft Certification and Air Traffic Safety Oversight Services staff will play a role in FAA's NextGen initiative. As new products are introduced for use in advancing the technology, AVS will establish regulations and standards for the use of these products. Certification and safety oversight efforts will also be conducted throughout the process.

This request provides for 15 FTE's, contract services and related resources to support AVS' efforts in support of NextGen.