U.S. Department of Transportation

BUDGET ESTIMATES

FISCAL YEAR 2016

FEDERAL AVIATION ADMINISTRATION

SUBMITTED FOR USE OF
THE COMMITTEE ON APPROPRIATIONS

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SECTION 1: OVERVIEW

OVERVIEW

Introduction

The Federal Aviation Administration (FAA) operates the safest and most efficient aerospace system in the world. Since 1958, the FAA has regulated and overseen all aspects of civil aviation in the United States, proudly running the largest and safest air traffic control system in the world, and ensuring the safety of the traveling public. Today, the breadth of the FAA's mission and capabilities is dedicated to achieving the next level of safety, efficiency, environmental responsibility and global leadership.

The FAA's mandate for increased safety through technological innovation has never been more relevant. From Unmanned Aircraft Systems (UAS) to Next Generation Air Transportation System (NextGen) capabilities and procedures, to commercial space launches, the FAA must work to continue making our Nation's air traffic control system smarter and safer. We must continue delivering the benefits of new systems, technologies and procedures so we can provide improved levels of safety and tangible efficiencies to the traveling public.

As an agency, the FAA has a tremendous opportunity to make a difference for stakeholders while addressing the challenges that the changing industry presents. Our vision is to transform the aviation system to reflect the highest standards of safety and efficiency and be a model for the world. The FAA will bring about this transformation by fostering innovation in our workforce and in how we serve our stakeholders and the American people. This vision is brought to life in our strategic priorities for the agency:

- **Make aviation safer and smarter** - The aerospace industry is growing more complex, and is not the same industry we regulated in decades past. At the same time, there is more safety data than ever before. This provides the FAA with the opportunity to be more proactive about safety and use safety management principles to make smarter, risk-based decisions throughout the agency and with industry and global stakeholders. This will make our aviation system safer and smarter and raise the bar on safety.

- **Deliver benefits through technology and infrastructure** - The nation's air traffic system is based on infrastructure that was largely built 50 years ago and is out of balance with our stakeholders' changing needs. NextGen is redefining the NAS and is delivering benefits to system users, such as reduced fuel costs, reduced delays, and reduced environmental impact. Great technological advancements require the FAA to safely integrate new types of user technologies, such as unmanned aircraft systems and commercial space vehicles, into the airspace. As we accommodate new services, the FAA must rationalize and rebalance existing services while modernizing our existing infrastructure in order to reduce costs and become more efficient in the long run.

- **Enhance global leadership** - Aviation is a global industry and millions of Americans travel overseas every year. The FAA must continue America's heritage as world leaders in aviation and set the standard for others to measure against. Aviation was invented in America, but other nations have seen their aviation systems grow dramatically and have become significantly more influential on the international stage. The FAA needs to be at the table to shape international standards to improve aviation safety and efficiency around the world.

- **Empower and innovate with FAA's people** - Meeting this strategic challenge requires the FAA harness the collective strength of the agency's employees. The FAA's people are the ultimate drivers of success, which means that FAA must attract and develop the best and the brightest talent with the appropriate leadership and technical skills to undertake this transformation. The FAA's workforce is changing and is in the midst of a retirement wave, which presents both challenges and opportunities. There is significant work to do to set the foundation to empower and innovate with FAA's people.

Agency Authorization

The current FAA authorization expires in September of 2015. As we prepare for reauthorization, we have asked some fundamental questions about how the FAA operates, and are identifying a set of core principles that will guide us through this process. The FAA must continue moving to a satellite-based air navigation system and replace air traffic control facilities that are an average of 50 years old. Reauthorization proposals should support FAA's efforts to modernize the air traffic control system and airspace, invest in infrastructure for our airways and airports, and continue to achieve near-term NextGen benefits. Reauthorization should also provide the FAA with stable and predictable funding to enable the agency to effectively manage multi-year projects.

To this end, we're engaged in discussions with our stakeholders about what services we might consider providing differently through innovative business methods and technologies, or possibly eliminating obsolete services. As we work with our industry partners to transform today's aviation system, confidence in the FAA's ability to deliver on investments is paramount. To build the FY 2016 budget, we have focused our request on those items which will inspire industry confidence, garner the complementary industry investments that make NextGen viable, and realize benefits to users. The FAA is making major capital investment decisions in FY 2015 and FY 2016 that will continue to fulfill NextGen's promise, evolving from the deployment of foundational infrastructure to the implementation of new operational capabilities that drive additional user benefits.

Overview by Appropriation Account

Our total FY 2016 budget request of $15.83 billion will support our ongoing mission and a continued, but measured, transition to the future. It represents a careful balancing of these responsibilities and supports forward progress. This request is an investment in the future of aviation, an industry which accounts for more than five percent of our nation's gross domestic product. It is a responsible and necessary investment in critical capital infrastructure and the ongoing deployment of NextGen technologies. This allows the FAA to safely integrate new entrants such as unmanned vehicles and increasing numbers of commercial space launches into the National Airspace System (NAS). The proposal will increase capital investments while decreasing FAA's overall budget by reshaping the airport financing system. This transformation focuses federal grant dollars on airports that need it most, while providing for increased investment in airport infrastructure.

In keeping with the set of core principles that will guide us through the upcoming reauthorization, the FY 2016 budget requests additional budget flexibility. While the FAA has long benefited from the ability to seek congressional approval to reprogram limited amounts within budget accounts, there has traditionally been no flexibility at the account level. In fact, when the FY 2013 sequestration forced FAA to implement employee furloughs that resulted in air traffic delays, Congress needed to enact special legislation granting the budget flexibility required to minimize the disruption to the airspace system. This new authority requested in the budget will allow the FAA to transfer up to 10 percent of any appropriation across accounts, provided that no account is increased by more than 10 percent. Such a transfer would be subject to approval by both congressional Committees on Appropriations.

This budget request supports today's infrastructure while deploying key NextGen benefits to our stakeholders and upholding our critical safety programs. The FAA remains deeply committed to providing the safest, most advanced and efficient aviation system in the world.

Operations

The FY 2016 request of $9.92 billion represents a 2 percent increase above the FY 2015 enacted level. The requested funding provides for pay increases consistent with government-wide inflationary factors ($68.1 million) and an additional compensable day ($25.3 million). In addition, it provides for the prescribed agency contribution increases into the Federal Employees Retirement System (FERS) for both Air Traffic Controllers and non-controller employees ($24.8 million) and non-pay inflationary costs ($11.2 million). There is also a net decrease of $616,000 for the Department of Transportation's projected Working Capital

Fund obligation. Included in the budget request are program adjustments totaling $45.5 million as well as an increase of 119 full time equivalents (FTE) in the safety and security program areas.

For the Air Traffic Organization (ATO), the budget provides $11.7 million in discretionary increases. The largest is $7.5 million in second level engineering, telecommunication infrastructure, and logistics support costs for Terminal sites transitioning from Common Automated Radar Terminal System (CARTS) to Terminal Automation Modernization and Replacement (TAMR). The budget also requests $1.7 million to provide maintenance and operations for all 221 weather camera sites and its services in Alaska, as well as a $1.2 million request to expand the Technical Operations Safety Action Program from the Central Service Area to all three Service Areas. The FAA recently consolidated the Agency's Environmental Occupational Safety and Health (EOSH) program into ATO. An additional $1.3 million is requested to meet the most urgent operational requirements of the Agency. After completing a hiring surge in FY 2015, ATO will utilize existing resources to replace controllers as they retire in FY 2016, thereby precluding the need for additional funding in FY 2016.

For the Aviation Safety Office (AVS), increases of $21.3 million and 85 FTE are requested to hire additional aviation safety inspectors and engineers for surveillance and certification services, as well as to provide continued support for the development and implementation of procedures and training for integration of Unmanned Aircraft, Risk Based Decision Making, and Designee Management Oversight. This includes $11.5 million and 54 FTE for increased surveillance and oversight of commuter and on-demand operators, repair stations and manufacturers; $5.3 million and 29 FTE to support the increased demand for FAA aircraft, operator and airmen certification services; and $4.5 million and 2 FTE for the FAA's Safety Management System. The AVS request also includes funding to focus on oversight and training for designee supervision and the integration of manned and unmanned aircraft into the National Airspace System. This staffing request is aligned with the forecasted staffing requirements included in the AVS Workforce Plan.

In FY 2015, FAA anticipates there will be 20-30 commercial space launches, an increase of up to 11 over the 19 that occurred in FY 2014. The budget therefore includes an additional $1.3 million and 13 FTE in Commercial Space Transportation (AST) for license and permit determinations, certifications, and technical outreach.

For the first time, the Office of Security and Hazardous Materials Safety (ASH) is separated in the budget as a Line of Business, rather than a component of the Staff Offices program activity. The request includes three program increases totaling $11.3 million for this office. As a result of the comprehensive security review conducted after the Chicago Air Route Traffic Control Center (ZAU) fire incident on September 26, 2014, the FAA is requesting $8.8 million and 18 FTE to implement facility and personnel security recommendations for critical operational facilities. Also included is $1.5 million and 1 FTE to install and manage an Agency-wide Emergency Notification System (ENS) and $1.0 million and 2 FTE to establish a capability to protect FAA from malicious insider activity, foreign intelligence and cyber-espionage threats.

Facilities & Equipment (F&E)

The FY 2016 Budget request of $2.85 billion restores the F&E program to a healthier, more balanced level after the major reductions in FY 2013. The funding appropriated to F&E over the past few years has forced FAA to choose between deferring maintenance of current infrastructure and keeping NextGen progress on track. The FY 2016 request increases F&E by $255 million (nearly 10 percent) over the FY 2015 enacted level, and includes funding for the near-term priorities identified by the NextGen Advisory Committee. It further allows for maintenance of the existing infrastructure as well as forward movement on NextGen, Unmanned Aircraft Systems (UAS) and commercial space transportation.

Approximately $2.0 billion of this request keeps the current NAS maintained and operational. Notably, this request provides $464 million, a 23 percent increase over FY 2015 enacted levels, for facility-related maintenance. After years of underinvestment in sustainment, this modest increase puts us on a slow path to recovery. However, real progress on the backlog will require sustained support over several years, complemented by divestiture and decommissioning of infrastructure where feasible. The request also supports the ongoing sustainment of systems, ranging from radars to weather sensors/systems to navigation aids and satellite leases, all of which will continue to be needed to support NAS services in the FY 2016 timeframe and beyond.

The F&E NextGen portfolio is $845 million in FY 2016, a seven percent increase above the FY 2015 enacted level. This funding fully supports program segments such as the core ADS-B (Automatic Dependent Surveillance – Broadcast) program, En Route Automation Modernization System Enhancements and Tech Refresh, the initial phase of Data Communications, and the first segment of System Wide Information Management (SWIM). It also fully funds the NAS Voice System, given the imperative of replacing legacy voice switches by 2025.

The budget request prioritizes and funds NextGen program segments such as en route and terminal automation platforms, which are foundational requirements to deliver advanced flight capabilities and decision support tools. It also requests funding for en route Data Communications segment 1 and for Time Based Flow Management, which is a necessary underpinning program that enables the performance based navigation program to maximize traffic flow into and out of the busy metropolitan airspaces and corresponding airports. The budget further funds SWIM, supporting FAA's commitment to facilitate data availability and movement between all system users.

This year's F&E request is also a reminder of the dynamic nature of aviation. The integration of both UAS and commercial space into the NAS are represented in the F&E budget request for the first time. The FAA feels strongly that additional budgetary resources are required to address emerging and expanding responsibilities in these areas. These resources will be used to undertake the activities for developing policies and procedures that support their integration into the NAS.

Research, Engineering & Development (RE&D)

The FY 2016 budget request of $166 million is a $9.3 million (6 percent) increase over the FY 2015 enacted level. This allows us to boost funding for Continuous Low Energy, Emission and Noise (CLEEN) by $2.5 million, alternative jet fuel by $1.5 million, and provide $3.0 million for necessary commercial space transportation research.

The RE&D NextGen portfolio is $61 million, an increase of $9.7 million over the FY 2015 enacted level, and supports NextGen-specific research in wake turbulence, human factors, clean aircraft technologies, and unmanned aircraft systems. The remaining $105 million supports continued research in key safety areas such as fire safety, propulsion systems, advanced materials, aircraft icing, and continued airworthiness.

The NextGen Alternative Fuels for General Aviation program is funded at $5.8 million to support the transition from the current aviation 100 low lead fuel to an unleaded replacement fuel that will have the least impact on the general aviation fleet. The Environment and Energy program (including NextGen) requests $38.9 million. This program supports a range of activities, including research to mature certifiable clean and quiet aircraft technologies and develop sustainable fuels. The program also supports enhanced NextGen environmental research via the CLEEN program and other vehicles.

The request of $3.0 million for commercial space transportation will fund additional research in areas such as the safe and efficient integration of commercial space launch activity into the NAS, advanced safety assessments methods, advanced vehicle safety technologies, and safety factors for high utilization reusable vehicles.

Our RE&D request continues to support the safe integration of UAS technologies into the NAS, providing $9.6 million to conduct research on UAS technologies. The program is focused on sense and avoid and command and control requirements that will support the safe integration of UAS in the NAS within the 14 Code of Federal Regulations regulatory framework.

Grants-in-Aid for Airports

Airports remain a critical part of the aviation system infrastructure. The FAA's FY 2016 request provides the funding needed to ensure safety, capacity, and efficiency at our nation's airports through a combination of grant funding and revenue generated through Passenger Facility Charges (PFCs). Our $2.9 billion request is $450 million below FY 2015 enacted levels, representing a 13.4 percent decrease. This supports our continued focus on safety-related development projects, including runway safety area improvements, runway incursion reduction, aviation safety management, and improving infrastructure conditions.

The FY 2016 budget request proposes to eliminate passenger and cargo entitlement funding for large hub airports. It allows all commercial service airports to increase revenue through an increased PFC that provides them greater flexibility to generate their own revenue. The budget provides FAA sufficient AIP resources to focus federal grants to support projects of high priority and aviation benefits in smaller commercial and general aviation airports that do not have access to additional revenue or other outside sources of capital.

The FAA requests $107.1 million for Personnel & Related Expenses, consistent with the FY 2015 enacted level. The budget also provides $31 million for Airport Technology Research, an increase of 4.2 percent from the FY 2015 enacted level. The additional funding will continue to support enhanced safety and pavement research efforts as well as increased studies for noise abatement and environment impacts. The budget continues to provide $15 million for Airport Cooperative Research.

NextGen

As described above, the budget supports continued progress on our NextGen efforts and allows the FAA to focus funding on achieving near term capabilities that inspire industry confidence, garner industry investments that will make NextGen viable, and deliver more immediate benefits to users while we scope longer term investments based on needs of the community and anticipated benefits. The entire FY 2016 NextGen portfolio totals $956 million, distributed among F&E programs ($845 million), RE&D programs ($61 million), and Operations activities ($51 million). This investment portfolio reflects an increase of $99 million, or approximately 12 percent, above the FY 2015 enacted level. This funding will be used to support the delivery of capabilities that will benefit the users of the National Airspace System.

Conclusion

The overall health of the U.S economy is highly dependent on the aviation industry. Civil aviation contributes roughly $1.5 trillion annually to the national economy and constitutes 5.4 percent of the gross domestic product. Aviation generated more than 11.8 million jobs, with earnings of $459 billion.

Aviation enables the economic benefits of tourism, shipping and travel for business or pleasure. Through our airports, aviation delivers economic impact to large and small communities across our Nation. The ongoing implementation of NextGen technologies, policies and procedures, will support the continued economic growth in the aviation industry and our country. The FAA's FY 2016 budget request will enable us to continue to protect and expand this vital economic engine, while moving forward with our transformation and fulfilling our mission of providing the safest and most efficient aerospace system in the world.

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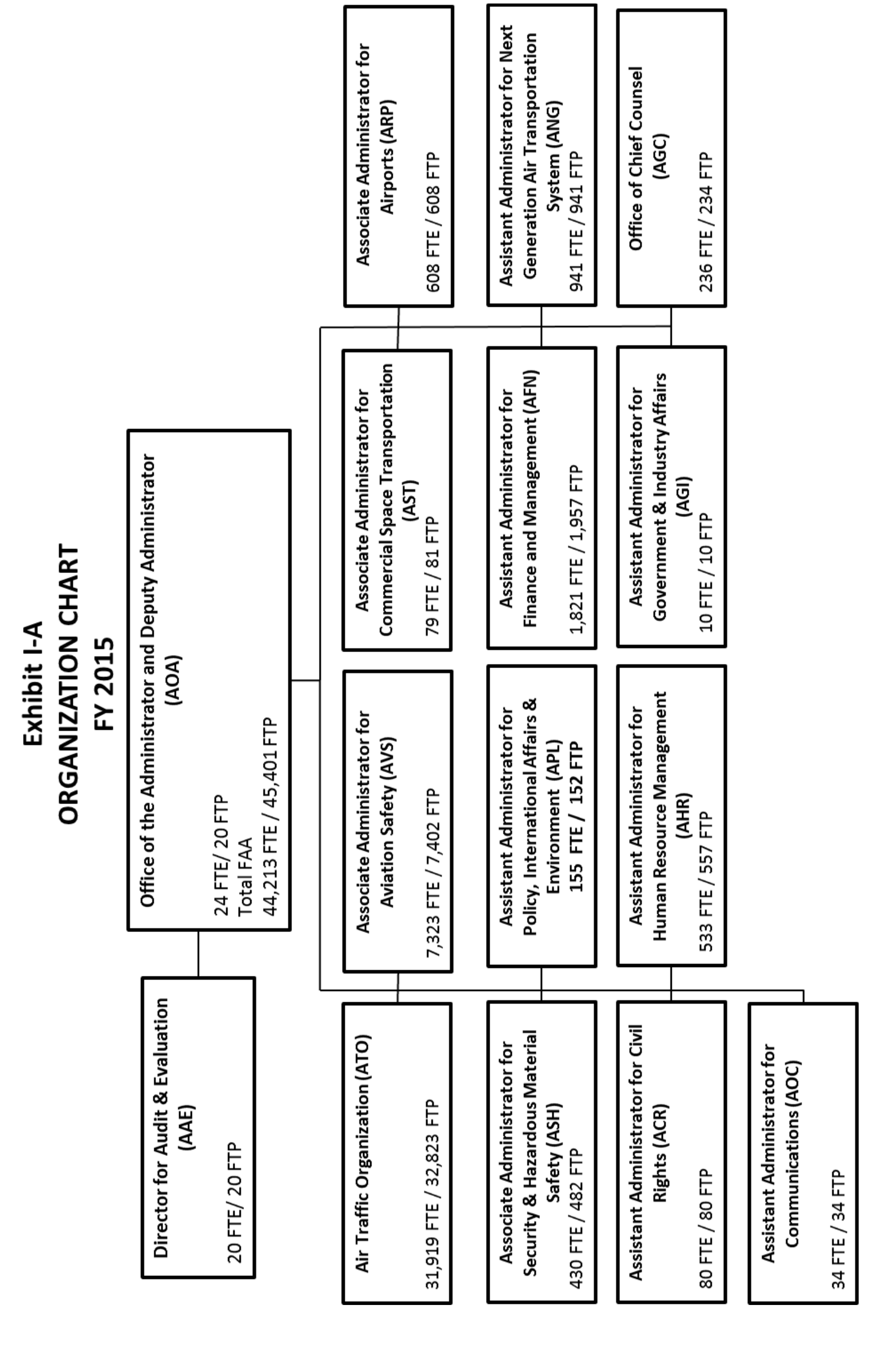
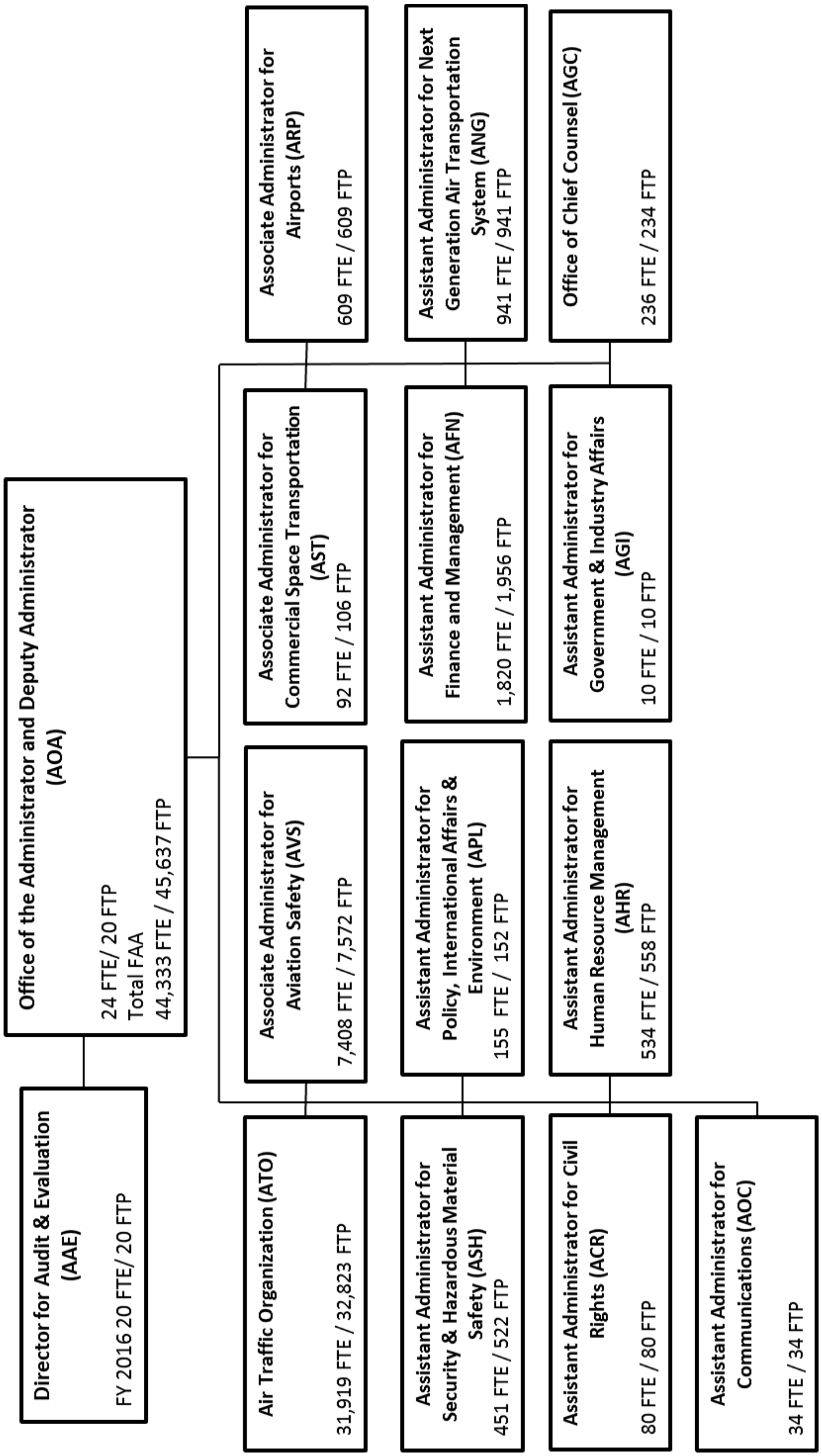


Exhibit I-A
ORGANIZATION CHART
FY 2015
Office of the Administrator and Deputy Administrator (AOA)
24 FTE/ 20 FTP
Total FAA
44,213 FTE / 45,401 FTP
Director for Audit & Evaluation (AAE)
20 FTE/ 20 FTP
Associate Administrator for Airports (ARP)
608 FTE / 608 FTP
Assistant Administrator for Next Generation Air Transportation System (ANG)
941 FTE / 941 FTP
Office of Chief Counsel (AGC)
236 FTE / 234 FTP
Associate Administrator for Commercial Space Transportation (AST)
79 FTE / 81 FTP
Assistant Administrator for Finance and Management (AFN)
1,821 FTE / 1,957 FTP
Assistant Administrator for Government & Industry Affairs (AGI)
10 FTE / 10 FTP
Associate Administrator for Aviation Safety (AVS)
7,323 FTE / 7,402 FTP
Assistant Administrator for Policy, International Affairs & Environment (APL)
155 FTE / 152 FTP
Assistant Administrator for Human Resource Management (AHR)
533 FTE / 557 FTP
Air Traffic Organization (ATO)
31,919 FTE / 32,823 FTP
Associate Administrator for Security & Hazardous Material Safety (ASH)
430 FTE / 482 FTP
Assistant Administrator for Civil Rights (ACR)
80 FTE / 80 FTP
Assistant Administrator for Communications (AOC)
34 FTE / 34 FTP

Exhibit I-A
ORGANIZATION CHART
FY 2016



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SECTION 2: BUDGET SUMMARY TABLES

EXHIBIT II-1

FY 2016 COMPARATIVE STATEMENT OF NEW BUDGET AUTHORITY
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	FY 2014 ACTUAL	FY 2015 ENACTED	FY 2016 REQUEST
Operations	$9,651,422	$9,740,700	$9,915,000
Rescission			
Subtotal	**$9,651,422**	**$9,740,700**	**$9,915,000**
Facilities and Equipment	$2,600,000	$2,600,000	$2,855,000
Rescission			
Subtotal	**$2,600,000**	**$2,600,000**	**$2,855,000**
Research, Engineering and Development	$158,792	$156,750	$166,000
Rescission	($26,184)		
Subtotal	**$132,608**	**$156,750**	**$166,000**
Grants-in-Aid for Airports			
Contract Authority (AATF)*	$3,350,000	$3,480,000	$2,900,000
Pop Up Contract Authority (49 USC 48112)	$130,000	$130,000	
Rescission		($260,000)	
Cancellation			
Subtotal	**$3,480,000**	**$3,350,000**	**$2,900,000**
Obligation Limitation [Non-Add]	[$3,350,000]	[$3,350,000]	[2,900,000]
Overflight Fees	$130,000	$106,000	$108,379
Overflight Fees (Transfer to EAS)	($128,000)	($106,000)	($108,379)
TOTAL	**$15,866,030**	**$15,847,450**	**$15,836,000**
Appropriations	$15,762,214	$15,977,450	$15,836,000
Rescissions	($26,184)	($260,000)	$0
Cancellations	$0	$0	$0

* FY 2015 Grants-in-Aid for Aiports rescission reflects Pop Up Authority from both FY 2014 and FY 2015.
FY 2015 Contract Authority has been increased to net at $3,350,000

EXHIBIT II-2

FY 2016 TOTAL BUDGETARY RESOURCES BY APPROPRIATION ACCOUNT
FEDERAL AVIATION ADMINISTRATION
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

ACCOUNT NAME	FY 2014 ACTUAL*	FY 2015 ENACTED	FY 2016 REQUEST
Operations	**9,651,422**	**9,740,700**	**9,915,000**
Air Traffic Organization (ATO)	7,311,790	7,396,654	7,505,293
Aviation Safety (AVS)	1,204,777	1,218,458	1,258,411
Commercial Space Transportation (AST)	16,331	16,605	18,114
Finance & Management (AFN)	762,462	756,047	764,621
NextGen (ANG)	59,696	60,089	60,582
Security and Hazardous Materials Safety (ASH)**	0	0	100,880
Staff Offices	296,366	292,847	207,099
Facilities & Equipment	**$2,600,000**	**$2,600,000**	**$2,855,000**
Engineering, Development, Test and Evaluation	347,195	177,937	151,050
Air Traffic Control Facilities and Equipment	1,437,390	1,577,983	1,671,201
Non-Air Traffic Control Facilities and Equipment	146,800	158,280	171,000
Facilities and Equipment Mission Support	218,365	225,800	225,700
Personnel and Related Expenses	450,250	460,000	470,049
ADS-B Subscription and WAAS GEOs ***			166,000
Research, Engineering & Development	**$158,792**	**$156,750**	**$166,000**
Improve Aviation Safety	87,244	91,019	96,623
Improve Efficiency	24,329	22,286	24,671
Reduce Environmental Impacts	41,579	37,935	38,884
Mission Support	5,640	5,510	5,822
Grants-in-Aid for Airports	**$3,350,000**	**$3,350,000**	**$2,900,000**
Grants-in-Aid for Airports	3,193,900	3,192,650	2,746,900
Personnel & Related Expenses	106,600	107,100	107,100
Airport Technology Research	29,500	29,750	31,000
Small Community Air Service	5,000	5,500	0
Airport Cooperative Research Program	15,000	15,000	15,000
TOTAL:	**15,760,214**	**15,847,450**	**15,836,000**

* Funding levels reflect internal transfers in the Operations account.
** The Office of Security Hazardous Materials Safety (ASH) was previously displayed within the Staff Office (SO); in FY 2016 ASH is displayed as a Line of Business
*** Funds are transferred from Activity 2 to Activity 6 in FY 2016 to support ADS-B and WAAS ongoing activities.

EXHIBIT II-4

FY 2016 BUDGET AUTHORITY
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	Mandatory / Discretionary	FY 2014 ACTUAL	FY 2015 ENACTED	FY 2016 REQUEST
Operations	**D**	**$9,651,422**	**$9,740,700**	**$9,915,000**
General		$3,156,214	$1,145,700	$1,368,000
AATF		$6,495,208	$8,595,000	$8,547,000
Facilities & Equipment (AATF)	**D**	**$2,600,000**	**$2,600,000**	**$2,855,000**
Research, Engineering & Development (AATF)	**D**	**$132,608**	**$156,750**	**$166,000**
Grants in Aid for Airports (AATF)	**M**	**$3,480,000**	**$3,350,000**	**$2,900,000**
Contract Authority (AATF) *	**M**	$3,350,000	$3,480,000	$2,900,000
Pop Up Contract Authority (49 USC 48112)	**D/M**	$130,000	$130,000	
Rescission	**D/M**		($260,000)	
Cancellation - CHIMPS	**D/M**			
Aviation User Fees	**M**	**$130,000**	**$106,000**	**$108,379**
Aviation User Fees (transfer to EAS)	**M**	**($128,000)**	**($106,000)**	**($108,379)**
		---------------	---------------	---------------
TOTAL:		**$15,866,030**	**$15,847,450**	**$15,836,000**
[Mandatory]		$3,482,000	$3,480,000	$2,900,000
[Discretionary]		$12,384,030	$12,367,450	$12,936,000
		---------------	---------------	---------------
[General]		$3,156,214	$1,145,700	$1,368,000
[AATF]		$12,707,816	$14,701,750	$14,468,000

Note: Totals may not add due to rounding.
* FY 2015 Grants-in-Aid for Aiports rescission reflects Pop Up Authority from both FY 2014 and FY 2015.
FY 2015 Contract Authority has been increased to net at $3,350,000

EXHIBIT II-5

FY 2016 OUTLAYS
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	FY 2014 ACTUAL	FY 2015 ENACTED	FY 2016 REQUEST
Operations	**$9,599,884**	**$9,938,000**	**$10,100,000**
General	$3,104,676	$1,343,000	$1,553,000
AATF	$6,495,208	$8,595,000	$8,547,000
Facilities & Equipment	**$2,717,375**	**$2,661,000**	**$2,827,000**
Aviation Insurance Revolving Account (M)	**($134,000)**	**($24,000)**	**($51,000)**
Research, Engineering & Development	**$148,925**	**$171,000**	**$179,000**
Grants-in-Aid for Airports	**$3,258,741**	**$3,800,000**	**$3,580,000**
Aviation User Fees (Overflight) (M)	**$1,000**		
Franchise Fund	**($96,000)**	**$5,000**	**$55,000**
TOTAL:	**$15,495,925**	**$16,551,000**	**$16,690,000**
[Mandatory]	($133,000)	($24,000)	($51,000)
[Discretionary]	$15,628,925	$16,575,000	$16,741,000

EXHIBIT II-6
SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
Federal Aviation Administration
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

		Baseline Changes										
Operations	**FY 2015 Enacted**	**Annualization of 2015 Pay Raises**	**Annualization of 2015 FTE**	**2016 Pay Raises**	**FY 2016 Increase to Government contribution to FERS**	**One Additional Compensable Day**	**GSA Rent**	**WCF Increase/ Decrease**	**Inflation/ Deflation**	**FY 2016 Baseline Estimate**	**Program Increases/ Decreases**	**FY 2016 Request**
PERSONNEL RESOURCES (FTE)												
Direct FTE	40,623									40,623	119	40,742
FINANCIAL RESOURCES												
Salaries and Benefits	6,842,125	12,492	0	55,638	24,790	25,295				6,960,340	15,438	6,975,778
Travel	152,732									152,732	2,278	155,010
Transportation	24,299									24,299	26	24,325
GSA Rent	122,169								4,320	126,489	14	126,503
Rental Payments to Others	63,559									63,559	172	63,731
Communications, Rent & Utilities	298,240								1,876	300,116	366	300,482
Printing	6,117									6,117	120	6,237
Other Services	2,046,009							-616	4,971	2,050,364	25,680	2,076,044
Supplies	122,715									122,715	405	123,120
Equipment	55,130									55,130	1,535	56,665
Lands and Structures	1,697									1,697	0	1,697
Grants, Claims and Subsidies	2,923									2,923	-500	2,423
Insurance Claims and Indemnities	2,985									2,985	0	2,985
Object Class Total	**9,740,700**	**12,492**	**0**	**55,638**	**24,790**	**25,295**	**0**	**-616**	**11,167**	**9,869,466**	**45,534**	**9,915,000**
PROGRAMS												
Air Traffic Organization (ATO)	7,396,654	9,201		42,160	19,594	19,459		-285	6,847	7,493,630	11,663	7,505,293
Aviation Safety (AVS)	1,218,458	2,187		8,980	3,510	3,855		144	0	1,237,134	21,277	1,258,411
Commercial Space Transportation (AST)	16,605	31		119	48	53		0	0	16,856	1,258	18,114
Finance and Management (AFN)	756,047	514		2,190	797	953		-200	4,320	764,621	348	764,969
NextGen (ANG)	60,089	59		227	94	113		0	0	60,582	0	60,582
Security and Hazardous Materials Safety (ASH)*	0	155		603	240	269		-395	0	872	100,008	100,880
Staff Offices	292,847	345		1,359	507	593		120	0	295,771	-89,020	206,751
Programs Total	**9,740,700**	**12,492**	**0**	**55,638**	**24,790**	**25,295**	**0**	**-616**	**11,167**	**9,869,466**	**45,534**	**9,915,000**
TOTAL	**9,740,700**	**12,492**	**0**	**55,638**	**24,790**	**25,295**	**0**	**-616**	**11,167**	**9,869,466**	**45,534**	**9,915,000**

EXHIBIT II-6
SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
Federal Aviation Administration
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

		Baseline Changes										
Facilities & Equipment	**FY 2015 Enacted**	**Annualization of 2015 Pay Raises**	**Annualization of 2015 FTE**	**2016 Pay Raises**	**FY 2016 Increase to Government contribution to FERS**	**One Additional Compensable Day**	**GSA Rent**	**WCF Increase/ Decrease**	**Inflation/ Deflation**	**FY 2016 Baseline Estimate**	**Program Increases/ Decreases**	**FY 2016 Request**
PERSONNEL RESOURCES (FTE)												
Direct FTE	2,733									2,733		2,733
FINANCIAL RESOURCES												
Salaries and Benefits	408,263	875		3,688	1,357	1,595				415,778	0	415,778
Travel	36,886								369	37,255	1,935	39,190
Transportation	2,361								24	2,385	0	2,385
GSA Rent	0								0	0	0	0
Rental Payments to Others	29,464								295	29,759	3,500	33,259
Communications, Rent & Utilities	26,105								261	26,366	2,175	28,541
Printing	30								0	30	0	30
Other Services:	1,765,794								17,658	1,783,452	197,695	1,981,147
-WCF	35							13	0	48	0	48
Supplies	18,918								189	19,107	0	19,107
Equipment	198,303								1,983	200,286	10,300	210,586
Lands and Structures	107,500								1,075	108,575	9,950	118,525
Grants, Claims, Subsidies and Interest	6,341								63	6,404	0	6,404
Object Class Total	**2,600,000**	**875**	**0**	**3,688**	**1,357**	**1,595**	**0**	**13**	**21,917**	**2,629,445**	**225,555**	**2,855,000**
PROGRAMS												
Engineering, Development, Test and Evaluation	177,937								1,779	179,716	-28,666	151,050
Air Traffic Control Facilities and Equipment	1,577,983								15,780	1,593,763	77,438	1,671,201
Non-Air Traffic Control Facilities and Equipment	158,280								1,583	159,863	11,137	171,000
Facilities and Euipment Mission Support	225,800								2,258	228,058	-2,358	225,700
Personnel & Related Expenses	460,000	875		3,688	1,357	1,595		13	517	468,045	2,004	470,049
ADS-B Subscription and WAAS GEOs *	0								0	0	166,000	166,000
Programs Total	**2,600,000**	**875**	**0**	**3,688**	**1,357**	**1,595**	**0**	**13**	**21,917**	**2,629,445**	**225,555**	**2,855,000**
TOTAL	**2,600,000**	**875**	**0**	**3,688**	**1,357**	**1,595**	**0**	**13**	**21,917**	**2,629,445**	**225,555**	**2,855,000**

*Funds are transferred from Activity 2 to Activity 6 in FY 2016 to support ADS-B and WAAS ongoing activities.

EXHIBIT II-6
SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
Federal Aviation Administration
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

Research, Engineering & Development	FY 2015 Enacted	Baseline Changes: Annualization of 2015 Pay Raises	Annualization of 2015 FTE	2016 Pay Raises	FY 2016 Increase to Government contribution to FERS	One Additional Compensable Day	GSA Rent	WCF Increase/ Decrease	Inflation/ Deflation	FY 2016 Baseline Estimate	Program Increases/ Decreases	FY 2016 Request
PERSONNEL RESOURCES (FTE)												
Direct FTE	249										0	249
FINANCIAL RESOURCES												
Salaries and Benefits	37,922	95		300		145				38,461		38,461
Benefits for Former Personnel	0									0		0
Travel	1,800								18	1,817	-17	1,800
Transportation	41								0	41		41
GSA Rent	0									0		0
Rental Payments to Others	0									0		0
Communications, Rent & Utilities	14								0	14		14
Printing	4								0	4		4
Other Services:	0									0		0
-WCF	0									0		0
-Advisory and Assistance Services	0									0		0
-Other	97,278								973	98,251	7,539	105,791
Supplies	1,467								15	1,482		1,482
Equipment	1,208								12	1,220		1,220
Lands and Structures	0									0		0
Grants, Claims & Subsidies	17,017								170	17,187		17,187
Insurance Claims and Indemnities	0									0		0
Interest & Dividends	0									0		0
Object Class Total	**156,750**	**95**	**0**	**300**	**0**	**145**	**0**	**0**	**1,188**	**158,478**	**7,522**	**166,000**
PROGRAMS												
Improve Aviation Safety	91,019	77		232		118			601	92,047	4,576	96,623
Economic Competitiveness	22,286	4		16		6			206	22,519	2,152	24,671
Environmental Sustainability	37,935	6		23		9			356	38,329	555	38,884
Mission Support	5,510	8		29		11			25	5,583	239	5,822
Programs Total	**156,750**	**95**	**0**	**300**	**0**	**145**	**0**	**0**	**1,188**	**158,478**	**7,522**	**166,000**
TOTAL	**156,750**	**95**	**0**	**300**	**0**	**145**	**0**	**0**	**1,188**	**158,478**	**7,522**	**166,000**

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	FY 2015 Enacted	Baseline Changes: Annualization of 2015 Pay Raises	Annualization of 2015 FTE	2016 Pay Raises	FY 2016 Increase to Government contribution to FERS	One Additional Compensable Day	GSA Rent	WCF Increase/ Decrease	Inflation/ Deflation	FY 2016 Baseline Estimate	Program Increases/ Decreases	FY 2016 Request
PERSONNEL RESOURCES (FTE)												
Direct FTE	608									608	1	609
FINANCIAL RESOURCES												
Salaries and Benefits	88,127	220	0	859	269	338				89,813	75	89,888
Travel	2,924								29	2,953		2,953
Transportation	261								3	264		264
GSA Rent	101								1	102		102
Rental Payments to Others	872								8	880		880
Communications, Rent & Utilities	491								5	496		496
Printing	492								5	497		497
Other Services:										0		0
-WCF	925							-791		134		134
-Advisory and Assistance Services	25,353								258	25,611	-357	25,254
-Other	30,253								305	30,558		30,558
Supplies	647								6	653		653
Equipment	964								9	973		973
Lands and Structures	994								9	1,003		1,003
Grants, Claims & Subsidies	3,192,059								0	3,192,059	-445,750	2,746,309
Insurance Claims and Indemnities	1								0	1		1
Interest and Dividends	36								0	36		36
Financial transfers	5,500								0	5,500	-5,500	0
Object Class Total	**3,350,000**	**220**	**0**	**859**	**269**	**338**	**0**	**-791**	**637**	**3,351,532**	**-451,532**	**2,900,000**
PROGRAMS												
Grants	3,192,650	0		0	0	0		0	0	3,192,650	-445,750	2,746,900
Personnel and Related Expenses	107,100	209		815	258	320		-791	235	108,146	-1,046	107,100
Airport Technology Research	29,750	9		36	10	14		0	260	30,080	919	31,000
Airport Cooperative Research	15,000	2		8	0	3		0	142	15,155	-155	15,000
Small Community Air Service	5,500			0		0		0	0	5,500	-5,500	0
Programs Total	**3,350,000**	**220**	**0**	**859**	**268**	**338**	**0**	**-791**	**637**	**3,351,532**	**-451,532**	**2,900,000**
TOTAL	**3,350,000**	**220**	**0**	**859**	**268**	**338**	**0**	**-791**	**637**	**3,351,532**	**-451,532**	**2,900,000**

EXHIBIT II-7
WORKING CAPITAL FUND
FEDERAL AVIATION ADMINISTRATION
($000)

	FY 2014 ACTUAL	FY 2015 ENACTED	FY2016 REQUEST	CHANGE
DIRECT:				
Facilities & Equipment	35	35	48	**13**
Grants-in-Aid for Airports	926	926	135	**(791)**
Operations	48,684	49,286	48,670	**(616)**
TOTAL	**$ 49,645**	**$ 50,247**	**$ 48,853**	**$ (1,394)**

Footnote:

F&E, Grants-in-Aid for Airports funding only support E-gov Inititatives.

Operations funding supports WCF projects including E-gov Initiatives and the Department of Transportation InterAgency Agreement (IAA) for News Media transfers to a Working Capital Fund line item in the amount of $218,446.

EXHIBIT II-8
FEDERAL AVIATION ADMINISTRATION
PERSONNEL RESOURCE -- SUMMARY
TOTAL FULL-TIME EQUIVALENTS

	FY 2014 ACTUAL	FY 2015 ENACTED	FY 2016 REQUEST
DIRECT FUNDED BY APPROPRIATION			
Operations	39,491	40,623	40,742
Facilities & Equipment	2,598	2,733	2,733
Research, Engineering & Development	225	249	249
Grants-in-Aid for Airports	564	608	609
SUBTOTAL, DIRECT FUNDED	42,878	44,213	44,333
REIMBURSEMENTS / ALLOCATIONS / OTHER			
Reimbursements and 'Other'			
Operations	303	222	222
Aviation Insurance Revolving Fund	5	5	4
Facilities & Equipment	68	62	62
Grants-in-Aid for Airports	-	1	1
Administrative Services Franchise Fund	1,678	2,072	2,368
Allocations from other Organizations			
SUBTOTAL, REIMBURSE./ALLOC./OTH.	2,054	2,362	2,657
TOTAL FTEs	**44,932**	**46,575**	**46,990**

EXHIBIT II-9
FEDERAL AVIATION ADMINISTRATION
RESOURCE SUMMARY – STAFFING
FULL-TIME PERMANENT POSITIONS

	FY 2014 ACTUAL	FY 2015 ENACTED	FY 2016 REQUEST
DIRECT FUNDED BY APPROPRIATION			
Operations	39,676	41,787	42,020
Facilities & Equipment	2,654	2,751	2,751
Research, Engineering & Development	226	255	257
Grants-in-Aid for Airports	567	608	609
SUBTOTAL, DIRECT FUNDED	43,123	45,401	45,637
REIMBURSEMENTS / ALLOCATIONS / OTH.			
Reimbursements and 'Other'			
Operations	93	175	175
Aviation Insurance Revolving Fund	5	6	4
Facilities & Equipment	30	39	39
Grants-in-Aid for Airports	-	2	2
Administrative Services Franchise Fund	1,648	2,020	2,250
Allocations from other Organizations			
SUBTOTAL, REIMBURSE./ALLOC./OTH.	1,776	2,242	2,470
TOTAL POSITIONS	**44,899**	**47,643**	**48,107**

EXHIBIT II-10
FEDERAL AVIATION ADMINISTRATION
USER FEES
($000)

	FY 2014 ACTUAL	FY 2015 ESTIMATE	FY 2016 ESTIMATE
USER FEE			
Civil Aviation Registry Fees	389	500	500
Foreign Repair Station/Certification Fees	8,386	9,000	9,000
Aeronautical Charting Fees	6,826	9,000	9,000
Overflight Fees	84,914	97,443	99,859
Total User Fees	**100,515**	**115,943**	**118,359**

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SECTION 3: BUDGET BY APPROPRIATIONS ACCOUNT

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3A. OPERATIONS

OPERATIONS

(AIRPORT AND AIRWAY TRUST FUND)

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 112–95, $9,915,000,000 of which $8,547,000,000 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 for expenses incurred in the provision of agency services, including receipts for the maintenance and operation of air navigation facilities, and for issuance, renewal or modification of certificates, including airman, aircraft, and repair station certificates, or for tests related thereto, or for processing major repair or alteration forms.

Program and Financing (in millions of dollars)

Identification code: 69-1301-0-1-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Obligations by program activity:			
0001	Air Traffic Organization (ATO)	7,313	7,411	7,519
0002	NextGen	60	60	61
0003	Finance & Management	759	759	768
0004	Regulation & Certification	1,210	1,229	1,269
0005	Commercial Space	16	17	18
0006	Security & Hazardous Materials Safety	....	....	101
0007	Staff Offices	296	293	207
0799	Total Direct Obligations	9,654	9,769	9,943
0801	Reimbursable program	162	192	192
0900	Total new obligations	9,816	9,961	10,135
	Budget resources:			
1000	Unobligated balance brought forward, Oct. 1	35	44	40
1021	Recoveries of prior year unpaid obligations	2	....	....
1050	Unobligated balance (total)	37	44	40
	Budget authority:			
	Appropriations, discretionary:			
1100	Appropriation	3,156	1,146	1,368
1160	Appropriation, discretionary (total)	3,156	1,146	1,368
	Spending authority from offsetting collections:			
	Discretionary:			
1700	Collected	6,595	8,811	8,763
1701	Change in uncollected payments, federal sources	81	....	....
1750	Spending auth from offsetting collections, disc (total)	6,676	8,811	8,763
1900	Budget authority (total)	9,832	9,957	10,131
1930	Total budgetary resources available	9,869	10,001	10,171
	Memorandum (non-add) entries:			
1940	Unobligated balance expiring	-9	....	....
1941	Unexpired unobligated balance, end of year	44	40	36
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct. 1	1,519	1,529	1,336
3010	Obligations incurred, unexpired accounts	9,816	9,961	10,135
3011	Obligations incurred, expired accounts	79	....	....
3020	Outlays (gross)	-9,783	-10,154	-10,316
3040	Recoveries of prior year unpaid obligations, unexpired	-2	....	....
3041	Recoveries of prior year unpaid obligations, expired	-100	....	....
3050	Unpaid obligations, end of year (gross)	1,529	1,336	1,155
	Uncollected payments:			
3060	Uncollected pymts, Fed sources, brought forward, Oct 1	-174	-162	-162
3070	Change in uncollected pymts, Fed sources, unexpired	-81	....	....
3071	Change in uncollected pymts, Fed sources, expired	93	....	....
3090	Uncollected pymts, Fed sources, end of year	-162	-162	-162
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	1,345	1,367	1,174
3200	Obligated balance, end of year	1,367	1,174	993
	Budget authority and outlays, net:			
	Discretionary:			
4000	Budget authority, gross	9,832	9,957	10,131
	Outlays, gross:			
4010	Outlays from new discretionary authority	8,505	8,789	8,941
4011	Outlays from discretionary balances	1,278	1,365	1,375
4020	Outlays, gross (total)	9,783	10,154	10,316
	Offsets against gross budget authority and outlays:			

Identification code: 69-1301-0-1-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Offsetting collections (collected) from:			
4030	Federal sources	-6,641	-8,775	-8,727
4033	Non-Federal sources	-35	-36	-36
4040	Offsets against gross budget authority and outlays (total)	-6,679	-8,811	-8,763
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pymts, Federal sources, unexpired	-81	....	....
4052	Offsetting collections credited to expired accounts	84	....	....
4060	Additional offsets against budget authority only (total)	3	....	....
4070	Budget authority, net (discretionary)	3,156	1,146	1,368
4080	Outlays, net (discretionary)	3,104	1,343	1,553
4180	Budget authority, net (total)	3,156	1,146	1,368
4190	Outlays, net (total)	3,104	1,343	1,553
	Memorandum (non-add) entries:			
5093	Unavailable balance, SOF: Offsetting collections	1	1	1
5095	Unavailable balance, EOY: Offsetting collections	1	1	1

For 2016, the Budget requests $9,915 million for Federal Aviation Administration (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 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 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Direct obligations:			
	Personnel compensation:			
11.1	Full-time permanent	4,479	4,545	4,629
11.3	Other than full-time permanent	29	30	30
11.5	Other personnel compensation	414	374	376
11.9	Total personnel compensation	4,922	4,949	5,035
12.1	Civilian personnel benefits	1,731	1,891	1,940
13.0	Benefits for former personnel	5	1	1
21.0	Travel and transportation of persons	135	153	155
22.0	Transportation of things	24	24	24
23.1	Rental payments to GSA	119	122	127
23.2	Rental payments to others	62	64	64
23.3	Communications, utilities, and miscellaneous charges	297	298	300
24.0	Printing and reproduction	6	6	6
25.1	Advisory and assistance services	572	656	669
25.2	Other services	1,585	1,419	1,435
26.0	Supplies and materials	128	123	123
31.0	Equipment	60	55	57
32.0	Land and structures	3	2	2
41.0	Grants, subsidies, and contributions	3	3	2
42.0	Insurance claims and indemnities	2	3	3
99.0	Direct obligations	9,654	9,769	9,943
99.0	Reimbursable obligations	162	192	192
99.9	Total new obligations	9,816	9,961	10,135

Employment Summary

Identification code: 69-1301-0-1-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
1001	Direct civilian full-time equivalent employment	39,491	40,623	40,742
2001	Reimbursable civilian full-time equivalent employment	303	222	222

Exhibit III-1

Operations Appropriation
Summary by Program Activity
Appropriations, Obligation Limitations and Exempt Obligations
($000)

	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Air Traffic Organization (ATO)	$7,311,790	$7,396,654	$7,505,293	$108,639
Aviation Safety (AVS)	$1,204,777	$1,218,458	$1,258,411	$39,953
Commercial Space (AST)	$16,331	$16,605	$18,114	$1,509
Finance & Management (AFN)	$762,462	$756,047	$764,969	$8,922
NextGen (ANG)	$59,696	$60,089	$60,582	$493
Security and Hazardous Materials Safety (ASH)	$0	$0	$100,880	$100,880
Staff Offices	$296,366	$292,847	$206,751	-$86,096
TOTAL	**$9,651,422**	**$9,740,700**	**$9,915,000**	**$174,300**
FTEs				
Direct Funded	39,491	40,623	40,742	119
Reimbursable, allocated, other	303	222	222	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 surveillance 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.

*In previous budget submissions, the Office of Security and Hazardous Materials Safety (ASH) was displayed within the Staff Offices (SO); in FY 2016 ASH is displayed as a Line of Business (LOB).

Exhibit III-1a

OPERATIONS APPROPRIATION
Summary Analysis of Change from FY 2015 to FY 2016
Appropriations, Obligation Limitation, and Exempt Obligations
($000)

	Change from FY 2015 to FY 2016	
	$	FTE
FY 2015 Enacted	**$9,740,700**	**40,623**
Adjustments to Base	**$128,766**	**0**
Annualized FY 2015 Pay Raise	12,492	
FY 2016 Pay Raise [1.3%]	55,638	
Additional Compensable Day	25,295	
FERS Contribution	24,790	
Non-Pay Inflation	11,167	
Working Capital Fund	-616	
Program Reductions	**$0**	**0**
New Or Expanded Programs	**$45,534**	**119**
Weather Camera Program Sustainment	1,686	
CARTS to TAMR Transition	7,504	
Technical Operations Safety Action Program (T-SAP)	1,198	
Environmental and Occupational Safety and Health (EOSH) Program	1,275	
Surveillance and Oversight Request	11,428	54
AVS Certification and UAS Integration	5,333	29
Safety Management Systems	4,516	2
AST Staff Increase	1,258	13
Insider Threat Detection and Mitigation (ITDMP) and Defensive Counterintelligence Program (DCIP)	1038	2
Security Review (ZAU)	8,820	18
Emergency Notification System (ENS)	1,478	1
FY 2016 Request	**$9,915,000**	**40,742**

*In previous budget submissions, the Office of Security and Hazardous Materials Safety (ASH) was displayed within the Staff Offices (SO); in FY 2016 ASH is displayed as a Line of Business (LOB).

Operations Summary
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$9,740,700**	**41,787**	**898**	**40,623**
Adjustments to Base	**$129,382**			
Annualized FY 2015 Pay Raise	12,492			
FY 2016 Pay Raise [1.3%]	55,638			
Additional Compensable Day	25,295			
FERS Contribution	24,790			
Non-Pay Inflation	11,167			
Other Changes	**-$616**			
Working Capital Fund (WCF) Adjustments	-616			
Discretionary Adjustments	**$45,534**	**233**		**119**
Weather Camera Program Sustainment	1,686			
CARTS to TAMR Transition	7,504			
Technical Operations Safety Action Program (T-SAP)	1,198			
Environmental and Occupational Safety and Health (EOSH) Program	1,275			
Surveillance and Oversight Request	11,428	107		54
AVS Certification and UAS Integration	5,333	57		29
Safety Management Systems	4,516	4		2
AST Staff Increase	1,258	25		13
Insider Threat Detection and Mitigation (ITDMP) and Defensive Counterintelligence Program (DCIP)	1,038	4		2
Security Review (ZAU)	8,820	35		18
Emergency Notification System (ENS)	1,478	1		1
Base Transfers				
Aviation Education				
FAA Leadership and Learning Institute				
FY 2016 Request	**$9,915,000**	**42,020**	**898**	**40,742**

Base Transfer Summary
($000)

	LOB/SO	FTE	FTP	Funding	LOB/SO	FTE	FTP	Funding
Aviation Education	AFN	-1	-1	-$164	AHR	+1	+1	+$164
FAA Leadership and Learning Institute	AFN			+$512	AHR			-$512
Total		**-1**	**-1**	**+$348**		**+1**	**+1**	**-$348**

Staffing Summary – FY 2014-FY 2016

Air Traffic Organization		ATO	FTP	29,269	30,904	30,904
			OTFTP	481	687	687
			FTE	29,285	30,011	30,011
Associate Administrator for Aviation Safety		AVS	FTP	7,025	7,238	7,406
			OTFTP	18	125	125
			FTE	6,884	7,161	7,246
Associate Administrator for Commercial Space Transportation		AST	FTP	72	81	106
			OTFTP	1	2	2
			FTE	72	79	92
Assistant Administrator for Finance and Management		AFN	FTP	1637	1790	1789
			OTFTP	10	21	21
			FTE	1637	1665	1664
Assistant Administrator for Next Generation Air Transportation System		ANG	FTP	186	201	201
			OTFTP	6	7	7
			FTE	179	201	201
Associate Administrator for Security and Hazardous Materials Safety		ASH	FTP	0	0	522
			OTFTP	0	0	0
			FTE	0	0	451
Staff Offices	Assistant Administrator for Human Resource Management	AHR	FTP	535	557	558
			OTFTP	5	31	31
			FTE	508	533	534
	Office of the Administrator and Deputy	AOA	FTP	18	20	20
			OTFTP	3	4	4
			FTE	22	24	24
	Assistant Administrator for Audit and Evaluation	AAE	FTP	19	20	20
			OTFTP	0	0	0
			FTE	19	20	20
	Assistant Administrator for Civil Rights	ACR	FTP	69	80	80
			OTFTP	2	4	4
			FTE	64	80	80
	Asst. Administrator for Government and Industry Affairs	AGI	FTP	7	10	10
			OTFTP	2	0	0
			FTE	9	10	10
	Assistant Administrator for Communications	AOC	FTP	28	34	34
			OTFTP	1	1	1
			FTE	29	34	34
	Office of Chief Counsel	AGC	FTP	229	234	234
			OTFTP	9	9	9
			FTE	227	236	236
	Asst. Administrator for Policy, International Affairs and Environment	APL	FTP	124	136	136
			OTFTP	5	7	7
			FTE	126	139	139
	Asst. Administrator for Security and Hazardous Materials Safety	ASH	FTP	458	482	0
			OTFTP	5	0	0
			FTE	430	430	0
Total			FTP	39,676	41,787	42,020
			OTFTP	548	898	898
			FTE	39,491	40,623	40,742

*In previous budget submissions, the Office of Security and Hazardous Materials Safety (ASH) was displayed within the Staff Offices (SO); in FY 2016 ASH is displayed as a Line of Business (LOB).

FY 2014 – FY 2016 Resource Summary
($000)

				FY 2014 Actual		FY 2015 Enacted		FY 2016 Request
	Air Traffic Organization (ATO)	pcb	$	5,284,343	$	5,316,511	$	5,406,925
		o/o	$	2,027,447	$	2,080,143	$	2,098,368
	ATO Total		**$**	**7,311,790**	**$**	**7,396,654**	**$**	**7,505,293**
	Associate Administrator for Aviation Safety (AVS)	pcb	$	987,875	$	1,012,242	$	1,042,424
		o/o	$	216,902	$	206,216	$	215,987
	AVS Total		**$**	**1,204,777**	**$**	**1,218,458**	**$**	**1,258,411**
	Associate Administrator for Commercial Space Transportation (AST)	pcb	$	13,201	$	13,410	$	14,919
		o/o	$	3,130	$	3,195	$	3,195
	AST Total		**$**	**16,331**	**$**	**16,605**	**$**	**18,114**
	Assistant Administrator for Finance and Management (AFN)	pcb	$	248,126	$	244,640	$	248,930
		o/o	$	514,336	$	511,407	$	516,039
	AFN Total		**$**	**762,462**	**$**	**756,047**	**$**	**764,969**
	Assistant Administrator for NextGen Air Transportation System (ANG)	pcb	$	24,845	$	28,434	$	28,927
		o/o	$	34,851	$	31,655	$	31,655
	ANG Total		**$**	**59,696**	**$**	**60,089**	**$**	**60,582**
	Associate Administrator for Security and Hazardous Materials Safety (ASH)	pcb	$	-	$	-	$	73,031
		o/o	$	-	$	-	$	27,849
	ASH Total		**$**	**-**	**$**	**-**	**$**	**100,880**
Staff Offices	Assistant Administrator for Human Resource Management (AHR)	pcb	$	65,084	$	73,053	$	74,498
Staff Offices		o/o	$	38,406	$	26,947	$	26,708
Staff Offices	**AHR Total**		**$**	**103,490**	**$**	**100,000**	**$**	**101,206**
Staff Offices	Office of the Administrator and Deputy (AOA)	pcb	$	3,414	$	3,465	$	3,527
Staff Offices		o/o	$	603	$	552	$	552
Staff Offices	**AOA Total**		**$**	**4,017**	**$**	**4,017**	**$**	**4,079**
Staff Offices	Assistant Administrator for Audit and Evaluation (AAE)	pcb	$	2,857	$	2,873	$	2,927
Staff Offices		o/o	$	343	$	327	$	327
Staff Offices	**AAE Total**		**$**	**3,200**	**$**	**3,200**	**$**	**3,254**
Staff Offices	Assistant Administrator for Civil Rights (ACR)	pcb	$	8,690	$	9,723	$	9,892
Staff Offices		o/o	$	3,178	$	2,076	$	2,076
Staff Offices	**ACR Total**		**$**	**11,868**	**$**	**11,799**	**$**	**11,968**
Staff Offices	Assistant Administrator for Government and Industry Affairs (AGI)	pcb	$	1,247	$	1,456	$	1,482
Staff Offices		o/o	$	283	$	74	$	74
Staff Offices	**AGI Total**		**$**	**1,530**	**$**	**1,530**	**$**	**1,556**
Staff Offices	Assistant Administrator for Communications (AOC)	pcb	$	5,660	$	5,861	$	5,969
Staff Offices		o/o	$	343	$	342	$	342
Staff Offices	**AOC Total**		**$**	**6,003**	**$**	**6,203**	**$**	**6,311**
Staff Offices	Office of the Chief Council (AGC)	pcb	$	37,203	$	37,431	$	38,127
Staff Offices		o/o	$	6,987	$	6,812	$	6,659
Staff Offices	**AGC Total**		**$**	**44,190**	**$**	**44,243**	**$**	**44,786**
Staff Offices	Assistant Administrator for Policy, International Affairs and Environment (APL)	pcb	$	23,030	$	23,792	$	24,200
Staff Offices		o/o	$	10,366	$	9,391	$	9,391
Staff Offices	**APL Total**		**$**	**33,396**	**$**	**33,183**	**$**	**33,591**
Staff Offices	Assistant Administrator for Security and HazMat Safety (ASH)	pcb	$	66,097	$	69,234	$	-
Staff Offices		o/o	$	22,575	$	19,438	$	-
Staff Offices	**ASH Total**		**$**	**88,672**	**$**	**88,672**	**$**	**-**
	Grand Total		**$**	**9,651,422**	**$**	**9,740,700**	**$**	**9,915,000**

*In previous budget submissions, the Office of Security and Hazardous Materials Safety (ASH) was displayed within the Staff Offices (SO); in FY 2016 ASH is displayed as a Line of Business (LOB).

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AIR TRAFFIC ORGANIZATION (ATO)

Air Traffic Organization (ATO)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$7,396,654**	**30,904**	**687**	**30,011**
Adjustments to Base	**$97,261**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$9,201			
FY 2016 Pay Raise (1.3%) (.75)	$42,160			
Additional Compensable Day	$19,459			
FERS Contribution	$19,594			
Non-Pay Inflation	$6,847			
Other Changes	**-$285**			
Working Capital Fund	($285)			
Discretionary Adjustments	**$11,663**			
Weather Camera Program Sustainment	$1,686			
CARTS to TAMR Transition	$7,504			
Technical Operations Safety Action Program (T-SAP)	$1,198			
Environmental and Occupational Safety and Health (EOSH) Program	$1,275			
FY 2016 Request	**$7,505,293**	**30,904**	**687**	**30,011**

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Executive Summary: Air Traffic Organization (ATO)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Air Traffic Organization (ATO)
($000)

Program Activity	FY 2014 Actuals	FY 2015 Enacted	FY 2016 Request	Change FY 2015-2016
Total	**$7,304,413**	**$7,396,654**	**$7,505,293**	**+$108,639**
Air Traffic Services (AJT)	3,861,419	3,930,300	3,994,434	+64,134
Technical Operations (AJW)	1,599,939	1,594,442	1,620,643	+26,201
System Operations (AJR)	328,470	299,610	301,122	+1,512
Safety and Technical Training (AJI)	266,364	308,106	310,711	+2,605
Mission Support Services (AJV)	284,470	281,708	286,576	+4,867
Management Services (AJG)	208,530	302,646	302,871	+225
Program Management (AJM)	755,221	679,843	688,936	+9,093

The request of $7,505,293,000 and 30,904 FTP / 30,011 FTE allows FAA to maintain our position as the global leader in delivering the world's safest, most secure air traffic services. This request provides an adjustment to base of $42,160,000 for the 2016 pay raise, $9,201,000 for the annualized cost of the FY 2015 pay increase, $19,594,000 for the Federal Employees Retirement System (FERS) contribution increase, $19,459,000 for one additional compensable day, and $6,847,000 for non-pay inflation. Included in the request is a change of -$285,000 for Working Capital Fund adjustments. The request also includes discretionary adjustments of $11,663,000 for program increase requests.

Program Increase Requests include:

Program	Service Unit*	Amount
Weather Camera Program	AJV	$1,686,000
Common Automated Radar Terminal System (CARTS) to Terminal Automation Modernization and Replacement (TAMR) Transition	AJM	$7,504,000
Technical Operations Safety Action Plan (T-SAP)	AJI	$1,198,000
FAA Occupational Safety and Health (OSHA) Program	AJW	$1,275,000

What is this Program and Why is it Necessary?

ATO is a Performance-Based Organization providing safe, secure, and cost-effective air traffic control services to commercial and private aviation and the military. ATO is comprised of more than 30,000 professional employees committed to providing safe and efficient air traffic control services. Many of the employees, including approximately 14,500 air traffic controllers, 5,000 air traffic supervisors and air traffic managers, 1,800 engineers, and 6,000 maintenance technicians, directly serve our customers. The remaining employees work in a wide variety of professions to sustain the smooth operations of ATO. They research, plan, and build air traffic control equipment and programs; manage payroll and benefits programs; maintain productive relationships with the aviation industry and the general public; and ensure that the environment and ATO employees are protected.

ATO supports the **Department of Transportation's (DOT) strategic goals** and outcomes related to:

- **Safety:** "*Reduction in transportation related fatalities and injuries*";
- **Economic Competitiveness:** *"Maximum economic returns in transportation policies and investments*"**;** and
- **State of good repair:** *"Maintain or improve operating conditions and sustain assets"***.**

The ATO also supports **DOT's Priority Goal: "Reduction of Total Runway Incursions".**

ATO provides air traffic services for the Nation and is fully committed to the agency's mission. It handles 69,000 flights per day and transport 743 million passengers per year; a vital part of the Nation's economy. FAA data shows that civil aviation accounted for over $1.5 trillion in total economic activity, supporting 5.4 percent of U.S. Gross Domestic Product. Earning over $459.4 billion a year, 11.8 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, ATO is also taking steps to enable growth and changes in aviation.

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

ATO operates the most complex and technically advanced air traffic control system in the world. In FY 2016, an operating budget of $7,505,293,000 is required to sustain and improve effective and efficient air traffic control throughout U.S. airspace. The funding being requested will enable ATO to train its highly-skilled workforce, provide information and updates to the flying public to ensure safe air travel, maintain critical infrastructure necessary to operate the National Airspace System (NAS), provide full lifecycle management of systems entering the NAS, review and update navigational information to promote more efficient air transportation, and effectively control air traffic which is a major contributor to our national economy.

What Benefits will be provided to the American Public through this request?

ATO sets annual performance goals in safety, economic competitiveness, finance, international leadership, and organizational excellence. In **safety**, ATO tracks the commercial fatal accident rate, general aviation fatal accidents, rate of runway incursions, and operational errors. For **economic competitiveness**, ATO tracks average daily airport capacity, on-time arrivals, and adjusted operational availability. In the area of **finance**, ATO measures program performance using schedule and budget metrics. In **international leadership**, ATO synchronizes Next Generation Air Transportation System (NextGen) systems and technologies with international standard setting organizations. For **organizational excellence**, ATO measures 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 2003, we have coordinated more than 135 million successful flights on commercial aircraft, transporting over 7 billion passengers safely to their destinations. This outstanding record is attributable to efforts at reducing fatal accident rates, deploying systems and procedures to reduce serious runway incursions, and conducting training programs aimed at reducing operational errors.

Detailed Justification for the - Vice President Air Traffic Services, ATS-0

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Air Traffic Services – Budget Request ($000)

Program Activity	FY 2014 Actuals	FY 2015 Enacted	FY 2016 Request	Change FY 2015-2016
Air Traffic Services	$3,861,419	$3,930,300	$3,994,434	+$64,134

The FY 2016 budget request for Air Traffic Services is $3,994,433,755 and 19,531 FTP / 19,053 FTE. It includes for $29,905,678 for FY 2016 pay raise, $6,526,616 for the annualized cost of the FY 2015 pay increase, $13,898,763 for the FERS contribution increase, and $13,803,003 for one more compensable day in FY 2016.

Air Traffic Services provides ATC operations at 567 service delivery points in the U.S., Puerto Rico, and Guam. Air Traffic Services provides its owners, customers, and system operators the highest degree of safety and service in the most efficient manner.

Air Traffic Services 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. 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. The responsibility to operate all air traffic activity within the NAS is carried out the ATO, with Air Traffic Services managing airport and arrival/departure operations near the airport and en-route traffic between airports.

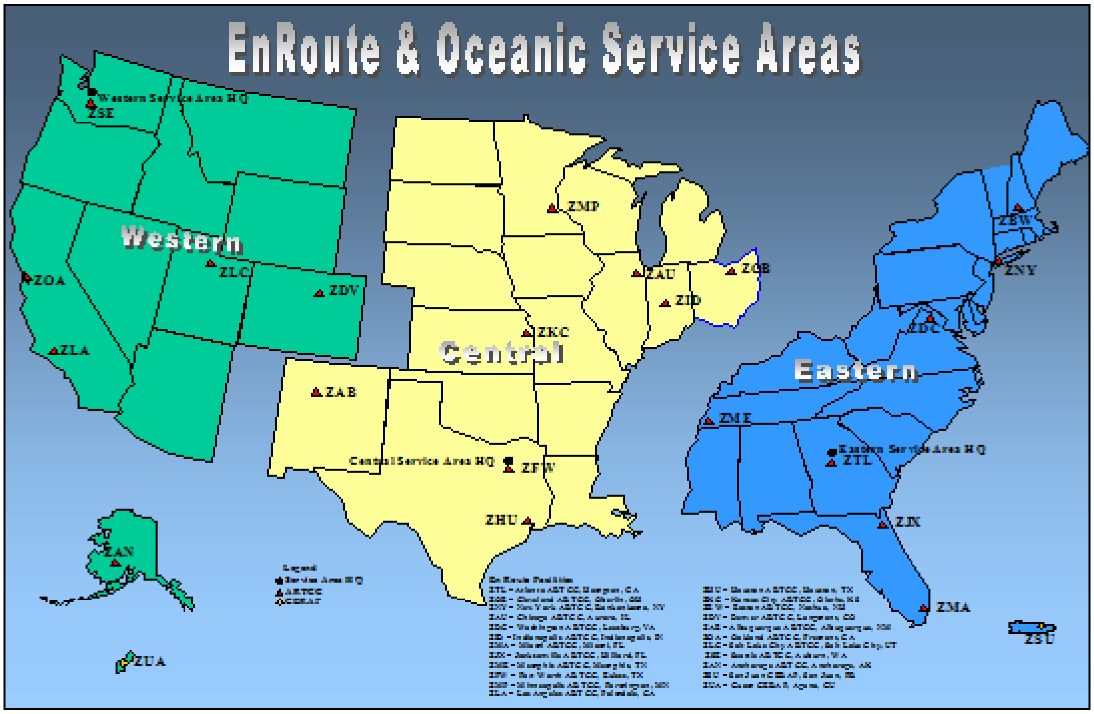
What is this Program and Why is it Necessary?

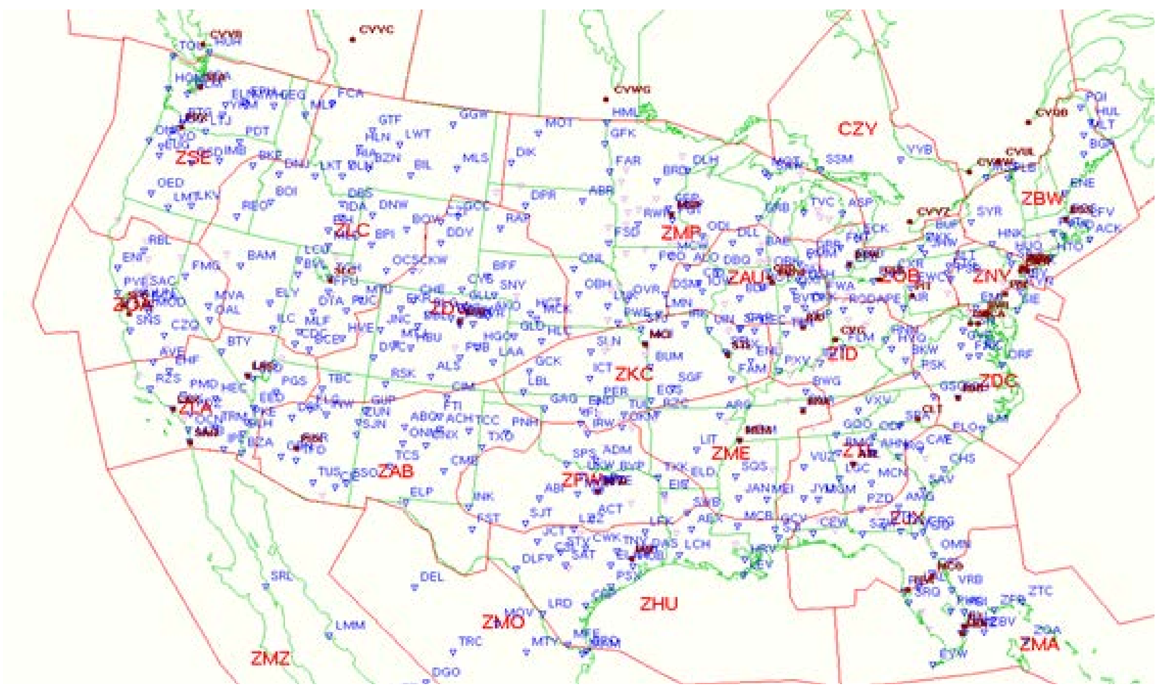
FAA's ATO handles 69,000 flights per day and helps transport over 743 million passengers per year, contributing to 5.4 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future. Air Traffic Services provides air traffic control operations from 21 en-route, 542 terminal, and three Combined Control facilities in the U.S., Puerto Rico, and Guam. Air Traffic Services also controls more than 59 million square miles of airspace over the continental U.S. and the Atlantic and Pacific Oceans including the South Pacific, to the Northern Polar Routes, the North Atlantic, the Caribbean, and the Gulf of Mexico. Every day we ensure thousands of positively controlled aircraft, en route from one terminal area to another, are directed to the safest, most efficient path onto their destinations.

The en-route domain provides service by controllers at 21 air route traffic control centers (ARTCCs) and two combined control facilities, who interface with more than 18 air navigation service providers. Terminal air traffic control (ATC) services include both airport surface operations and terminal area operations. Airport surface operations are conducted by controllers at 263 federal and 252 contract towers located at the Nation's airports. Terminal area operations are conducted by controllers at 161 TRACON facilities, which routinely handle aircraft within 40 miles of an airport.

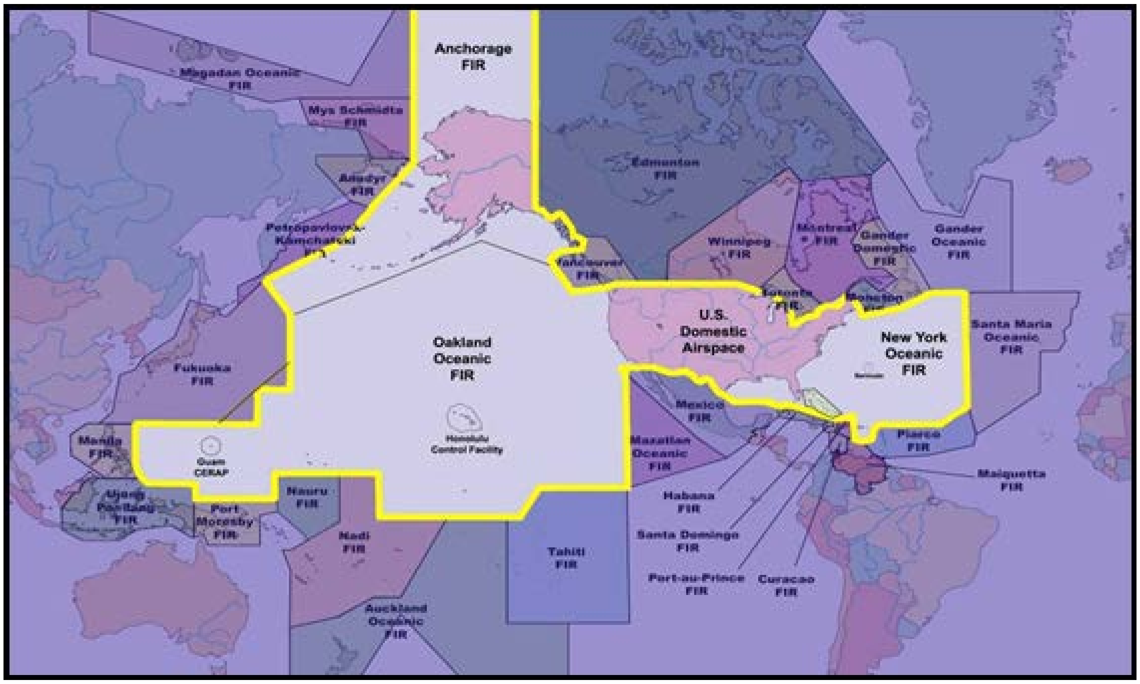
The Contract Weather Observation Program provides quality weather monitoring, augmentation, and backup of automated weather systems (Automated Surface Observing System and Automated Weather Observation System).

Air Traffic Services is divided into three geographical service areas (Eastern, Central, and Western) to better manage the delivery of ATC services. The primary function of each service area is to oversee ATC operations within its geographical area and to ensure quality standards established for Safety, Capacity, and Organizational Excellence are met. The first chart below shows where the service delivery points are for en route (21 ARTCCs and two combined control facilities). The second chart depicts the location of ATO's air traffic control towers and en-route center airspace.





In addition to domestic air traffic control, Air Traffic Services also provides control services outside of the contiguous U.S. as shown in the chart below.



By the end of FY 2015, planned accomplishments for Air Traffic Services include:

- Achieve an average daily airport capacity for the Nation's Core Airports during reportable hours of 59,062 arrivals and departures per day and maintain that level through FY 2018.
- Achieve a National Airspace System (NAS) on-time arrival rate of 88 percent at the Nation's Core Airports and maintain that level through FY 2018. FY 2015 Target: 88 percent.
- Decrease the rate of commercial air carrier fatalities per 100 million passengers on-board aircraft by 24 percent over a 9-year period (2010-2018). FY 2015 Target is 6.9
- Continue efforts to ensure global harmonization of service improvements through collaboration with international and industry service providers by active participation and leadership in regional ICAO and inter-organizational workgroups and decision making processes.
- Conduct research to improve safety and increase throughput using wake turbulence monitoring, operational procedures, and controller tools.
- Using the cross-organizational Airport Obstructions Standards Committee (AOSC), 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.
- Continue to support establishment of Facility Hiring Plan requirements and selection of potential candidates for placement into terminal, en-route, and combined control facilities in accordance with the ATC Workforce Hiring Plan.

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

FY 2016 funding levels will support 19,531 FTPs in the Air Traffic Services unit whose primary function is to ensure the safe and efficient flow of ATC services throughout the NAS. In FY 2016, we will continue to increase safety efforts as well as increase capacity and efficiency of the NAS. We will continue to support achieving an average daily airport capacity for the Nation's Core Airports during reportable hours of 59,062 arrivals and departures per day in FY 2016 and a NAS on-time arrival rate of 88.0 percent at the Nation's Core Airports. In addition, we will continue efforts to decrease the number of operational errors in the terminal and en-route environments. In the Oceanic airspace, our plan is to reduce separation to improve the percentage of NAS on-time arrivals and increase fuel efficiency.

In support of DOT's **Safety and Economic Competitiveness** Strategic Plan goals key outcomes expected to be achieved in the budget year with the requested resources:

Safety:

- Decrease the rate of commercial air carrier fatalities per 100 million passengers on-board aircraft by 24 percent over a 9-year period (2010-2018). FY 2016 Target is 6.9.
- Maintain the rate of serious runway incursions (Category A and B) at a rate of no more than 0.395 per million operations by improving training, procedures, evaluation, analysis and testing, and by designing, developing, and implementing an improved runway incursion analysis capability.
- Support the reduction of risks in-flight by limiting the rate of the most serious losses of standard separation to 20 or fewer for every thousand (.02) losses of standard separation within the National Airspace System (NAS) by developing a system that integrates remotely retrievable radar and other NAS data feeds to provide a common platform to detect and report suspected losses of separation in the En Route, Terminal, and surface environments by the end of FY 2018.
- Support the design, development, and implementation of an improved runway incursion analysis capability.
- Provide operational support to determine root causal factors of pilot deviations and operational errors.

Economic Competitiveness:

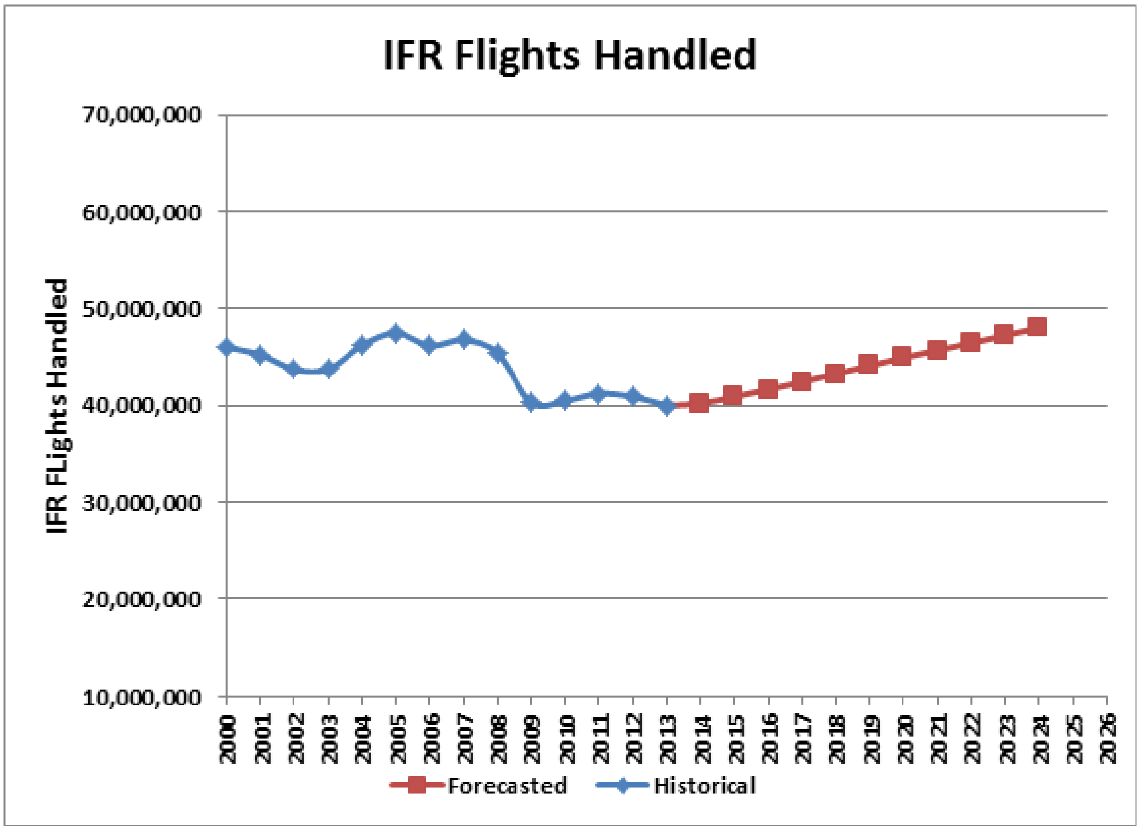
- Achieve an average daily airport capacity for the Nation's Core Airports during reportable hours of 59,062 arrivals and departures per day and maintain that level through FY 2018.
- Achieve a National Airspace System (NAS) on-time arrival rate of 88 percent at the Nation's Core Airports and maintain that level through FY 2018. FY 2016 Target: 88 percent.
- Oversee ATC operations for aircraft operating under instrument flight rules between airport terminal areas, which is performed by air traffic controllers located in service delivery points in the U.S., Puerto Rico, and Guam;
- Achieve the specified average daily airport capacity at the Nation's Core Airports and the NAS on-time arrival rate.
- Implement enhancements (some requiring new technology insertion) to air traffic control aircraft wake hazard mitigation procedures that will allow more airport runway and air corridor throughput capacity while at the same time maintain the current level of flight safety. The enhancements to the wake mitigation procedures will improve arrival and departure slot usage per airport, directly increasing the airport throughput capacity.
- Analyze each facility that has widely spaced parallel approaches to determine if benefits can be derived from use of color displays to identify parallel operations in lieu of existing final monitor positions.
- Ensure terminal facilities can maximize airspace design for arrivals and departures by supporting assessing the viability of reducing the separation minima from obstructions.
- Reduce means and variances of average time it takes to go from one core airport to another affecting at least 90 percent of passengers by supporting research to improve safety and increase throughput using wake turbulence monitoring, operational procedures, and controller tools.
- Provide the oversight, management, and support necessary to enable safe increases in capacity and efficiency through changes in airspace, procedures improvement, and inserting new technology into operations.
- Support the Reconfigurable Cockpit Avionics Test-bed (RCAT) in examining data from FAA investigations related to Pilot Deviations, loss of standard separation, and Vehicle/Pilot Deviations in order to determine root causal factors for the incident.

Air Traffic Services also supports the FAA Mission and U.S. Transportation interests in advancing aviation in the U.S. and beyond. One of the activities we will assist in is to ensure harmonization of service improvements through collaboration with international and industry service providers by active participation and leadership in regional International Civil Aviation Organization (ICAO) and other inter-organizational workgroups.

What Benefits will be provided to the American Public through this request?

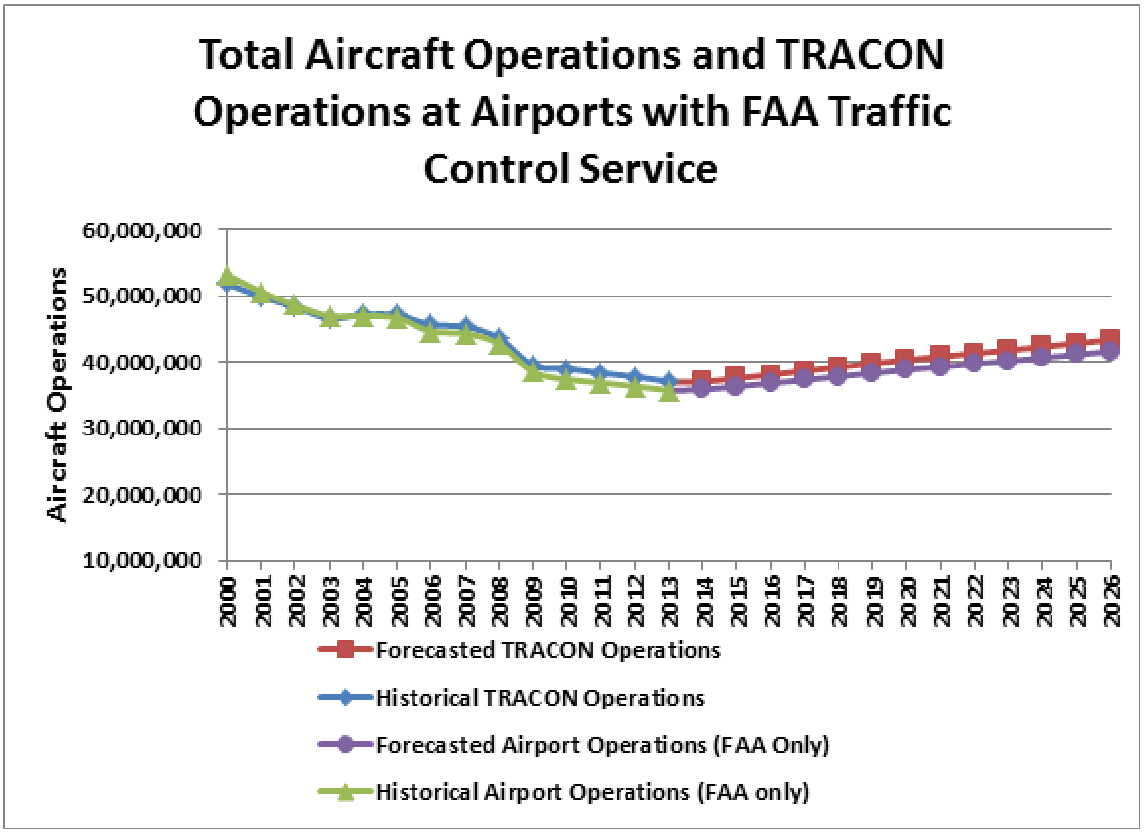
The ATC system benefits the American public by preventing collisions between aircraft operating in the system, by providing an organized and expeditious flow of air traffic, and by providing support for National Security and Homeland Defense.

The chart below depicts the number of Instrument Flight Rules (IFR) flights handled. 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).



Source: FAA Aerospace Forecasts FY 2014-2026

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



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. Air Traffic Services' efforts support an air transportation system responsive to consumer needs and helps maintain a well-trained controller workforce.

The Air Traffic Services unit is effective in achieving its annual performance goal for NAS on-time arrival and average daily airport capacity, which are tracked at the Nation's Core Airports and seven metropolitan areas. The terminal and en route domains have specific long-term performance goals, including "reducing the commercial air carrier and general aviation fatal accident rates;", "increase reliability/on-time performance of scheduled carriers" and "increase capacity for the Nation's Core Airports to meet projected demand/reduce congestion". We have also achieved the annual performance goals for runway incursions. This goal is tracked at all airports for which Air Traffic Services is responsible.

FY 2013 Air Traffic Services Scope of Operations

Number of Flights Handled Annually	24,968,328
Number of Air Traffic Controllers	14,463
Number of Facilities Operated	567
Amount of Airspace	5 Million Square Miles
Amount of Space Over Water	24 Million Square Miles

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

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Technical Operations Services – Budget Request ($000)

Program Activity	FY 2014 Actuals	FY 2015 Enacted	FY 2016 Request	Change FY 2015-2016
Technical Operations Services	$1,599,939	$1,594,442	$1,620,643	+$26,201

The FY 2016 budget request for Technical Operations Services is $1,620,643,459 and 8,123 FTP / 7,762 FTE. It provides for $8,430,362 for the FY 2016 pay raise, $1,839,843 for the annualized cost of the FY 2015 pay increase, $3,918,039 for the FERS contribution increase, $3,891,044 for one more compensable day in FY 2016 and $6,847,000 for non-pay inflation. The request also includes $1,275,000 for a discretionary increase.

The Air Traffic Organization (ATO) Environmental and Occupational Safety and Health (EOSH) Program funding request of $1,275,000 will allow FAA to address required OSH training standards, identify and deploy employee safety equipment, and continue to assess and address hazards across all FAA workplaces.

ATO provides Air Traffic Control services in the Continental US, Alaska, and a significant portion of the Atlantic, Pacific and Caribbean airspace. The ATO operates out of 644 staffed locations (Towers, Centers, Automated Flight Service Centers (AFSS), and System Support Centers) and owns and operates nearly 67,000 pieces of equipment which make up the NAS.

Technical Operations supports the delivery of safe and efficient flight services to customers through responsive and cost effective maintenance of National Airspace System facilities, systems, and equipment, and by providing operational oversight of leased services.

What is this Program and Why is it Necessary?

FAA's ATO handles 69,000 flights per day and helps transport over 743 million passengers per year, contributing to 5.4 percent of the total U.S. economy.

The NAS is composed of a mix of hardware and software systems that enable controllers to monitor and communicate with pilots and other ATC facilities. NAS system capabilities include automation, communication, surveillance and navigation. Failure at any point in the system can cause capacity reductions and potentially compromise safety. Reductions in capacity cause delays with costs to users and the flying public. Technical Operations ensures that terminal and en route controllers have all critical parts of the NAS infrastructure available for the safe and efficient delivery of air traffic services.

Technical Operations - NAS Systems and Facilities			
Staffed/Non Staffed Facilities		**NAS Equipment and Services**	
		Automation	2,445
		Communications	18,934
Towers	544	Infrastructure	23,763
Centers	23	Mission Support	3,500
AFSS	12	Navigation	13,614
Other Staffed Facilities	65	Surveillance	2,314
Non-staffed Facilities	12,494	Weather	2,338
Total - Facilities	**13,138**	**NAS Systems/Services**	**66,908**

The mission of the Technical Operations Service Unit is to:

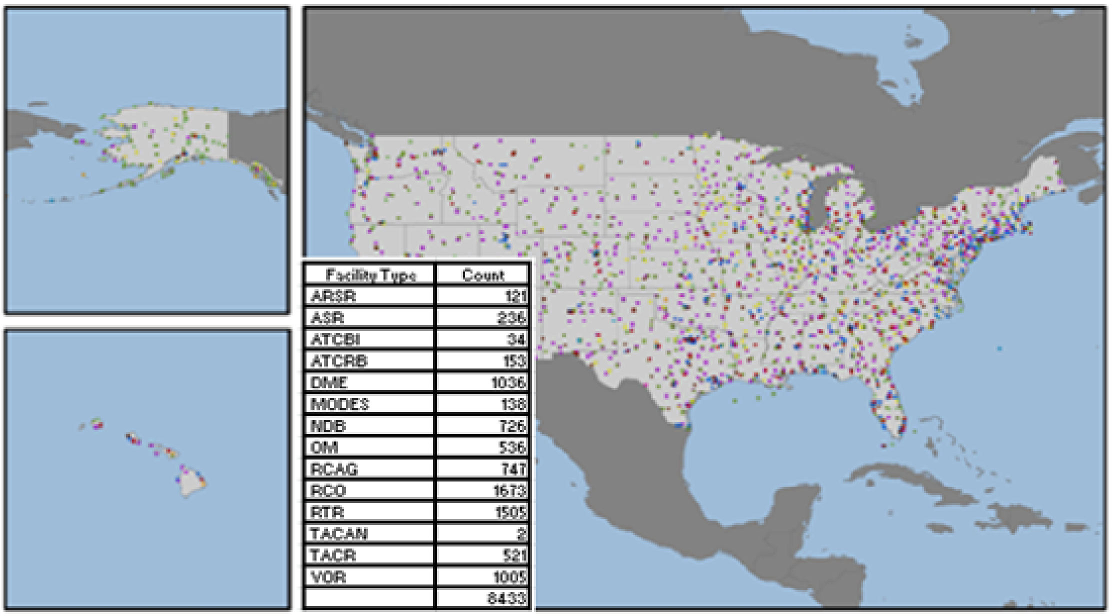
- Ensure efficient delivery of all NAS services for all stakeholders;
- Increase NAS capacity for all users through changes in technology;
- Maintain optimal NAS services for all users by strategically investing in the current infrastructure and providing operational oversight of leased NAS services;
- Improve situational awareness for pilots, controllers and airfield operators by providing them with real-time information concerning potential conflicts and offering possible resolutions; and
- Provide a safe and healthful workplace for all FAA employees through an active OSHA program.

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

- NAS system installation, maintenance, restoration, modification, certification of NAS Systems, and oversight of vendor supplied NAS services and vendor maintenance programs;
- Inspection to support restorations and periodic inspection of NAVAIDs and the validation of instrument flight procedures;
- Facilities maintenance; and
- Engineering and assignment of aeronautical frequency spectrum.

Our core work is performed by the System Support Centers, Flight Inspection Field Offices, and Technical Operations Control Centers. 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, maintenance, modifications, and technical documentation.

Aviation Equipment Across the NAS



Facility Type	Count
ARSR	121
ASR	236
ATCBI	34
ATCRB	153
DME	1036
MODES	138
NDB	726
OM	536
RCAG	747
RCO	1673
RTR	1505
TACAN	2
TACR	521
VOR	1005
	8433

These graphics represent 8,433 of 66,908 facilities and equipment maintained by the FAA. Produced by AJW-1B January 2015

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

Without system specialists and management teams working to complete preventive maintenance and repair equipment, unscheduled outages can result in delays in the system, negatively impacting the flying public.

Technical Operations manages its operations by measuring performance of the NAS based on what systems or services are available for air traffic control operations (Adjusted Operational Availability). This metric directly impacts FAA's airport capacity metric (Average Daily Airport Capacity), as well as our safety reduction goals (Commercial and General Aviation Fatal Accident Rates).

Technical Operations Flight Inspection provides another vital link in the delivery of air traffic control services. Technical Operations employees conduct airborne inspection of electronic signals from ground-based NAVAIDS to support aircraft departure, en route, and arrival procedures. This group evaluates flight procedures for accuracy, human factors fly-ability, and obstacle clearance. Without this "check," the NAS would not be as safe as it is today.

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

Funding the FY 2016 request at this level will allow Technical Operations to continue to maintain NAS availability and system integrity and to achieve these initiatives:

- Deploy runway status lights at Airport Movement Area Safety System (AMASS) and Airport Surface Detection Equipment – Model X (ASDE-X) airports.
- Continue development and implementation of Technical Operations Control Centers to provide operational improvements such as improved response times, reduced service caused delays, reduced impact of NAS infrastructure anomalies, and reduced NAS service outage occurrences and durations.
- Develop and manage an ATC Facilities Infrastructure Strategic Plan that maps both future infrastructure and future sustainment to right size the NAS.

The Air Traffic Organization (ATO) Environmental and Occupational Safety and Health (EOSH) Program funding request of $1,275,000 will allow FAA to address required OSH training standards, identify and deploy employee safety equipment, and continue to assess and address hazards across all FAA workplaces.

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

- Provide continuous NAS information to external aviation partners by monitoring, restoring, and directing restoration of the systems and networks providing the information.
- Sustain operational availability of all facilities at 99 percent by sustaining power systems; evaluating system operations; and implementing solutions to increase operational readiness. In addition, complete funded activities of preventive maintenance, equipment modifications, service certifications, and restoration activities to include flight inspection and oversight of leased services.
- Improve incident detection within the NAS infrastructure environment and improve cyber incident response.

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

- Reduce the commercial air carrier fatalities per 100 million persons on board by 24 percent over a 9-year period (2010-2018). No more than 6.2 in 2018.
- Reduce the general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.
- Sustain adjusted operational availability of 99.7 percent for the reportable facilities and services that support the Nation's Core Airports.
- Achieve zero cyber-security events that disable or significantly degrade FAA services.

What Benefits will be provided to the American Public through this request?

The NAS is an inherently complex system with multiple levels of redundancy to assure ongoing availability of key services. Technical Operations ensures thousands of systems, facilities, and pieces of equipment are operationally ready to manage our Nation's air traffic control system. The ability of the NAS to continually provide operational availability and awareness to controllers and pilots is crucial to both safety and capacity.

The goal for Adjusted Operational Availability is expected to remain at 99.7 percent. ATO analyzes various performance data to increase or maintain the targeted level of performance in order to provide appropriate safety and capacity outcomes to system users.

The target performance level is met by adherence to FAA maintenance policies and procedures for NAS monitoring, control, maintenance, and restoration. This strict adherence optimizes service availability for the Nation's Core Airports.

Providing physical security elements at FAA facilities supports the Agency's efforts to ensure the safety of air travelers. These physical security systems and guard forces protect the FAA employees who in turn ensure the safe and efficient control of flight operations.

Sustain Adjusted Operations Availability at 99 Percent for Reportable Facilities that Support the NAS

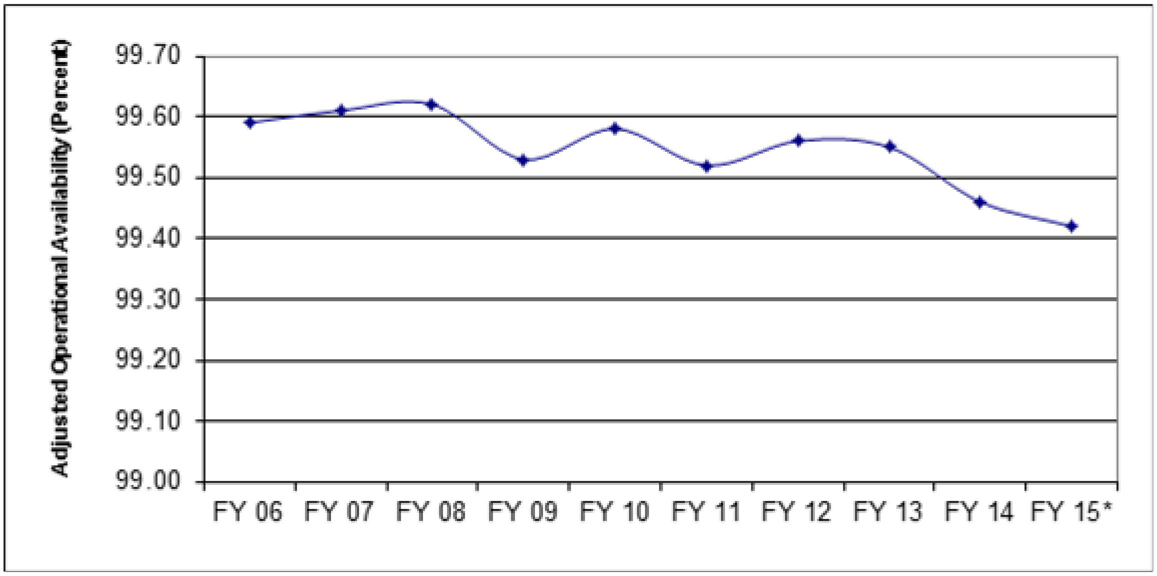


Figure 7: Adjusted Operational Availability of NAS Capabilities
Note: *FY 2015 data thru 12/31/14 (December 2014 data is preliminary)

Systems Maintenance Field Maintenance Performance Indicators

Fiscal Year	Number of Facilities**	Adjusted Operational Availability	Reliability
2006	22,860	99.59%	99.85%
2007	22,627	99.62%	99.84%
2008	22,611	99.62%	99.84%
2009	22,804	99.53%	99.85%
2010	22,419	99.58%	99.85%
2011	22,451	99.52%	99.85%
2012	22,022	99.57%	99.86%
2013	26,624	99.55%	99.85%
2014	26,554	99.46%	99.84%
2015*	26,493	99.42%	99.86%

*FY 2015 data thru 12/31/14 (December 2014 data is preliminary)
**Operational facilities deemed reportable in FAA Order 6040.15, "National Airspace Performance Reporting System." (The grouping in NASPAS for "NAS Reportable Facilities" was updated in October 2013)

Detailed Justification for the - Vice President System Operations, AJR-0

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – System Operations Services – Budget Request
($000)

Program Activity	FY 2014 Actuals	FY 2015 Enacted	FY 2016 Request	Change FY 2015-2016
System Operations Services	$328,470	$299,610	$301,122	+$1,512

The FY 2016 budget request for System Operations Services is $301,122,000 and 482 FTP / 444 FTE. It provides for $705,277 for the FY 2016 pay raise, $153,920 for the annualized cost of the FY 2015 pay increase, $327,780 for the FERS contribution increase, and $325,522 for one more compensable day in FY 2016. Systems Operations (AJR) provides a broad range of operational services to the Air Traffic Organization (ATO). All national air traffic flow management initiatives are provided by AJR along with policy and concept development for new airport surface flow management programs. AJR is working to provide gate-to-gate strategic traffic management. We are the focal point for stakeholder interaction through formal Collaborative Decision Making venues and serve as FAA's Customer Advocate. We provide all national flight service functions and operational oversight to all National Airspace System (NAS) security issues. As part of the Administrator's NAS Strategic Sub-Initiative, "Right-sizing the NAS", Flight Service is developing a plan to streamline its services. As overall NAS management requires exacting data exchange, we manage FAA data policy and orders. With data management we provide ATO with system performance analysis, trending and forecasting. Finally, in promoting FAA's sophisticated approach to air traffic system management we enable the global outreach to the international community on behalf of ATO, providing subject matter experts and operational insight to our global partners

What is this Program and Why is it Necessary?

FAA's ATO handles 69,000 flights per day and helps transport over 743 million passengers per year, contributing to 5.4 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 System Operations Service Unit consists of several directorates that perform essential functions in the daily operation of the NAS. These functions affect all aspects of FAA Air Traffic Control (ATC) operations and our engagement with other Government agencies, airlines, and foreign Air Navigation Service Providers (ANSPs). These directorates are:

- Air Traffic Control System Command Center (ATCSCC)
- Security
- Flight Services
- Data Management
- Surface Operations
- International
- Performance Analysis

Systems Operations primary operational responsibility is managing FAA's **Air Traffic Control System Command Center (ATCSCC)**. The Command Center exercises command, control and oversight of air traffic activity within the National Airspace System (NAS). The facility, located in northern Virginia, coordinates all air traffic movement, both civil and military, in domestic and oceanic airspace. Its staff strategically manages air traffic to minimize delays and congestion, while maximizing the overall use of the NAS.

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. Decisions are carried out in cooperation with airline personnel, traffic management specialists and controllers at affected facilities.

The **Security Directorate** orchestrates ATO's efforts to protect the U.S. and its interests from national defense, homeland security, and law enforcement-related threats and natural hazards involving the air domain. The Security Directorate leads ATO's efforts to mitigate the impact of those threats and hazards. System Operations Security comprises a small headquarters command and support component and Air Traffic Security Control (ATSC) watch-standing teams and operations liaisons at key air defense and homeland security nodes.

Flight Services collects and disseminates aeronautical and meteorological information and provides customized pre-flight and in-flight briefings to domestic and international General Aviation (GA) communities, military aircraft, air carriers, and federal and local law enforcement. These include requests for disaster relief, medical evacuations, weather and traffic reporting, and business/personal travel to thousands of airports/landing areas and exclude the military and scheduled airline services. DoD, law enforcement, commercial, and air taxi operators also benefit from services provided by Flight Service. Flight Service has identified several opportunities to increase efficiency and reduce costs by "rightsizing" the flight service footprint.

The **Data Management Directorate** is responsible for four primary functional program areas: Data Release Process, NAS Data Repository, ATO Data and Information Sharing Policy and Standards, and ATO Block Aircraft Registration Request (BARR).

The **Surface Operations Directorate** serves as a single point of responsibility, authority, and accountability for improving surface operations in coordination with industry. It provides shared situational awareness of surface movements through surveillance and data exchange. With industry, the Systems Operations Directorate defines system requirements, metrics, and interoperability standards for improved decision making of traffic flow management, and facilitates the implementation of integrated airport movement management decision support tools, standards, and processes.

International is focused on the harmonization of international standards for ATM services. This requires extensive multilateral and bilateral consultation in international forums with global partners, civil aviation authorities, and air navigation service providers.

The **Performance Analysis Directorate** monitors the operational performance of the NAS and is responsible for developing and coordinating FAA operational metrics. The Directorate also maintains an analytical tool, Performance Data and Reporting System (PDARS), which provides operational facilities with gate-to-gate flight and operational data. As part of its performance analysis role, the Directorate monitors airline schedules and behavior, reporting monthly on the likely impact of schedules on performance.

In addition to maintaining a high level of daily performance in FY 2016, key Systems Operations outputs include:

- ATCSCC improvements in critical information-sharing with aviation stakeholders to more effectively manage flight diversions during severe weather events.
- Maintain an average daily airport capacity for the Nation's Core Airports of 86,606 arrival and departures per day.
- Maintain an average daily airport capacity for the seven metropolitan areas of 39,484 arrivals and departures per day.
- Improve management of surface flow operations to increase throughput, reduce surface-related delays and decrease fuel consumption and emissions, while providing opportunities to reduce noise and improve safety.
- Continue to strengthen the preparedness and consequence management capabilities used to sustain NAS operations and to support disaster response air missions in the face of critical events, including natural disasters and large scale terrorist attacks.
- Develop policy and procedures for implantation of the President's Open Data Policy in ATO.
- Collaborate with international organizations to produce International Civil Aviation Organization (ICAO) and Civil Air Navigation Services Organization (CANSO) documents recommending improved operational practices and analyzing operational performance.

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

Funding the FY 2016 request at this level will allow System Operations to ensure the operational safety, security, and efficiency of the National Airspace System (NAS) by accomplishing the following initiatives. Key outcomes include:

- Continuing to manage the real-time use of the NAS to ensure safe and efficient use of available airspace, equipment, and workforce resources through planning, directing, implementing, overseeing, and continuously regulating the flow of air traffic to minimize delays and congestion while maximizing the overall flow of air traffic throughout the United States.
- Utilizing the Collaborative Trajectory Options Program giving flight operators flexibility to propose multiple trajectories or routes when weather or other factors impact air traffic flow and develop the Collaborative Decision Making (CDM) process model and share airport surface data with stakeholders.
- Incorporating commercial space launches into the NAS.
- Right-sizing Flight Service, by expanding the use of existing and developing technologies to provide operational services based on user preferences to create efficiencies through automation.
- Continuing to lead ATO's crisis management efforts to sustain the continuity of NAS operations and to support the National Response Framework during critical events such as catastrophic hurricanes or large scale terrorist attacks.
- Supporting implementation of the President's Open Data Policy and the associated Executive Orders in ATO.
- Executing the program for aircraft owners that blocks display of their flight information in the Aircraft Situation Display to Industry data feed.
- Supporting ATO implementation of ICAO's Global Air Navigation Plan (GANP), the Aviation System Block Upgrade (ASBU) initiative and Global Air Safety Plan (GASP).
- Supporting the Administrator's Global Leadership Initiative through participation on the International Steering Committee, as well as supporting AJR's role as the co-chair of the International Advisory Board.
- Tracking average flight and surface times within the NAS by including Airport Surface Detection Equipment (ASDE-X) data in the PDARS data set and integrating that data with the terminal and en route data already available to provide a consolidated gate-to-gate measurement and analysis capability.

What Benefits will be provided to the American Public through this request?

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 Flight Service AFSS contract is on schedule to reach its expected savings and cost avoidance of $2.045 billion in capital and labor over the 13-year period of the contract. The service unit's Flight Service Directorate continues to provide pre-flight, in-flight, and post-flight services within established cost estimates for the AFSS contract. Flight Service will continue to provide efficiencies and value for its stakeholders by: expanding the use of existing and developing technologies, realigning/reengineering/consolidating activities, and eliminating obsolete activities.

The Systems Operations Security Directorate has demonstrated sound operational performance and adherence to national security guidance in a number of real-world and exercise scenarios. The directorate's response and performance during the 2010 earthquake in Haiti, 2010 Deep Water Horizon oil spill, and Hurricanes Katrina, Ike, and Gustav validated ATO's operational actions and processes were sound in protecting lives and resources and in maintaining economic and operational stability for civil aviation.

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

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Safety and Technical Training Services – Budget Request ($000)

Program Activity	FY 2014 Actuals	FY 2015 Enacted	FY 2016 Request	Change FY 2015-2016
Safety and Technical Training	$266,364	$308,106	$310,711	+$2,605

The FY 2016 budget request for Safety and Technical Training is $310,711,157 and 557 FTP / 538 FTE. It provides $656,246 for the FY 2016 pay raise, $143,219 for the annualized cost of the FY 2015 pay increase, $304,993 for the FERS contribution increase, and $302,891 for one more compensable day in FY 2016. In addition, $1,198,000 is requested for the Technical Operations Safety Action Program (T-SAP) discretionary increase request.

The discretionary increase request of $1,198,000 for the Technical Operations Safety Action Program (T-SAP) will provide funding for expansion of a voluntary, cooperative, non-punitive environment for open and confidential reporting of National Airspace System related safety concerns. This request is to expand the T-SAP program from the Central Service area to the Eastern and Western Service areas

Safety and Technical Training is the only organization within ATO that provides technical training to controllers, technicians, and engineers. We ensure the technical competency (knowledge and skills) of the workforce, and ensure we certify enough of the right workers to meet operational needs. We develop and deliver technical training programs for a workforce of approximately 14,500 air traffic controllers, 6,000 Airway Transportation Systems Specialist (ATSS), and 1,800 engineers.

Our safety programs validate and categorize airborne and surface safety occurrences; conduct in-depth analysis of airborne and surface events to identify hazards (determine causal factors and root causes); and implement corrective actions to mitigate identified hazards. In addition, Safety and Technical Training manages policy development, mitigates fatigue risks through a comprehensive fatigue risk management system, and facilitates an ongoing ATO safety culture transformation that leads to improved safety performance.

What is this Program and Why is it Necessary?

FAA's ATO handles 69,000 flights per day and helps transport over 743 million passengers per year, contributing to 5.4 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 work of **ATO Safety and Technical Training** benefits DOT's 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.

Safety and Technical Training supports the Department of Transportation's (DOT) goal of reducing transportation-related injuries and fatalities and is the lead for two of FAA's Priority Goals – Runway Incursion Rate and Hazards Mitigation. Safety and Technical Training also supports the FAA Administrator's initiative, Risk-Based Decision Making: to build on safety management principles to proactively address emerging safety risks by using consistent, data-informed approaches to make smarter, system-level, risk-based decisions.

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 ATO, and reporting findings to improve safety performance. Safety and Technical Training integrates the functions of data and information from investigations, evaluations, independent assessments, safety risk management, runway safety, and operational services to identify collision risks, influence their resolution, and provide information on assessments of operational and safety performance within the NAS.

Safety and Technical Training provides all technical training to controllers, technicians, and engineers. We ensure the technical competency (knowledge and skills) of the workforce, and ensure we certify enough of the right workers to meet operational needs

We deliver state-of-the-art training solutions to meet our ever-changing employee demographics and operational requirements both today and throughout the transition to NextGen. We are undertaking major course redesign work, augmenting field training, and providing a high-level of service and customer support to our facilities.

Safety and Technical Training uses contract resources to provide a broad range of comprehensive professional, technical, and support services including, but not limited to, air transportation support, engineering services, training development and maintenance, and training delivery. Our safety programs validate and categorize airborne and surface safety occurrences; conduct in-depth analysis of airborne and surface events to identify hazards (determine casual factors and root causes); and implement corrective actions to mitigate identified hazards. In addition, Safety and Technical Training manages policy development, improves fatigue risks through a comprehensive fatigue risk management system, and facilitates an ongoing ATO safety culture transformation that leads to improved safety performance.

Safety and Technical Training also provides logistical support and subject matter expertise in aircraft accident litigation where allegations of negligence are made, in whole or part, involving ATO employees.

By the end of FY 2015, the accomplishments for Safety and Technical Training will include:

- Evolving our comprehensive event reporting, risk reduction and investigation policies to help us measure the effectiveness of our Safety Management System.
- Using the best analytical tools, such as the Traffic Analysis Review Program (TARP), to not only measure compliance with safety standards but to also enable digital analysis of radar data throughout the NAS. These sophisticated tools enable management at all levels to identify safety issues, determine the likelihood of occurrence, target correction, and establish monitoring systems to evaluate the effectiveness of mitigations implemented.
- Continuing to target efforts to significantly remove risk from the NAS with new risk analysis processes, new safety performance metrics (i.e., System Risk Event Rate (SRER), Performance Data Analysis and Reporting System (PDARS)) and tools (i.e., Risk Analysis Process (RAP), Event Review Committee (ERC), Corrective Action Requests (CAR), Partnership for Safety (PFS), and Safety Analytics Tool (SAT)).
- Developing the ATC Fatality Metric, a performance target that tracks the ATC contribution to fatal accidents.
- Institutionalizing analysis and reporting of information that ensures the effectiveness of Quality Assurance and Quality Control programs.
- Implementing safety culture principles that address human behavior and the tools to improve such behaviors.
- Support initial and follow on training for air traffic controllers and technicians at the Academy.
- Maximize the benefit of the air traffic controller training contract to augment delivery of curriculum at the ATC Academy and at field facilities.
- Integrating SMS and Risk Management philosophies, processes, and tools throughout ATO.
- Completing Air Traffic Safety Action Program (ATSAP) training to all new air traffic control personnel.
- Developing new safety performance metrics and dashboards that improve our ability to ensure the effectiveness of safety mitigations.
- Continuing to identify operational fatigue risks and develop and recommend fatigue risk mitigations.
- Increasing awareness throughout ATO on fatigue risks and mitigation approaches.

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

Funding Safety and Technical Training programs at the requested level will provide the necessary resources to ensure risk in the delivery of air navigation services is effectively managed, operational personnel understand and participate in disclosing and addressing safety issues, air traffic facilities are properly staffed with the optimum number of qualified individuals, and personnel receive timely training directly tied to addressing safety concerns in the NAS.

Funding will also provide $1,198,000 for the Technical Operations Safety Action Program (T-SAP) which is a voluntary, cooperative, non-punitive environment for open and confidential reporting of National Airspace System related safety concerns. This request will expand the T-SAP program from the Central Service area to the Eastern and Western service areas. Funding is requested for recurring cost for contractor support, administrative budget, travel budget, hardware and software procurement development and support.

Funding of Safety and Technical Training programs support the development and implementation of NextGen. Safety and Technical Training are working in partnership with the NextGen program office to ensure training is an integral part in the development and implementation of NextGen systems and procedures. Safety and Technical Training also completes independent safety assessments prior to NextGen systems being used in a live air traffic environment. Our application of safety risk management on the introduction of new technologies and procedures into the NAS ensures a safe transition to NextGen.

Safety and Technical Training has already undertaken measures to reduce costs through more effective contract management and will continue to work toward maximizing available resources. To fulfill our core responsibilities and deploy new technologies, processes, and policies in support of these efforts, the requested level of funding is necessary to fully realize the capabilities of a realigned organization that provides safety and technical training services for the entire ATO.

In FY 2016, key outcomes expected to be achieved with the requested resources:

- Conduct analysis and disseminate findings of Risk Analysis Events (loss of less than 66 percent required radar separation) on a quarterly basis which supports the identification of ATO system issues hazards.
- Improved identification of system risk for surface safety occurrences which support the development and implementation of corrective actions to mitigate hazards associated with identified risk. This will mitigate risk associated with runway incursions (total and A&B (most serious)).
- Addition of a voluntary safety reporting program for ATO technicians, to learn more about the technical risks existing within the increasingly automated NAS, and then develop plans mitigate those risks.
- Addition of a service integrity risk analysis process (SI-RAP) to analyze reported problems with the air traffic system equipment and technical systems.
- Improved safety culture that promotes a non-punitive, voluntary reporting environment that encourages employees at all levels to report safety issues and concerns without fear of reprisal.
- Improved litigation support to the FAA's Office of Chief Counsel, Aircraft Accident Litigation and Enforcement Divisions, by managing discovery and coordinating with the air traffic facilities for access to air traffic witnesses and the collection of evidence in property lost, personal injury, and wrongful death tort actions against the government; and provides expert consultation regarding all air traffic matters.
- Improved training, procedures, evaluation, analysis, testing, and certification to reduce the risk of runway incursions resulting from errors by pilots, air traffic controllers, pedestrians, vehicle operators, tug operators, and individuals conducting aircraft taxi operations.
- Complete assigned independent safety reviews and assessments of NAS systems, including NextGen operational concept demonstrations and prototyping, to identify safety risk.
- Provide sufficient numbers of trained/qualified individuals to meet operational needs.
- Improve the technical requirements for air traffic controller training to standardize training across the NAS.
- Complete the integration of ATO Learning Content Management System (LCMS).
- Deploy annual controller and technician recurrent training while incorporating ATO professional standards.

What Benefits will be provided to the American Public through this request?

Safety and Technical Training ensures the safety of the flying public. All our programs are geared toward finding risk in the NAS, then fixing it. The benefits of our programs are manifested in risk reduction. Through risk mitigation, risk management, SMS, and voluntary reporting systems, Safety and Technical

Training helps FAA accomplish its commitment to the flying public to provide the safest aviation system in the world.

Safety and Technical Training continues to provide the flying public with the safest aviation system by continuing to focus on safety culture, outreach, awareness, improved procedures and infrastructure, and technology. Additionally, it ensures all technical employees in every FAA facility are educationally equipped to perform their duties in the NAS. We have become more efficient not only within our office, but our outreach activities and technological advances have also helped improve the way FAA conducts safety as a whole.

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

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Mission Support Services – Budget Request
($000)

Program Activity	FY 2014 Actuals	FY 2015 Enacted	FY 2016 Request	Change FY 2015-2016
Mission Support Services	$284,470	$281,708	$286,575	+$4,867

The FY 2016 budget request for Mission Support Services is $286,575,488 and 1,372 FTP / 1,368 FTE. It provides for $1,483,467 for the FY 2016 pay raise, $323,752 for the annualized cost of the FY 2015 pay increase, $689,446 for the FERS contribution increase, and $684,696 for one more compensable day in FY 2016. In addition, a discretionary increase request of $1,686,000 is requested for the Weather Camera Program.

The discretionary increase request for the Weather Camera Program in Alaska will provide near real-time camera images, updated every 10 minutes to pilots for situational awareness, pre-flight planning, and en route weather briefings for reduction of weather-related accidents. Funding is required for maintenance and operations of all 221 weather camera sites and its services.

The Mission Support Services mission is to promote the standardization of processes, efficiency, and effectiveness between Air Traffic 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:

- Oversight and support for NAS procedures and changes which affect operations and special activities with the NAS.
- Development and distribution of Aeronautical Charts.
- 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.
- Standardized administrative support services.
- Financial, material, procurement, and logistical support services.
- Integrated planning, requirements management, program implementation, and management support services.

What is this Program and Why is it Necessary?

FAA's ATO handles 69,000 flights per day and helps transport over 743 million passengers per year, contributing to 5.4 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.

Mission Support Services is comprised of: three **Service Centers** and five **Directorates.**

The **Service Centers** are located in Atlanta, Fort Worth, and Seattle and provide support to the Director of Operations in matters concerning airspace and procedures, quality assurance, equipment installation, financial management, materiel management, procurement, hiring, and training. Each service center is comprised of five groups: Administrative Services, Business Services, Planning and Requirements, Operations Support, and Quality Control. The shared services model brings people together with similar expertise, allows sharing of ideas and resources, fosters collaboration to promote standardization of processes, improves efficiency and effectiveness, and enhances communication to achieve results among service units.

The **Airspace Services Directorate** provides an important systems view that incorporates transition access/egress points available through newer technologies that are not tied to ground-based navigation aids. Airspace Services is responsible for coordinating all Airspace redesign efforts and the implementation of new Performance-Based Navigation (PBN) routes and procedures.

The **Aeronautical Information Management** (AIM) Directorate is responsible for providing quality aeronautical data and aeronautical information necessary for the safety, regularity, and efficiency of the NAS. AIM provides static aeronautical information to users along with dynamic real-time updates in support of the NAS, flight operations, and industry.

The **Aeronautical Navigational Products** (AeroNav Products) serves as the FAA's aeronautical charting authority to ensure the design, development, and publication of aeronautical charts and products necessary for the safe and efficient navigation of aircraft in the NAS. AeroNav Products include continual modification, revision, and updates to Approach, Departure, Arrival and Airway Instrument Flight Procedures (IFP's) through the issuance of critical amendments, Notices to Airmen (NOTAMs), completing periodic reviews, and updating/revising Aeronautical Chart Products as necessary.

The **Operational Concepts, Validation, & Requirements** Directorate focuses on increasing organizational effectiveness and efficiency and addresses evolving needs and future readiness to meet operational and technical changes in the NAS.

The **Air Traffic Standards and Procedures** Directorate provides policy and procedural management and support to air traffic operations and serves as the primary point of contact for Terminal, En Route and Oceanic/Offshore, traffic management operations on standards and procedures issues.

By the end of FY 2015, significant accomplishments for Mission Support Services will include the following:

- Continue development of the Federal NOTAM system including 120 additional deployments of the NOTAM Manager to public use airports.
- Develop and publish 100 Wide Area Augmentation System (WAAS) Localizer Performance with Vertical Guidance (LPV)/ Localizer Performance (LP) procedures. Complete all required modifications, revisions, and updates to Approach, Departure, Arrival and Airway Instrument Flight Procedures (IFPs) through the issuance of critical amendments, IFP Notice to Airmen (NOTAMs), completing biennial IFP periodic reviews, obstacle review and analysis of all proposed new construction, and updating/revising Aeronautical Chart Products as necessary to ensure currency and adapt the IFP infrastructure to reflect the changes occurring in the NAS.
- Complete all required revisions and updates on Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) Aeronautical Chart Products. Airport and Facilities Directory (A/FD), airport diagrams and sketches and the Terminal Procedure Publications (TPPs); Create/build new and maintain ATC Radar Video Maps (RVMs), and Minimum Vector Altitude (MVA) maps in support of Air Traffic Controllers to safely guide aircraft through the NAS.
- Develop, coordinate and present FAA and U.S. positions on operations in oceanic and offshore airspace with other FAA LOBs, U.S. organizations, other States and international organizations.
- Provide enhanced guidance (directives) to support a consistent, standardized use of Time Based Flow Management (TBFM) from a national perspective and ensure future capabilities have operational subject matter expertise in support of implementation.

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

Funding requested in FY 2016 will provide continued development of Performance Based Navigation (PBN) criteria and procedures and for continued development of cornerstone documents, safety studies, and research needed for the safe integration of UAS into the NAS.

Funding will also provide $1,686,000 for maintenance and operations of all 221 weather camera sites and services of the Weather Camera Program in Alaska. The Weather Camera Program provides near real-time camera images, updated every 10 minutes to pilots for situational awareness, pre-flight planning, and en route weather briefings for reduction of weather-related accidents.

FY 2016 funding for Mission Support Services will also:

- Complete Metroplex design work and pre-implementation evaluation activities at one Metroplex location (e.g., South/Central Florida)
- Begin Post Evaluation activities at one Metroplex location (e.g., Southern California)
- Complete Post Evaluation activities at two Metroplex locations specifically for benefits analysis and metric analysis. (e.g., Atlanta, Charlotte)
- Begin Metroplex documentation reviews at two Metroplex locations (e.g., Charlotte, Atlanta)
- Complete Metroplex documentation reviews, lessons learned and potential redesign based on benefits analysis, and process improvement activities at two Metroplex locations. (e.g., Washington DC, Northern California)
- Complete all required modifications, revisions, and updates to Approach, Departure, Arrival and Airway Instrument Flight Procedures (IFPs) through the issuance of critical amendments, IFP Notice to Airmen (NOTAMs), completing biennial IFP periodic reviews, and updating/revising Aeronautical Chart Products as necessary to ensure currency and adapt the IFP infrastructure to reflect the changes occurring in the NAS.
- Complete all required revisions and updates on Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) Aeronautical Chart Products. Airport and Facilities Directory (A/FD), airport diagrams and sketches and the Terminal Procedure Publications (TPPs).
- Complete all required obstacle review and analysis of all proposed new construction to protect the existing IFP's or any future IFP development to ensure the safety in the NAS.
- Create/build new and maintain ATC Radar Video Maps (RVMs), Minimum Safe Altitude ATC facility RVMs, Minimum Safety Altitude Warning (MSAW) system data files, and Minimum Vector Altitude (MVA) maps in support of Air Traffic Controllers to safely guide aircraft through the NAS.
- Optimize airspace and PBN procedures by decreasing the distance at level flight from top of descent to runway threshold by an average of 10% across core airports by 2018. Formalize and begin implementing the National Route Structure Program Plan to establish RNAV based route structure across the NAS to support the agency's transition to NextGen.
- Refine, design and conduct planning for New York metropolitan airspace design elements.
- Complete airspace and related safety studies and research to assist in the integration of unmanned aircraft into the NAS.
- Demonstrate capture and dissemination capabilities for digital aeronautical information via web services and portals. This will result in relevant information being integrated into the common operating picture of the NAS via NOTAM distribution services over System Wide Information Management (SWIM).

What Benefits will be provided to the American Public through this request?

Many Mission Support Services outputs have direct benefit to the flying public. We reduce costs for users through more efficient use of the airspace gained through new procedures and better dissemination of charts and NOTAMS. Safety is improved through better procedures, awareness of obstructions to navigation, and the use of weather cameras in remote locations in Alaska.

The FAA is committed to providing end-to-end PBN capabilities in the NAS. We have already developed and implemented 869 RNAV SIDs/STARs; 675 RNP Authorization Required (AR) instrument approach procedures; and 215 Q/T Routes in addition to Global Navigation Satellite System Minimum En Route Altitude (GNSS MEA) RNAV routes as of April 3, 2014. The use of these procedures has already provided significant efficiency and safety benefits to operators.

The AeroNav Products Directorate serves as the FAA's Instrument Flight Procedure (IFP) design and aeronautical charting authority, providing the development, publication and update/revisions of IFPs and provides aeronautical charts and aeronautical products as necessary for the safe and efficient navigation of aircraft in the National Airspace System (NAS). In order to accomplish this, AeroNav Products Directorate will:

- Complete all required modifications, revisions, and updates to Approach, Departure, Arrival and Airway IFPs through the issuance of critical amendments, NOTAMs, completing periodic reviews, and updating/revising Aeronautical Chart Products as necessary.

- Complete all required revisions and updates on Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) Aeronautical Chart Products. Airport and Facilities Directory (A/FD), airport diagrams and sketches and the Terminal Procedure Publications (TPPs).
- Complete all required obstacle review and analysis of all proposed construction to protect the existing IFPs or any future IFP development in conjunction with the OE/AAA Program in support of NextGen.
- Complete all necessary revisions, changes, and updates to the automated production tools in support of IFP design, development, maintenance, and Aeronautical Charting Products.
- Create/build new and maintain ATC Radar Video Maps (RVMs), Minimum Safe Altitude ATC facility RVMs, Minimum Safety Altitude Warning (MSAW) system data files, and Minimum Vector Altitude (MVA) maps.
- Complete all revisions to Aeronautical Radio Incorporated (ARINC-424) format Coded Instrument Flight Procedure (CIFP), flight management system product, and Digital Enroute Supplement (DERS) product for both public and ATC systems support including flight inspection, HOST and ERAM; and
- Print and distribute all FAA aeronautical charts and publications as required annually.

Mission Support Services ensures all IFPs are updated and revised to reflect the changes continuously occurring in the NAS and provides updated and revised Aeronautical Charts and publications to ensure the most current information is available to the user. Over 3,000 IFP amendments will be completed to reflect the changes in the NAS; over 40,000 IFP temporary Notice to Airmen (NOTAMs) will be issued to keep airmen aware of current changes in the NAS; over 17,500 aeronautical chart revisions will be processed to ensure current aeronautical data is depicted on the charts; and over 9,000 biennial IFP reviews to ensure the currency in IFPs used in the NAS; over 80,000 obstacle reviews of all proposed construction requests will be conducted to determine IFP impact and will provide Air Traffic Control Radar Video Maps (RVMs), Minimum Safe Altitude ATC facility RVMs, Minimum Safety Altitude Warning (MSAW) system data files, and Minimum Vector Altitude (MVA) maps as needed in support of Air Traffic Controllers providing safe guidance of aircraft through the NAS.

Among other benefits to the public, the Aeronautical Information Management's weather camera program supports the DOT's Strategic Goal for Safety: The reduction in transportation related injuries and fatalities.

This new FAA data service is facilitating measurable reductions in weather-related aviation accidents and fatalities in Alaska and is providing measurable reductions in weather related flight interruptions and aviation fuel consumptions. Weather cameras contribute to the FAA goals and to the American Public by reducing a subset of Alaska accidents per 100,000 operations and are facilitating measurable reductions in weather-related aviation accidents and fatalities in Alaska and is providing measurable reductions in weather related flight interruptions and aviation fuel consumptions.

The following table shows the program metrics as compared to actual results.

Performance Metric: DOT Strategic Goal for Safety for the reduction in transportation related injuries and fatalities in Alaska

Year	Goal	Actual
2007	.28 accidents per 100,000 operations (Baseline)	
2008	.24 accidents per 100,000 operations	.21 accidents per 100,000 operations
2009	.22 accidents per 100,000 operations	.21 accidents per 100,000 operations
2010	.20 accidents per 100,000 operations	.17 accidents per 100,000 operations
2011	.18 accidents per 100,000 operations	.13 accidents per 100,000 operations
2012	.17 accidents per 100,000 operations	.17 accidents per 100,000 operations
2013	.16 accidents per 100,000 operations	.13 accidents per 100,000 operations
2014	.15 accidents per 100,000 operations	Not yet available

Note: Data pertains to both commercial and general aviation aircrafts

Detailed Justification for the - Vice President Management Services, AJG-0

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Management Services – Budget Request
($000)

Program Activity	FY 2014 Actuals	FY 2015 Enacted	FY 2016 Request	Change FY 2015-2016
Management Services	$208,530	$302,647	$302,871	+$225

The FY 2016 budget request for Management Services is $302,871,240 and 259 FTP / 270 FTE. It provides for $237,913 for the FY 2016 pay raise, $51,922 for the annualized cost of the FY 2015 pay increase, $110,571 for the FERS contribution increase, and $109,809 for one more compensable day in FY 2016. The request includes a reduction of -$285,000 for the Working Capital Fund.

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

Management Services supports DOT's Strategic Plan's Organizational Excellence: Financial Performance goals.

We recruit, develop, and retain a diverse and collaborative workforce by providing an all-encompassing career progression plan and leadership development program along with personnel and organizational policies that meet the needs of our highly skilled workforce. We ensure performance stays on track by providing the framework to integrate ATO's plans, programs, and activities. We work with aviation stakeholders to develop strategies for implementing solutions and to continue coordination with FAA offices.

What is this Program and Why is it Necessary?

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

By the end of FY 2015, significant accomplishments for Management Services include:

An air traffic controller and technician workforce that supports the changing operational demands of the U.S. National Airspace System (NAS) and that is in support of the agency goals and priorities. This includes establishing prioritized and effective hiring and retention processes that supports a right-sizing of the NAS and a Recruitment and Outreach Program to attract a diverse applicant pool for ATO mission-critical occupations.

- A national program to prepare air traffic controllers, technicians, front line managers, and operations managers for success in their next level of leadership responsibility.
- A reduced number of employees on Office of Workers' Compensation Programs rolls and associated compensation costs.
- A space strategy, in conjunction with ARC, to co-locate offices and reduce the ATO space footprint and annual lease costs.

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

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

Funding requested in FY 2016 will allow Management Services to support key initiatives such as meeting Office of Personnel Management Hiring Standards and maintaining the air traffic controller, technician and field/Headquarters management workforce at optimum levels. Requested funding levels will also allow Management Services to provide training services, consultations, and interventions to ATO service units to identify and reduce or eliminate barriers to maintaining a professional, model workplace.

FY 2016 funding for Management Services will:

- Continue National ATO hiring programs and processes to ensure FAA has the controllers and technicians needed to operate and maintain the NAS, including leading the Centralized Selection Process.
- Recruit the number of controllers and technicians required to operate and maintain the NAS.
- Establish outreach strategies and major initiatives to promote education and public awareness of aviation occupations and other critical hiring opportunities within the ATO to establish a broad-based diverse pipeline.
- Develop and implement an integrated strategy in managing labor relationships and liaison activities across ATO organizations and bargaining units.
- Provide Human Resource Management (AHR) with a centralized and focused point of contact for technical information.
- Promote ATO Career Progression Plan tools accessible to 100 percent of the ATO population.

What Benefits will be provided to the American Public through this request?

Personnel resources are the key element to ensure the American public can safely and efficiently use air transportation. Air traffic controller and technician candidates must consistently enter the pipeline so that they are trained and certified prior to supporting the NAS. Management Services recruits, hires and processes these candidates through our training facilities in Oklahoma City, OK.

The management workforce at our ATC facilities comes from our certified air traffic controller ranks. Management Services develops succession planning programs and training to prepare for the transition of the workforce. By ensuring the aviation workforce is available at all levels, Management Services plays an integral role in continuing the seamless operation of the NAS.

Detailed Justification for the - Vice President Program Management Organization, AJM-0

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Program Management Organization – Budget Request
($000)

Program Activity	FY 2014 Actuals	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Program Management Organization	$755,221	$679,843	$688,936	+$9,093

FAA's **Program Management Organization (PMO)** request is $688,935,801 and 580 FTP / 576 FTE. It provides $741,056 for the FY 2016 pay raise, $161,728 for the annualized cost of the FY 2015 pay increase, $344,408 for the FERS contribution increase, and $342,036 for one more compensable day in FY 2016. The request also includes a program increase request of $7,504,000 for the operating costs for the Terminal Automation Modernization and Replacement (TAMR) program. TAMR is the umbrella program for the effort to transition our Terminal automation from the Common Automated Radar Terminal System (CARTS) to the Standard Terminal Automation Replacement Systems (STARS) platform. Throughout the transition, both platforms will be operational and support costs for both systems are required. The funding will support an increase in Second Level Engineering staffing, increased telecommunications infrastructure, and logistics support for the operation of facilities as they transition to a TAMR Automation Baseline running on the STARS platform. With this happening at over 100 TRACONs, we expect an increase in the number of issues that arise out of each site that require Second Level attention. Funding will allow for adequate response time to field fixes from second level engineering supporting the transition and deployment of STARS.

The PMO defines requirements and deploys ATC systems, equipment, and other services necessary to operate, maintain, and improve the National Airspace System (NAS). The PMO has the responsibility to manage program cost, schedule, and scope for capital investments in the NAS. The PMO plays a critical role in the success of NextGen by acting as the bridge between strategic requirements and tactical program implementation to improve the safety and efficiency of the NAS.

The PMO also clarifies program management career paths and helps us attract and retain the most highly skilled and motivated individuals on program management teams. This organization boosts key individual and organizational capabilities, such as program management, systems integration, software engineering, and communication, which are necessary to deploy critical infrastructure into the NAS as well as fully support and develop NextGen technology.

What is this Program and Why is it Necessary?

FAA's ATO handles 69,000 flights per day and helps transport over 743 million passengers per year, contributing to 5.4 percent of the total U.S. economy. ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

The PMO provides full-life cycle program management capability across all of ATO from initial definition, through design, development, and effective deployment of both NAS sustainment and NextGen modernization systems.

The PMO is made up of the following directorates:

The **Air Traffic Systems Directorate** develops, acquires, deploys, maintains, sustains, and improves automation, surveillance, and decision support systems that provide aircraft separation assurance and system-wide efficiency through flow control. Headquarters and Technical Center employees are responsible for sustainment management, engineering, production, logistics, testing, training, and systems and procedures implementation. Major acquisition programs such as ERAM and Automatic Dependent Surveillance-Broadcast (ADS-B) are replacing yesterday's equipment with flexible, resilient, scalable, and adaptive systems that will provide the platform for NextGen. We are providing additional capability to air carriers and general aviation, reducing delays for passengers, and decreasing airplane emissions.

The **Enterprise Services Directorate** is responsible for communications, weather, and aeronautical information products and services for the NAS.

- Navigation Services covers projects in the following areas: Global Positioning System (GPS) Satellite-Based Augmentation, GPS Ground-Based Augmentation, Ground Systems, Lighting Systems, and Technical Support.
- Communications Services provides communications and telecommunications services consistent with International Civil Aviation Organization (ICAO) standards required for air traffic control within the NAS. It provides communications infrastructure and services for the Department of Defense (DOD) to ensure interoperability with the NAS.
- Weather services provide sensor, processor, and distribution systems required to provide accurate forecasts for timely air traffic decisions.
- Through unique customer/client relationships and customer-derived requirements, we manage the full life-cycle for communications, navigation, and weather services.

In addition to managing the implementation of new programs, the PMO is responsible for providing in-service management of many NAS automation and communication systems. The activities include:

- Maintenance of service availability of automation platforms by providing sufficient second-level engineering and supply support for critical operational systems, such as: En Route Communications Gateway (ECG), ERAM, Advanced Technologies and Oceanic Procedures (ATOP), En Route Information Display (ERIDS), Flight Data Processor (FDP) 2000, Flight Data Input Output (FDIO), and Micro En Route Automated Radar Tracking System (MEART).
- Sustainment of operational Wide Area Augmentation System (WAAS) and deployment of WAAS maintenance releases.
- Support of NAS Voice System (NVS), System Wide Information Management (SWIM), and Data Communication System (DataComm) operational programs.
- Sustainment of the Weather and Radar Processor (WARP) service in accordance with the program specification and requirements.
- Ongoing support for the Runway Status Lights (RWSL) installed at select airports.
- Maintenance and support for the sites transitioning from CARTS to STARS
- Sustainment of adjusted operational availability of select terminal equipment at 99.7 percent for the reportable facilities that support the Nation's Core Airports.

By the end of FY 2015, PMO's significant accomplishments include:

- Complete the ERAM waterfall deployment at all 20 Air Route Traffic Control Centers (ARTCCs).
- Continue development and deployment of new Collaborative Air Traffic Management Technologies (CATMT) capabilities to reduce traffic delays associated with disruptive events in the NAS, such as severe weather, NAS equipment outages, and excessive traffic volume.
- Complete deployment of Airborne Re-route (ABRR) which provides the ability to electronically send TFM-generated airborne reroutes to En Route automation for ATC execution.
- Complete the Traffic Flow Management System (TFMS) Technology Refresh which replaces the hardware of the Traffic Flow Management (TFM) Production Center at the FAA's WJHTC, Disaster Recovery Center (DRC), and developmental facility.
- Provide Strategic Flow Management Integration (execution of flow strategies into controller tools). The program provides for the implementation of ERAM modifications needed to receive/process the Traffic Management Initiatives (TMI) in the ERAM baseline timeframe.
- Continue work on Flow Control – Strategic Flow Enhancement. This program will analyze the mid-term (FY 2012-2018) air traffic management (ATM) building blocks needed for the transition to the future NextGen system and the capability to improve the predictions for both capacity and demand. This program develops promising potential concepts to address operational Traffic Flow Management (TFM) shortfalls and prepares documentation for the developed concepts to achieve Investment Decisions
- Complete engineering, start implementation and deployment of System Enhancement and Technical Refresh (SE/TR) changes for ERAM.
- Complete turn on of ABRR capability at all 20 ARTCC's.

- Start the national roll out for Ground Interval Management Spacing (GIM-S) capability.
- Improve on-time performance and operator and passenger access to information by using TFM, Time Based Flow Management (TBFM), and CATMT, such as Airspace Flow Programs

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

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

Funding requested in the FY 2016 submission will continue deployment of NextGen systems. In addition to en route automation modernization, supported by ADS-B, we are modernizing and providing commonality in terminal automation, coupling it with ADS-B and providing upgrades to Collaborative Air Traffic Management Tools to support NextGen operations. Connecting all of the automation to and through a flexible digital communications infrastructure, and feeding it with spaced-based navigation will provide the information to both controllers, flow managers, dispatchers, and pilots necessary for the efficient and responsive NAS envisioned by NextGen.

The FY 2016 request includes a program increase request of $7,504,000 for the operating costs for the Terminal Automation Modernization and Replacement (TAMR) program. TAMR is the umbrella program for the effort to transition our Terminal automation from the Common Automated Radar Terminal System (CARTS) to the Standard Terminal Automation Replacement Systems (STARS) platform. Throughout the transition, both platforms will be operational and support costs for both systems are required. The funding will support an increase in Second Level Engineering staffing, increased telecommunications infrastructure, and logistics support for the operation of facilities as they transition to a TAMR Automation Baseline running on the STARS platform. With this happening at over 100 TRACONs, we expect an increase in the number of issues that arise out of each site that require Second Level attention. Funding will allow for adequate response time to field fixes from second level engineering supporting the transition and deployment of STARS.

By the end of FY 2016, PMO's anticipated accomplishments include:

- Deploy over 1,000 new Digital Multimode Radios.
- Continued acquisition and deployment of NVS, SWIM, and DataComm programs.
- Continued sustainment of operational WAAS through procurement of spares for logistics support, Radio Frequency Interference testing, evaluation of potential threats, mitigation needed for the restoration of any outages experienced by WAAS, providing Second-Level Engineering Support for hardware/software support, repairs performed, anomaly investigation, and site restoration of WAAS. Plan, engineer, and develop WAAS changes to support yearly maintenance release.
- Deploy of the final capability of CATMT Work Package (WP3) which provides two additional capability suites to improve the congestion management tools available to the Traffic Management Units.
- Maintain en route and oceanic air traffic systems in a state which will not degrade the services.
- Sustain terminal air traffic systems in a state which will not degrade the services.
- Continue implementation and deployment of System Enhancements/Tech Refreshes (SE/TR) changes for ERAM.
- Continue national roll out of Ground Based Interval Management for Spacing (GIM-S).

What Benefits will be provided to the American Public through this request?

The PMO will improve consistency of program execution through robust information sharing with stakeholders, institutionalization of acquisition best practices and community review of lessons learned. The PMO will standardize the required steps, from definition and design through development and deployment, creating a bridge between concepts and operational use of technologies. Having a portfolio of programs under one umbrella provides the potential for streamlining, better cost control and economies of scale to better manage uncertainty.

Explanation of Funding Changes

	Dollars ($000)	FTE
Air Traffic Organization	**$108,639**	**-**
Overview: For FY 2016, the Air Traffic Organization requests $7,505,293,000 and 30,011 FTE to meet its mission. The FY 2016 request corresponds to an increase of $108,639 from the FY 2015 enacted level. The FY 2016 request level reflects adjustments to base, other changes, and discretionary adjustments.		
Adjustments to Base	**$97,261**	**-**
Annualized FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	9,201	
FY 2016 Pay Raise: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	42,160	
Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	19,459	
FERS Contribution: OMB Circular A-11 has increased the agency's contribution rates to the Federal Employees Retirement System (FERS). This increase in cost to the FAA represents the increased rates for both Air Traffic Controllers and other agency employees.	19,594	
Non-Pay Inflation: While the FY 2016 GDP price index (year over year) is 1 percent, the FAA will only apply a non-pay inflationary increase on critical Agency requirements.	6,847	
Other Changes	**-$285**	**-**
Working Capital Fund: This cost adjustment is requested to support the Department of Transportation's (DOT) Working Capital Fund (WCF) profile. These adjustments are being made to best align each office's resources within their expected WCF costs.	-285	
Discretionary Adjustments	**$11,663**	**-**
Weather Camera Program: The Weather Camera Program in Alaska provides near real-time camera images, updated every 10 minutes to pilots for situational awareness, pre-flight planning, and en route weather briefings for reduction of weather-related accidents. Funding is required for maintenance and operations of all 221 weather camera sites and its services.	1,686	
Common Automated Radar Terminal System (CARTS) to Terminal Automation Modernization and Replacement (TAMR) Transition: This funding request is for costs associated with second level engineering, telecommunications infrastructure, and logistics support for Terminal sites transitioning from Common Automated Radar Terminal System (CARTS) to Terminal Automation Modernization and Replacement (TAMR). Sites transitioning from CARTS to STARS will require both automation systems to be running simultaneously during the transition.	7,504	
Technical Operations Safety Action Program (T-SAP): The Technical Operations Safety Action Program (T-SAP) is a voluntary, cooperative, non-punitive environment for open and confidential reporting of National Airspace System related safety concerns. This request is to expand the T-SAP program from the Central Service area to the Eastern and Western service areas.	1,198	

	Dollars ($000)	FTE
Environmental and Occupational Safety and Health (EOSH) Program: The FAA recently consolidated the Agency's Environmental Occupational Safety and Health (EOSH) program into ATO. The funding request will allow FAA to begin meeting required OSH training standards, identify and deploy employee safety equipment, and continue to assess and address hazards across all FAA workplaces.	1,275	

Traditional Tables for Air Traffic Organization

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

Controller Workforce FY 1981 through FY 2014

FY 1992	15,147	FY 2001	15,233	FY 2010	15,696
FY 1993	14,970	FY 2002	15,478	FY 2011	15,418
FY 1994	14,953	FY 2003	15,691	FY 2012	15,211
FY 1995	14,614	FY 2004	14,934	FY 2013	15,211
FY 1996	14,360	FY 2005	14,540	FY 2014	14,330
FY 1997	14,588	FY 2006	14,618	FY 2015 Est.	14,717
FY 1998	14,966	FY 2007	14,874	FY 2016 Req.	14,843
FY 1999	15,096	FY 2008	15,381		
FY 2000	15,153	FY 2009	15,770		

System Maintenance Overtime

	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request
Field Maintenance			
Hours	237	204	208
Amount	15,688	13,513	13,783
Program and Technical Support			
Hours	20	17	17
Amount	1,542	1,337	1,364
Total			
Hours	257	221	225
Amount	17,230	14,850	15,147

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AVIATION SAFETY (AVS)

Aviation Safety Organization (AVS)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$1,218,458**	**7,238**	**125**	**7,161**
Adjustments to Base	**$18,532**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$2,187			
FY 2016 Pay Raise (1.3%) (.75)	$8,980			
Additional Compensable Day	$3,855			
FERS Contribution	$3,510			
Other Changes	**$144**			
Working Capital Fund	$144			
Discretionary Adjustments	**$21,277**	**168**		**85**
Surveillance and Oversight Request	$11,428	107		54
AVS Certification and UAS Integration	$5,333	57		29
Safety Management Systems	$4,516	4		2
FY 2016 Request	**$1,258,411**	**7,406**	**125**	**7,246**

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Executive Summary: Aviation Safety (AVS)

What Is The Request And What Funds Are Currently Spent on the Program?

The request of $1,258,411,000 and 7,246 full-time equivalents (FTEs) will provide resources for aviation safety regulation and oversight of the civil aviation industry. The proposed funding level will enable AVS to expand surveillance and certification services to meet industry demand.

The request provides an adjustment to base of $8,980,000 for a pay raise, $3,510,000 for FERS Contribution, $2,187,000 for the annualized cost of the FY 2015 pay increase, $3,855,000 for an additional compensable day in FY 2016, and an adjustment of $144,174 for the Working Capital Fund (WCF).

The request also includes programmatic increases of $21,277,000 and 85 FTEs. The resource increase will provide for additional safety inspectors, engineers and other safety critical staff to expand surveillance and oversight of aircraft operators, repair stations, manufacturers, air carriers and air agencies. The request will also enable AVS to increase certification services for the aforementioned stakeholders as well as provide additional support for Unmanned Aircraft System (UAS) integration; and Safety Management System (SMS) risk-based decision making.

The FY 2016 budget request is aligned with the FY 2015 enacted level that provides a funding level of $1,218,458,000 and an FTE level of 7,161.

What is this Program and Why is it Necessary?

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

The AVS organization is responsible for:

- Providing surveillance and oversight of existing certificate holders.
- Developing and establishing the safety and certification standards for the civil aviation industry.
- Providing surveillance and oversight of air carriers, GA operators, repair stations, manufacturers and airman.
- Issuing or denying certifications.
- Ongoing and wide-ranging transformation of the United States NAS encompassed by NextGen.

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

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

The public expects the FAA to continually reduce the risk of flying while improving the efficiency of the system. This requested funding level will enable AVS to expand existing resource levels for continued operational safety and certification services. AVS forecasts the need for additional safety personnel to meet projected demands for industry oversight and certification services, while continuing to expand delegation responsibilities to designees for future NAS growth. FAA/AVS forecasts out year growth in the demand for the number of type certification design approvals required by applicants, production certificates provided to manufacturers and supplier control audits conducted at manufacturers. FAA/AVS has also observed complexity increases within the NAS for some products through Labor Distribution Reported hours collected. The time to complete supplemental type certifications for the design of new aviation products and airworthiness directives issued to correct aircraft safety deficiencies are requiring additional hours to complete. The increased number of aviation products requiring certification and approvals along with increased systems complexity has led to the AVS requirement for additional inspector and engineer positions.

What Benefits will be provided to the American Public through this request?

AVS will provide the American Public safety and economic benefits through this request by increasing oversight of the NAS through audits and surveillance of aircraft operators and production manufacturers, pilots, mechanics and other safety related positions.

This request will enable AVS to expand certification and integration services for newly designed and manufactured aviation products, including Unmanned Aircraft Systems (UAS). The additional engineer and inspector resources within this request will provide manufacturing and operational approvals of improved technologies that will lead to enhanced safety within the NAS.

This request will also enable AVS to effectively lead and manage the Administrator's Initiative on Risk-Based Decision Making as well as the FAA's evolution to SMS and U.S. State Safety Program (SSP). Through the Risk-Based Decision Making Initiative, the FAA will improve standardization, data access, and modeling integration, enhance decision-making processes and evolve the oversight model for industry. The improvements will enable the FAA to be more proactive about safety and use safety management principles to make smarter, risk-based decisions throughout the agency and with industry and global stakeholders. The Initiative will build on the foundation of existing policies and processes in the FAA, as well as the activities currently underway to evolve toward the use of SMS and SSP principles throughout the agency.

Detailed Justification for – Aviation Safety (AVS)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Aviation Safety (AVS)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Total	**$1,204,777**	**$1,218,458**	**$1,258,411**	**+$39,953**
Flight Standards Service	841,106	851,773	874,549	+22,776
Aircraft Certification Service	212,981	215,291	222,336	+7,045
Office of Aerospace Medicine	56,103	56,272	60,114	+3,892
Office of Rulemaking	6,195	6,218	6,368	+200
Air Traffic Safety Oversight Service	23,248	23,492	23,967	+375
Accident Investigation and Prevention Service	21,545	21,587	25,713	+4,126
Office of Quality, Integration and Executive Service	43,599	43,825	45,364	+1,539

The request of $1,258,411,000 and 7,246 full-time equivalents (FTEs) allows AVS to promote aviation safety by regulating and overseeing the civil aviation industry and continued airworthiness of aircraft, as well as certification of pilots, mechanics, and others in safety-related positions. The AVS submission increases the number of safety inspectors, engineers and other safety critical positions, and provides growth of FTE levels within the proposed funding level.

The request provides an adjustment to the base of $8,980,000 for a pay raise, $3,510,000 for increased FERS contribution, $2,187,000 for the annualized cost of the FY 2016 pay increase, $3,855,000 for an additional compensable day in FY 2016, and an adjustment of $144,174 for the Working Capital Fund (WCF).

The request also includes programmatic increases of $21,277,000 and 85 FTEs. The programmatic increases provide for additional safety inspectors and safety critical staff to increase surveillance and oversight of operators, repair stations, manufacturers, air carriers and air agencies; certification and unmanned aircraft system integration; and SMS risk-based decision making.

The AVS FY 2016 Budget request would provide $1,258,411,000 and 7,246 FTEs for the program.

AVS FY 2016 key initiatives include:

- Supporting Agency emerging technology initiatives by developing standards, policy, and guidance needed to transition and operate in the NextGen environment.
- Establishing regulations and standards, conducting inspections, audits, surveillance, investigations, enforcement and certification activities related to operators, airmen and designees, aircraft manufacturers and suppliers. AFS, AIR, AAM, AOV and AVP partner with other AVS organizations, other FAA lines of business and other aviation entities to assist with NextGen implementation. AVS also promotes safety of flight for civil aircraft and air commerce.
- Providing project management and analytical support to FAA teams on all agency rules as well as safety critical data analysis of the aviation industry. ARM and AQS work with other AVS organizations, FAA lines of business and other aviation entities in supporting system safety.
- Establishing, approving and accepting safety standards in providing independent oversight of the ATO through safety surveillance, audits, and targeted inspections; monitoring Air Traffic Control (ATC) procedures and operations, technical operations and facilities, personnel certification criteria.
- Establishing standards and managing the credentialing of ATO safety personnel, including air traffic controllers and airway transportation specialists, executing approvals, acceptances, or updates of new ATO safety standards, waivers, or modifications and monitoring the daily operations of the NAS.

- Implementing and managing the US State Safety Program (SSP) and promoting the implementation of SMS in industry to meet International Civil Aviation Organization (ICAO) standards.
- Transitioning and sustaining mature Aviation Safety Information, Analysis, and Sharing (ASIAS) program capabilities to an operational environment.
- Providing accident and incident investigation services, as well as safety critical data analysis of the aviation industry; working closely with the National Transportation Safety Board (NTSB) for appropriate aviation-related matters.
- Supporting a proactive approach to safety by leading the FAA's efforts to adopt a SMS.
- Increasing capabilities and expansion of ASIAS to provide better access and more effectively monitor safety data.
- Directing and managing the maintenance and improvement of the International Organization Standardization (ISO) 9001:2008-certified Quality Management System, (QMS). The AVS QMS ensures AVS meets its safety requirements and continuously improves its processes for safety systems.
- Supporting the implementation of an enhanced AVS telework program by conducting research and performing other executive services.

What is this Program and Why is it Necessary?

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

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

The AVS organization is responsible for approving the design and manufacture of aeronautical products and parts (including replacement parts to maintain the operation and safety of the existing fleet). Without these functions, there would be no safety system governing aircraft design, manufacture, and oversight and the flying public would encounter unsafe aircraft. Similarly, AVS has the responsibility of determining if a person is medically qualified to operate an aircraft. If the organization did not determine if the pilot was medically competent to operate an aircraft, individuals with debilitating medical conditions could fly and cause an accident with potentially disastrous consequences. AAM's Air Traffic Controller Specialist (ATCS) Health Program protects public safety by ensuring Air Traffic Controllers are medically fit to perform their duties. AAM leverages resources through Aviation Medical Examiner (AME) who ensure Air Traffic Controllers are medically fit to control air traffic operations within the NAS.
AVS consists of seven organizational elements. Of the seven AVS organizational elements three – the Office of Rulemaking (ARM), the Office of Accident Investigation and Prevention (AVP) and the Office of Quality, Integration, and Executive Services (AQS) are solely Washington Headquarters elements. The other four elements – Flight Standards Service (AFS), Aircraft Certification Service (AIR), the Office of Aerospace Medicine (AAM) and the Air Traffic Safety Oversight Service (AOV) – have field structures (including some overseas offices). The resource request would provide AVS with a staffing level of 7,406 personnel.

The seven AVS organizations perform the following activities:

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

- Promoting the flight safety of civil aircraft in air commerce by setting certification standards for air carriers, commercial operators, air agencies, and airmen.
- Directing, managing, and executing certification, inspection, and surveillance activities to ensure the adequacy of flight procedures, operating methods, airman qualification and proficiency, aircraft maintenance, and maintenance aspects of continued airworthiness programs.

- Managing systems for the registry of domestic civil aircraft and official airman records and supporting law enforcement agencies responsible for drug interdiction.
- Supporting strategic partnership efforts within the FAA and other aviation agencies.
- Providing regulatory and technical assistance to international civil aviation authorities.
- Performing surveillance and certification of foreign repair stations.
- Providing certification and operation policy recommendations governing foreign air operators operating within the United States.

Anticipated FY 2016 AFS accomplishments include:

- Developing policies, procedures, and approval processes to enable UAS operations.
- Conducting and participating in Pilot Seminars and Flight Instructor Refresher Courses and Commercial Flight Instructor/Designated Pilot Examiner refresher courses at towered and non-towered airports.
- Developing appropriate policy, procedural guidance, and certificate management programs for the emerging technologies needed to transition and operate in the NextGen environment.
- Validating effectiveness of initiatives, interventions, and recommendations, implemented by the General Aviation (GA) Loss of Control workgroup and the amateur-built flight standardization board to mitigate loss of control causes in GA.
- Establishing the infrastructure necessary to oversee the implementation of SMS by 14 CFR Part 121 Air Carriers.
- Deploying Safety Assurance System (SAS) to field offices.
- Formalizing an AFS Internal Safety Assurance Program.
- Developing a secure FAA airman test delivery system that incorporates new technology and is supported by training and testing documents, which embraces NextGen concepts.

<u>Aircraft Certification Service (AIR)</u> has the regulatory responsibility for type, production, and airworthiness certification of civil aeronautical products and parts. AIR's functions, which are essential to ensure the safety of the NAS, include the following:

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

Anticipated FY 2016 AIR accomplishments include:

- Advancing rulemaking efforts to update regulations to incorporate safety management principles into the design and manufacturing environments.
- Continuing efforts to update airworthiness standards, policies, and processes to reflect the safety continuum and enabling the proper introduction and oversight of safety enhancing technologies.
- Guiding development of standards and issuing policy and guidance associated with Unmanned Aircraft Systems (UAS).
- Taking action to encourage the implementation of voluntary safety enhancements by U.S. industry and the global community.
- Continuing Part 23 rulemaking to improve the certification standards of small airplanes leading to improved safety and reduced cost.
- Continuing efforts to transition the existing fleet of piston-engine aircraft to unleaded fuel and enable newly manufactured aircraft to be certificated with unleaded fuel.
- Continuing to evolve and optimize our delegation system to reinforce a systems approach to safety.

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

- Leading the world in developing medical standards for pilots and Air Traffic Controllers.
- Implementing and managing systems to medically certify commercial and GA pilots.
- Processing pilot medical certification and appeal cases, including special issuances for increasingly complex medical issues.
- Managing medical clearance of air traffic control specialists.
- Designating and overseeing AMEs.
- Conducting compliance and enforcement inspections of aviation industry drug and alcohol testing programs.
- Implementing and overseeing drug and alcohol testing of FAA employees in safety critical and security jobs.
- Providing critical physiological and survival training to thousands of general aviation and commercial airmen.

Anticipated FY 2016 AAM accomplishments include:

- Leading the world in development of medical standards for pilots and Air Traffic Controllers.
- Using risk based approaches to determine the eligibility of airmen and Air Traffic Controllers for medical certification and issuing medical certificates.
- Continuing to develop appropriate medical protocols and review complex medical cases to medically certify all applicants who can be safely qualified to fly.
- Managing and supporting nearly 4,000 designees that perform critical aviation medical examiner duties for the FAA.
- Continuing to issue medical clearances to Air Traffic Controllers.
- Continuing to improve our medically based approaches to managing aeromedical hazards.
- Conducting compliance and enforcement surveillance inspections of aviation industry employers that have required employee drug and alcohol testing programs.
- Continuing to manage the FAA internal substance abuse testing program.
- Overseeing the Aviation Medical Examiner (AME) Training and Oversight program for designees.
- Providing critical physiological and survival training to thousands of general aviation and commercial pilots.

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

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

Anticipated FY 2016 ARM accomplishments include:

- Sending critical safety rules to the Office of the Secretary of Transportation (OST) within 90 days of planned date.
- Continuing to process 85 percent of exemption requests within 120 days.
- Continuing improvements in FAA's rulemaking program.

Office of Accident Investigation and Prevention (AVP) is responsible for analytical capabilities to identify risk affecting the entire air transportation system and industry. AVP functions include:

- Identify corrective measures based on accident data and FAA/NTSB safety recommendations.
- Coordinating FAA-wide participation in accidents and incident investigations.
- Collecting aviation safety data, identifying trends, and measuring effectiveness of interventions.
- Leading agency efforts on risk-based decision making and Safety Management System.

Anticipated FY 2016 AVP accomplishments include:

- Leading agency efforts to effectively address NTSB recommendations issued to the FAA.
- Leading agency efforts to effectively address FAA Safety recommendations.
- Collecting and analyzing aviation safety data at a national level and consolidate the data under ASIAS.
- Leading and managing the Administrator's Initiative on Risk-Based Decision Making and aligning the activities with the FAA SMS, AVS SMS, and the U.S. SSP.
- Facilitating the continued maturation and evolution of the FAA's implementation of SMS and the U.S. SSP focusing on the effective use of safety risk management and safety assurance processes.
- Continuing to promote SMS implementation across the aviation system and working with other ICAO and Civil Aviation Authorities (CAA) to ensure consistency internationally.
- Advancing accident investigation by using root cause analysis techniques in analyzing data in conjunction with activity surrounding major accident investigations.
- Leading government/industry efforts for the Commercial Aviation Safety Team and the General Aviation Joint Steering Committee.

Air Traffic Safety Oversight Service (AOV) has the regulatory responsibility to provide independent safety oversight of the ATO and monitor ATO's compliance with safety standards and the SMS. AOV accomplishes its safety oversight functions by:

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

Anticipated FY 2016 AOV accomplishments include:

- Conducting risk-based audits of 60 facilities.
- Conducting risk-based audits of 15 Technical Operations facilities/locations.
- Surveillance of over 600 Air Traffic facilities and Technical Operation locations
- Conducting independent risk-based audits of 150 Air Traffic facilities and Technical Operations locations
- Issuing and renewing over 9,000 Air Traffic Control, Technical Operation, and Aeronautical Information credentials
- Conducting over 18,000 Air Traffic and Technical Operation Safety Report Event Reviews
- Approving over 100 changes to separation standards, procedures, alternative means of compliance, and hardware and automation modifications and upgrades in support of NextGen

Office of Quality, Integration, and Executive Services (AQS) is responsible for establishing integration policy and processes for safety systems. AQS functions include:

- Managing the AVS-wide Quality Management System (QMS) and is the lead for maintaining AVS's ISO 9001:2008 certification the flight safety of civil aircraft in air commerce by setting certification standards for air carriers, commercial operators, air agencies, and airmen.
- Managing and providing AVS-wide guidance for: Strategic and business planning, internal communications, OIG/GAO audits and reports to Congress, Financial management, Human resource management, integrating training and development services.
- Oversees the AVS Environmental Protection Policy (EPO).
- Oversees the AVS Safety and Health Program (OSH).

Anticipated FY 2016 AQS accomplishments include:

- Supporting AVS delegation management including the migration of the designee data from the current systems to shared or new applications.

- Continuing efforts to maintain the AVS ISO Certification.
- Meeting the National Archives and Records Administration (NARA) annual requirements for Records Management.
- Supporting the Government-wide initiative on Teleworking.
- Implementing the AIR Policy and Regulation (engineer and inspector) portion of the AVS Staffing Tool and Reporting System (ASTARS).
- Exploring development of a Medical Certification Staffing Model.
- Developing and implementing AVS-wide Leadership Development Programs in support of agency programs.

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

- Establishing regulations and standards, conducting inspections, audits, surveillance, investigations, enforcement and certification activities related to operators, airmen and designees, aircraft manufacturers and suppliers. AFS, AIR, AAM, AOV and AVP partner with other AVS organizations, other FAA lines of business and other aviation agencies to assist with NextGen implementation. AVS also promotes safety of flight for civil aircraft and air commerce.
- Providing project management and analytical support to FAA teams on all agency rules as well as safety critical data analysis of the aviation industry. ARM and AQS work with other AVS organizations, FAA lines of business and other aviation agencies to help support system safety.
- Establishing, approving and accepting safety standards in providing independent oversight of the ATO through safety surveillance, audits, and targeted inspections; monitoring ATC procedures and operations, technical operations and facilities, personnel certification criteria; establishing standards and managing the credentialing of ATO safety personnel, including air traffic controllers and airway transportation specialists, executing approvals, acceptances, or updates of new ATO safety standards, waivers, or modifications and monitoring the daily operations of the NAS.
- Providing accident and incident investigation services, as well as safety data analysis of the aviation industry. We work closely with the NTSB on appropriate aviation-related matters.
- Directing and managing the maintenance and improvement of the ISO-9001:2008-based QMS for all AVS services and offices and establishing integration policy and processes for safety systems.

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

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

The requested funding level will enable AVS to provide additional resources for surveillance and oversight of the existing aviation fleet and production manufacturers, as well as accommodate new operators and technologies into the NAS.

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

The requested funding level will enable AVS to increase surveillance and certification services, as well as expand integration activities for Unmanned Aircraft Systems. Our strategic goal for staffing is to have the right number of safety critical and support employees in the right locations thereby providing the aviation community with surveillance and oversight of air carriers, GA operations, repair stations, manufacturers and airman. This request will enable oversight, audit activities and certification activities for FAR Parts 121, 135, and 145 and manufacturers to be expanded beyond current levels.

The request enables AVS to provide increased levels of oversight and surveillance, rulemaking and certification services for existing and new operators and manufacturers. As the number of aircraft flying in the NAS grows, and new aircraft models and technologies are introduced, they will be provided certification services based on available resources. This resource request will enable sequencing time for operator and production certification services to be reduced.

The aviation community will receive AVS certification and operation services for operators, manufacturers and air traffic controllers to assist in the introduction of new technologies that will identify precisely where an aircraft is at any given moment, 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. AVS will expand current service levels to accommodate unmet industry demands for certification and surveillance requirements and will continue to balance certification resources against the need to maintain safety operations for the existing fleet and manufacturers.

Finally, the requested funding level will enable AVS to effectively lead and manage the Administrator's Initiative on Risk-Based Decision Making. Through this initiative, the FAA will build on safety management principles to proactively address emerging safety risk by using consistent, data-informed approaches to make smarter, system-level, risk-based decisions.

What Benefits will be provided to the American Public through this request?

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

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

Increased Surveillance and Oversight Service Request: This request will provide staffing for increased surveillance for commuter and on-demand operators, repair stations and manufacturers as well as resources to focus on oversight and training for designee supervision. The request will create one system to conduct surveillance, certification, and ongoing certificate management for all air operators, air carriers, and air agencies. It also provides effective tools and standardized oversight for designees and delegation programs

AVS Certification and UAS Integration Increase Request: This increase supports the NAS Initiative to enable safe and efficient incorporation of new aviation products and users such as UAS. This resource request will enable AVS to support the aviation industry's increased demand for aircraft, operator and airmen certification services as they continue to grow. New designs and products have been developed, and installed to meet challenges of the NextGen environment. The programmatic approach outlined in the NAS Initiative includes adapting services and regulatory approaches in order to integrate UAS operations into the NAS in a timely fashion and with the same level of safety and efficiency as other legacy operations.

SMS – Risk Based Decision Making: This request will enable AVS to effectively lead and manage the Administrator's Initiative on Risk-Based Decision Making, as well as the FAA's adoption of SMS and SSP. Through the Risk-Based Decision Making Initiative, the FAA will improve standardization, data access, and modeling integration, enhance decision-making processes, and evolve the oversight model for industry. The Risk-Based Decision Making Initiative will enable the FAA to be more proactive about safety and use safety management principles to make smarter, risk-based decisions throughout the agency and with industry and global stakeholders. The Initiative will build on the foundation of existing policies and processes in the FAA, as well as the activities currently underway to evolve toward the use of SMS and SSP principles throughout the agency. In addition, this request will enable the transition of mature ASIAS capabilities from development to an operational environment.

Explanation of Funding Changes

Aviation Safety	**$39,953**	**85**
Overview: For FY 2016, the Associate Administrator for Aviation Safety requests $1,258,411,000 and 7,246 FTEs to meet its safety mission. The FY 2016 request level reflects adjustments to base, other changes and discretionary adjustments.		
Adjustments to Base	**$18,532**	**-**
Annualized FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	2,187	
FY 2016 Pay Raise: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	8,980	
Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	3,855	
FERS Contribution: OMB Circular A-11 has increased the agency's contribution rates to the Federal Employees Retirement System (FERS). This increase in cost to the FAA represents the increased rates for both Air Traffic Controllers and other agency employees.	3,510	
Other Changes	**$144**	**-**
Working Capital Fund: This cost adjustment is requested to support the Department of Transportation's (DOT) Working Capital Fund (WCF) profile. These adjustments are being made to best align each office's resources within their expected WCF costs.	144	
Discretionary Adjustments	**$21,277**	**85**
Surveillance and Oversight: Provides staffing for increased surveillance for commuter and on-demand operators, repair stations and manufacturers as well as resources to focus on oversight and training for designee supervision. The staffing request is aligned with the forecasted staffing requirements from the ASTARS model. This funding request will also provide risk based designee training, development of risk based tools for designee management, expansion of Designee Management System (DMS) to include Organization Delegation Authority (ODA) and development of new designee types to better leverage our workforce in the future.	11,428	54
AVS Certification and Unmanned Aerial Surveillance (UAS) Integration: This increase supports the National Airspace System (NAS) Initiative to enable safe and efficient incorporation of new aviation products and users such as UAS. This resource request will enable AVS to support increased demand for FAA aircraft, operator and airmen certification services as they continue to grow. New designs and products have been developed, and installed to meet challenges of the NextGen environment. The programmatic approach outlined in the NAS Initiative includes adapting services and regulatory approaches in order to integrate UAS operations into the NAS in a timely fashion and with the same level of safety and efficiency as other legacy operations.	5,333	29
Safety Management Systems (SMS) – Risk Based Decision Making: This request is to accomplish the Administrator's Initiative on Risk-Based Decision Making (RBDM) and enhance the Quality Management Information Technology System (QMITS). It includes funding for staffing and contract support. AVS has provided funding to support the FAA SMS activity for the prior years, but requires additional resources to complete FAA-level SMS.	4,516	2

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AVS Primary Stakeholders
(General Public is our Ultimate Customer)

Air Operator Certificates:	**5,311**	**Active Pilots:**	**744,576**
Major Air Carriers – (e.g. United Airlines)	81	ATP	148,293
Commuter Air Carriers/On Demand Air Taxis	2,101	Commercial	133,681
Commercial Operators (e.g. Baltimore Orioles)	83	Private	207,742
Foreign air carriers (e.g. Lufthansa)	482	Recreational	221
External Load (Logging/Oil Platform)	329	Sport	4,418
Agricultural Operators	1,861	Student	121,500
Public Use Authorities (State/City/Police)	374	Foreign Pilot	128,721
Air Agency Certificates:	**5,911**	**Non-Pilot Air Personnel:**	**742,256**
Pilot Training Schools	708	Mechanics & Repairmen	380,543
Repair stations	4,774	Control Tower Operators	38,970
Maintenance Training Schools	171	Flight Attendants	171,474
Pilot Training Centers	258	Ground Instructors	73,859
		Other (Dispatchers /Flight Navigators / Navigators /Parachute Riggers / Flight Engineers	77,410
Aircraft:	**210,463**		
Air Carrier Aircraft	7,279	**Flight Instructors:**	**98,294**
Commuter Air carrier Aircraft	471		
On-Demand Air Taxi Aircraft	10,420	**Airmen Medical Examinations:**	**378,187**
General Aviation Aircraft	181,782	Special Issuances	32,540
Inactive Aircraft	10,511	Standard Issuances	345,647
Aviation Authorities – Other Countries:	**418**	**Approved Manufacturers:**	**1,619**
36 Bilateral Agreements	36		
Foreign Carrier Aviation Authorities	191	**Aviation Industry Entities Covered by Anti-Drug & Alcohol Programs**	**7,200**
Accident Investigation Authorities	191		
Check Airmen:	**7,584**	**National Transportation Safety Board:**	**455**
Part 121	4,453	Safety Recommendations (5-year average)	80
Parts 121/135	123	Open NTSB Safety Recommendations	343
Part 135	3,008	Major Investigations	32
Designees:	**9,944**	**ATCS Medical Clearance Exams:**	**13,305**
Aircraft Certification	3,312	Controller Workforce	13,219
Flight Standards	3,299	Flight Service Station Workforce	86
Aerospace Medicine	3,333		
Mechanics with Inspection Authority:	**20,944**		

As of July 2014

Staffing Information

	FY 2014 Actual	FY 2015 Enacted	Proposed Change	FY 2016 Request
Direct Full Time Equivalents (FTEs)	**6,884**	**7,161**	**+85**	**7,246**
Flight Standards	4,982	5,197	+50	5,247
Aircraft Certification	1,281	1,309	+19	1,328
Aerospace Medicine	354	369	+14	383
Rulemaking	33	34	0	34
Air Traffic Safety Oversight	117	128	0	128
Accident Investigation and Prevention	61	64	+1	65
Quality, Integration and Executive Services	56	60	+1	61
End of Year Employment (FTP)	**7,025**	**7,238**	**+168**	**7,406**
Flight Standards	5,087	5,254	+100	5,354
Aircraft Certification	1,292	1,319	+38	1,357
Aerospace Medicine	361	369	+28	397
Rulemaking	35	36	0	36
Air Traffic Safety Oversight	126	133	0	133
Accident Investigation and Prevention	65	67	+1	68
Quality, Integration and Executive Services	59	60	+1	61

As of January 2015

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

	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request
Flight Standards	**5,087**	**5,254**	**5,354**
Engineers	22	12	12
Aviation Safety Inspectors	3,926	4,104	4,184
Safety Technical Specialists	415	448	456
Operational Support	724	690	702
Aircraft Certification	**1,292**	**1,319**	**1,357**
Manufacturing Safety Inspectors	252	258	270
Pilots, Engineers and CSTAs	713	734	756
Safety Technical Specialist	174	170	172
Operational Support	153	157	159
Aerospace Medicine	**361**	**369**	**397**
Physicians, Physician Assistants, Nurses	51	55	57
Alcohol/Drug Abatement Inspectors	69	68	70
Safety Technical Specialist	196	206	226
Operational Support	45	40	44
Air Traffic Safety Oversight	**126**	**133**	**133**
Air Traffic Safety Inspectors	51	58	58
Safety Technical Specialist	70	68	68
Operational Support	5	7	7
Rulemaking	**35**	**36**	**36**
Safety Technical Specialist	32	33	33
Operational Support	3	3	3
Accident Investigation and Prevention Service	**65**	**67**	**68**
Air Safety Inspectors	9	9	9
Safety Technical Specialist	45	48	49
Operational Support	11	10	10
Quality, Integration and Executive Services	**59**	**60**	**61**
Safety Critical Staff	8	12	12
Operational Support	51	48	49
Total	**7,025**	**7,238**	**7,406**
Safety Critical Staff	6,033	6,283	6,432
Operational Support	992	955	974

As of January 2015

Workload Indicators

	FY 2014 Actual	Estimated Change	FY 2015 Estimate	Estimated Change	FY 2016 Estimate
Flight Standards					
Airmen Certification Activities	210,180	4.2%	218,933	3.9%	227,515
Operator Certification / Certificate Management Activities	103,179	5.3%	108,670	-3.7%	104,678
Investigation Activities	37,929	10.8%	42,009	1.8%	42,763
Non-ATOS Air Operator / Air Agency Surveillance Activities [Includes other than Part 121 Carriers]*	217,159	0.8%	218,806	-2.2%	214,033
ATOS Operator Surveillance Activities	96,003	5.5%	101,244	-17.8%	83,249
Enforcement and Investigation Activities	12,115	-1.6%	11,923	-14.1%	10,246
Education and Safety	10,650	10.0%	11,715	10.0%	12,886
Aircraft Registration Activities	751,402	0.2%	753,000	0.4%	756,000
Airmen Certification Examinations Activities	618,413	3.0%	636,954	3.0%	656,074
Aircraft Certification					
TC/STCs Issued	1,027	+0.7%	1,034	+0.7%	1,042
Other Design Approvals Issued	3,122	+0.5%	3,137	+0.5%	3,153
Production Approvals Issued	65	0.0%	65	+0.5%	66
Airworthiness Directives Issued	358	0.0%	358	0.0%	358
Certificate Management Audits	2,414	+2.0%	2,462	+2.0%	2,511
Aerospace Medicine					
Applications Processed / Received	378,187	0.4%	379,809	-0.5	378,008
DWI/NDR Recommendations Processed	7,099	-16.7%	5,916	10	6,508
Number of AMEs	3,333	-4.2%	3,194	-2.6	3,112
Anti-Drug and Alcohol Registrations Completed	185	8.1%	200	0.0	200
Anti-Drug and Alcohol MIS Annual Reports	3,250	23.1%	4,000	0.0	4,000
Compliance and Enforcement Inspections	1,205	-8.7%	1,100	50.0	1,650
Number of Drug Tests	9,032	6.1%	9,584	4.9	10,058
Number of Alcohol Tests	5,084	5.0%	5,338	5.0	5,605
Accident Investigation and Prevention					
NTSB Recommendations Received	62	61.3%	100	0.0%	100
Accidents / Incidents Investigated	31	16.1%	36	11.1%	40
Follow-up Investigations	303	4.0%	315	8.6%	342
Special Accidents / Incidents Investigated	250	0.0%	250	-100.0%	0
NTSB Hearings Participated In	3	0.0%	3	0.0%	3
FAA Recommendations Received	232	29.3%	300	0.0%	300
NTSB Requests Received	650	3.4%	672	0.4%	675
Rulemaking					
Exemptions	425	0.0%	425	76.5%	750
Petitions for Rulemaking	25	0.0%	25	-40.0%	15
Rulemaking Projects	30	0.0%	30	-16.7%	25
Aviation Rulemaking Advisory Committee					0
Tasks	2	0.0%	2	150.0%	5
Recommendations	2	0.0%	2	150.0%	5
Air Traffic Safety Oversight					
Safety Analysis and Audits	168,500	0.0%	168,500	0.0%	168,500
Safety Incident Investigations	12,569	0.0%	12,569	0.0%	12,569
Air Traffic Change Approvals	10,400	0.0%	10,400	0.0%	10,400
Safety Report Reviews	24,599	0.0%	24,599	0.0%	24,599
Airmen Credentialing / Examination	27,899	0.0%	27,899	0.0%	27,899
Education and Safety	52,500	0.0%	52,500	0.0%	52,500

As of January 2015

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COMMERCIAL SPACE TRANSPORTATION (AST)

Commercial Space Organization (AST)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$16,605**	**81**	**2**	**79**
Adjustments to Base	**$251**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$31			
FY 2016 Pay Raise (1.3%) (.75)	$119			
Additional Compensable Day	$53			
FERS Contribution	$48			
Discretionary Adjustments	**$1,258**	**25**		**13**
AST Staff Increase	$1,258	25		13
FY 2016 Request	**$18,114**	**106**	**2**	**92**

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Executive Summary: Commercial Space Transportation (AST)

What Is The Request And What Funds Are Currently Spent on the Program?

The request of $18,114,000 and 92 FTE allows AST to ensure protection of the public, property, and the national security and foreign policy interests of the United States (U.S.) during commercial space launch or reentry activities, as well as to encourage, facilitate and promote U.S. commercial space transportation. The request includes base funding of $16,605,000 plus discretionary adjustments of $1,258,000 and pay increases of $251,000. FY 2016 funding is used for Federal Full Time Permanent (FTP) employees, including financial, program, and technical support, such as issuing licenses and permits to keep pace with the increase of space launch or reentry activities, conducting a corresponding number of inspections, as well as coordination, planning, and oversight of commercial space transportation activities with the United States Air Force (USAF) and the National Aeronautics and Space Administration (NASA).

What is this Program and Why is it Necessary?

AST's mission is to ensure protection of the public, property, and the national security and foreign policy interests of the United States during commercial launch or reentry activities, and to encourage, facilitate, and promote U.S. commercial space transportation. In all endeavors, safety is AST's highest priority. Our specific actions to ensure safe operations include: developing and publishing regulations; conducting environmental assessments; granting licenses, experimental permits, and safety approvals; conducting safety inspections; supporting range operations; and carrying out space traffic management activities.

Presidential policies have directed AST, through the Secretary of Transportation, to undertake new or enhanced safety roles, beyond its traditional functions. The National Space Policy (NSP) in 2010 highlighted the critical importance of all departments and agencies making efforts to preserve the space environment, promoting safe and responsible operations in space, and strengthening U.S. leadership in space, while encouraging a robust and competitive commercial space sector. The President's National Space Transportation Policy, issued in November 2013, went even further to direct AST to execute exclusive authority, consistent with existing statutes and executive orders, to address orbital debris mitigation practices for U.S. licensed commercial launches and to include launch vehicle components such as upper stages, through its licensing procedures.

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

The funds in this request are necessary to enable AST to keep pace with the rapid growth of the U.S. commercial space transportation industry. Commercial space transportation activities are expanding at the same time NASA is increasingly relying on the commercial sector to provide cargo and crew services for the International Space Station. In addition, there is growing need to ensure the safe integration of space and air traffic, both domestically and internationally. In FY 2013, AST licensed and permitted 18 commercial launches, a six-fold increase over the previous year. Launch activity in FY 2014 reflected 19 completed launches. In FY 2015 AST expects the number of launches to exceed these recent totals, with 20-30 launches currently forecasted and growth is expected to continue. In addition, many planned missions will include technical and operational dimensions new in the 60-year history of spaceflight, involving an unprecedented level of complexity.

What Benefits will be provided to the American Public through this request?

From AST's inception in 1989 through April 2014, the Office has licensed 223 commercial space launches and four reentries, along with 34 permitted launches. Many benefits will be derived from the Commercial Space Integration into the NAS Program. They include safety, flight efficiency, and cost savings. This program will enhance the current level of safety by automating resource intensive, layered approaches, improving planning processes through advanced insight into complex constraints, and reducing the potential for human error. It will allow NAS performance and capacity to keep pace with current and future demand, reducing delays and reroutes while increasing launch and reentry opportunities for each space flight. Additional benefits include the development of airspace management processes and procedures for transition from special operations to routine operations, reduced FAA long-term costs and decreased costs to NAS users that would be passed down to the public. Commercial space transportation operators enhance citizens' lives through such activities as launch of supplies for the International Space Station and deployment of communications satellites to ensure reliable cell phone operations.

Detailed Justification for – Commercial Space Transportation (AST)

What Do I Need To Know Before Reading This Justification?

The 2010 National Space Policy states that 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." The 2013 National Space Transportation Policy reaffirms the commitment to "encourage and facilitate the U.S. commercial space transportation industry to increase industry robustness and cost effectiveness, foster innovation-driven entrepreneurship and international competitiveness, and benefit the U.S. economy…." AST has an essential role to play in enabling full implementation of these policies.

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Commercial Space Transportation (AST)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015-2016
Commercial Space Transportation	$16,331	$16,605	$18,114	+$1,509

The request of $18,114,000 and 92 FTE allows AST to ensure protection of the public, property, and the national security and foreign policy interests of the United States (U.S.) during commercial space launch or reentry activities, as well as to encourage, facilitate and promote U.S. commercial space transportation. The request includes an increase of $251,000 for basic pay raises, additional compensable day and the Federal Employees Retirement System (FERS) contribution.

The request also includes discretionary increases of $1,258,000 and 13 FTEs. The additional resource will be used to manage an increase in AST workload, driven by rapid industry growth, especially involving license and permit determinations within the legally mandated time periods of 180 and 120 days respectively. The requests will fund financial, program, and technical support. Examples include issuing licenses and permits to keep pace with the increase of space launch or reentry activities and conducting a corresponding number of inspections, as well as coordination, planning, and oversight of commercial space transportation activities with the United States Air Force (USAF) and the National Aeronautics and Space Administration (NASA).

What is this Program and Why is it Necessary?

FAA's Office of Commercial Space Transportation (AST) was established by Executive Order in 1984. Our mission is to ensure protection of the public, property, and the national security and foreign policy interests of the United States during commercial launch or reentry activities, and to encourage, facilitate, and promote U.S. commercial space transportation. Safety is our highest priority. Both the National Space Policy of 2010 and the National Space Transportation Policy of 2013 reflect a greater reliance by the Federal Government on the commercial space industry to accomplish national objectives.

AST accomplishes its safety mission through the execution of its licensing, permitting, and safety inspection functions. Within this process, AST conducts pre-application consultation with every company or entity that approaches the FAA for a license or permit. This consultation process can last months or even years, as it serves to educate these proponents on the applicable regulations and assist them in identifying potential issues as they develop and shape their plans. AST is, on average, involved with 25 pre-application consultations at any given time. Following pre-application consultation, a completed application is submitted to AST for evaluation of compliance with applicable regulations.

Every license or permit application requires an environmental review. These reviews can be complex and resource intensive, requiring specialized expertise in a number of resource areas including air and water quality, endangered species, noise, historical, archeological, and cultural resources. They require field surveys, carefully orchestrated consultations with multiple Federal and state agencies, tribes, and non-governmental organizations, as well as multiple public meetings and other opportunities for the receipt and disposition of public comments.

By statute, AST has only 180 days to evaluate a license application and 120 days to evaluate a permit application. During the evaluation, a number of safety assessments and analyses are conducted to ensure the applicant has demonstrated compliance with all applicable regulations. These include expected casualty calculations, system safety hazard analyses, and aircraft hazard area determinations. The evaluation also includes a policy review, interagency review, and a computation of maximum probable loss for determining an applicant's financial responsibility.

Safety inspection is an AST core function, ensuring license and permit holders adhere to regulatory requirements. At least one inspection of launch operations is required at time of flight, but inspection encompasses far more than flight activities alone. Once a license or permit is granted, AST sends safety inspectors to licensed and permitted launch and reentry operations to ensure an operator's compliance with the regulations and the representations made in its application. Licensing includes policy and payload reviews to determine that the proposed activity does not adversely affect foreign policy or national security. Other key activities are also inspected, including dress rehearsals and the testing and installation of flight termination systems. Each year, AST conducts an inspection of all licensed launch sites. AST safety inspectors thoroughly document their findings and maintain a collection of safety lessons learned and best practices. Inspections increased over 176 percent from FY 2012 to FY 2013. The need for inspections appears likely to continue growing rapidly, as industry expands in both suborbital and orbital domains, cargo transportation services, and in the near future, human transportation.

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

Beyond its licensing and permitting process, AST grants safety approvals and conducts rulemaking to develop new regulations. AST also works with: the interagency and international communities to support the formulation of policy; the commercial space transportation industry to develop forecasts and market studies; ARP on issues affecting spaceports and airports; AVS on hybrid vehicles and their operations; and ATO on safe integration of commercial launches and reentries into the National Air Space (NAS).

With the recent issuance of Presidential policies, AST has been directed, through the Secretary of Transportation, to undertake new or enhanced safety roles beyond its traditional functions. The National Space Policy (NSP) in 2010 highlighted the critical importance of all departments and agencies in making efforts to preserve the space environment, promoting safe and responsible operations in space, and strengthening U.S. leadership in space, while encouraging a robust and competitive commercial space sector. The National Space Transportation Policy issued in November 2013 went even further to direct AST to execute exclusive authority, consistent with existing statutes and executive orders, to address orbital debris mitigation practices for U.S.-licensed commercial launches, to include launch vehicle components such as upper stages, through its licensing procedures.

Both policies recognize the importance of commercial space transportation for enhancing US competitiveness and international leadership, as well as helping the US government meet its mission needs in a cost effective manner. Accordingly, the policy directs the Secretary, among other responsibilities, to:

- Ensure the regulatory environment for licensing commercial space transportation activities is timely and responsive, and addresses current market and industry developments;
- Develop, in coordination with the Administrator of NASA, a comprehensive, efficient approach to the regulatory oversight of commercial spaceflight capabilities transporting United States Government and United States Government-sponsored crews safely to and from orbit; and
- Advocate internationally for the adoption of United States Government safety regulations standards, and licensing measures to enhance global interoperability and safety of international commercial space transportation activities.

The increasing pace of growth in commercial space transportation brings challenges beyond increasing launch rates. The threat of orbital debris continues to grow and jeopardizes the safety of operations entering and returning from orbit. In addition, new types of space vehicles, such as balloons and a variety of winged launch and reentry vehicles, increase the complexity of licensing and operations, as do new ventures like small-satellites, cube-satellites, and commercial orbital servicing and commercial space stations, as well as the dawn of commercial human spaceflight operations.

Recognizing these growing needs, and consistent with Presidential policies, the Administrator's Strategic Initiative for the NAS requires that FAA develop and implement a strategy to ensure the efficient integration of air and space traffic. New programs like NAS integration of commercial launch and reentry operations and space traffic management will develop and implement the capabilities to plan and manage an effective transition of launches and reentries through the NAS, moving safely into and out of orbit. Automation of manual processes will improve FAA's ability to plan for space launches and reentries, as well as react to off-nominal situations, building the bridge from current capabilities to those that define the space vehicle operations (SVO) far-term concept of operations. This work will be performed in partnership with the ATO, NextGen, and other FAA organizations. Through the establishment of these programs, AST will be well positioned to execute the direction of the President's policies and implement the Administrator's Strategic Initiative.

AST activities in the support of the DOT Strategic Plan include:

- Conducting reviews and granting licenses, experimental permits, and safety approvals;
- Conducting inspections;
- Developing and issuing regulations and regulatory guidance;
- Performing accident investigation and prevention activities; and
- Supporting Federal range operations and related aircraft traffic management.

FY 2016 accomplishments are expected to be:

- Licensing/permitting over 30 launches/reentries within statutory time limits;
- Environmental assessment completion for all launches/reentries within the statutory time limits;
- Completion of additional safety approval applications, which evaluate space-related components, processes or services;
- Improving the integrated planning and execution of commercial space operations in the national airspace system;
- Enhancing AST's regulatory framework, including continual engagement with those developing new projects, in order to keep regulations current with the increasing complexity and diversity of suborbital and orbital operations.

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

The funds in this request are necessary to enable AST to keep pace with the growth of the U.S. commercial space transportation industry. Commercial space transportation activities are expanding at the same time NASA is increasingly relying on the commercial sector to provide cargo services for the International Space Station, and someday, astronauts, as well. There also continues to be a growing need to ensure the safe integration of space and air traffic, both domestically and internationally. The budget request allows AST to ensure protection of the public, property, and the national security and foreign policy interests of the United States (U.S.) during commercial space launch or reentry activities, as well as encourage, facilitate and promote U.S. commercial space transportation.

Expansion of commercial space transportation is increasing AST's regulatory workload, while the Office's resources remain essentially unchanged. The $1,258,000 in Discretionary Adjustments funds additional AST staff ($1,258,000 / 25 FTP) required to perform license and permit determinations within the legally mandated time periods of 180 and 120 days respectively; additionally, AST requests $251,000 for pay raises, benefits adjustment, and one additional compensable day.

AST issues licenses for commercial launches of both orbital and suborbital rockets. The first AST licensed launch was the suborbital launch of a Starfire vehicle on March 29, 1989. From 1989 until April 2014, the Office has licensed 223 commercial launches, along with 34 permitted launches. As the number of launches increases, the number of reviews, inspections, documents, studies, and regulations and operational integration will increase proportionally. AST has also seen an increase in the number of foreign space agencies seeking AST advice and guidance for activities in their own countries AST is seeking additional staff to ensure each of these actions and more are completed in a timely manner to continue its strong support of the industry.

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

- Rendering a license within the congressionally mandated 180 day time limit following receipt of a complete application.
- Meeting the congressional standard of 120 days to issue a permit upon receipt of a complete application.
- Licensing eight commercial spaceports in six states within the congressional timelines in every instance upon receipt of a complete application.
- Passing every internal and external audit of our Environmental Management System.
- Identifying safety issues early so that no major public safety related non-compliances have occurred and no resulting enforcement actions have been necessary.
- Awarding Safety Approvals for unique commercial training facilities and technician education programs.
- Creating and co-chairing the world's first international Human Spaceflight Safety Committee, within the International Astronautical Federation.
- Actively exploring opportunities to increase international leadership in spaceflight safety, based on our successful program, while responding to requests by representatives of several foreign governments for advice on establishing spaceflight regulatory regimes.

What Benefits will be provided to the American Public through this request?

Since AST's inception in 1989 until April 2014, we have licensed 223 commercial space launches and four reentries, along with 34 permitted launches. AST also licenses the operations of eight launch sites in six different states. These operators enhance American's lives in ways most are not even aware, including the launch of supplies for the astronauts on the International Space Station, communications satellites which ensure that in all cases, our cell phones are responsive, national security satellites to ensure our nation continues to be secure, and a myriad of additional day-to-day outcomes such as on-demand television transmission satellites. Of the nearly 1,000 operational satellites in orbit currently, nearly 70 percent are commercial. A considerable number of these satellites are approaching the end of their service life, requiring replacement in the coming years. While in the past, foreign launchers held a large share of commercial satellite launches, but the success of lower cost U.S. launchers like SpaceX and recent geopolitical developments are anticipated to send much of this business back to U.S. companies who will require a license from the FAA to conduct their launches. Beyond the traditional space lift market, commercial human space flights are anticipated to begin in earnest within the next several years. In the 60 years of space flight, less than 350 Americans have travelled to space. Over 700 people are currently signed up to fly on commercial suborbital flights that will be licensed by the FAA. AST is working to be able to support this continued growth.

Explanation of Funding Changes

	Dollars ($000)	FTE
Commercial Space Transportation	**$1,509**	**13**
Overview: For FY 2016, the Associate Administrator for Commercial Space Transportation requests $18,114,000 and 92 FTE 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.		
Adjustments to Base	**$251**	**-**
Annualized FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	31	
FY 2016 Pay Raise: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	119	
Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	53	
FERS Contribution: OMB Circular A-11 has increased the agency's contribution rates to the Federal Employees Retirement System (FERS). This increase in cost to the FAA represents the increased rates for both Air Traffic Controllers and other agency employees.	48	
Discretionary Adjustments	**$1,258**	**13**
AST Staff Increase: Additional staffing is requested to conduct license and permit determinations within the legally mandated time periods of 180 and 120 days respectively associated with a substantial increase in industry activity. Additionally, technical outreach requirements by AST have increased significantly. Because of this increased activity, additional analytical personnel and technical outreach staff are required to support the increased number of license and permit determinations, certifying, licensing, and supporting spaceports (new and established), various space vehicles, and launches. Additionally, AST is requesting an Environmental Specialist due to a steady and significant increase in proposed launch sites and launch operations.	1,258	13

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FINANCE AND MANAGEMENT (AFN)

Finance and Management (AFN)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$756,047**	**1,790**	**21**	**1,665**
Adjustments to Base	**$8,774**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$514			
FY 2016 Pay Raise (1.3%) (.75)	$2,190			
Additional Compensable Day	$953			
FERS Contribution	$797			
Non-Pay Inflation	$4,320			
Other Changes	**-$200**			
Working Capital Fund	-$200			
Base Transfers	**$348**	**-1**		**-1**
Aviation Education	-$164	-1		-1
FAA Leadership and Learning Institute	$512			
FY 2016 Request	**$764,969**	**1,789**	**21**	**1,664**

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Executive Summary - Office of Finance and Management (AFN)

What Is The Request And What Funds Are Currently Spent on the Program?

The FY 2016 request of $764,969,000, 1,789 full-time permanents (FTPs), and 1,664 full-time equivalents (FTEs) allows AFN to provide the FAA's enterprise level shared services for finance, acquisitions, non-NAS information technology, and regions and center operations support services to the FAA's 14 lines of business and staff offices, the Department of Transportation, and other government agencies.

Centralized management of the core services allows the FAA front-line organizations to focus on critical aviation safety mission delivery of Air Traffic control services to the flying public, safety and regulatory oversight of operators and manufacturers, and security oversight.

FY 2016 – Finance and Management (AFN)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Finance and Management (AFN)	**$762,462**	**$756,047**	**$764,969**	**+$8,922**
Financial Services (ABA)	117,600	118,175	118,859	+684
Acquisition and Business Services (ACQ)	45,800	52,166	52,675	+509
Information Services (AIT)	301,200	298,609	300,651	+2,042
Regions and Center Operations (ARC)	297,862	287,097	292,784	+5,687

Finance and Management (AFN)

The FY 2016 request of $764,969,000 and 1,789 full-time permanents (FTPs) and 1,664 full-time equivalents (FTEs) allows AFN to continue to provide the critical financial, acquisitions, IT, and regions and center operations support services that the agency's 14 lines of business and staff offices require to support and achieve the agency's aviation safety mission.

The request provides for salaries, benefits, FY 2015 annualized pay raise, as well as a 1.3 percent FY 2016 pay raise, and one additional compensable day in FY 2016. It also includes rent, leases, and basic fixed operating expenses such as telecommunications, IT infrastructure and security, maintenance, and financial systems operations. A base transfer moves Aviation Education personnel from ARC to the Human Resources Management organization (AHR), and a funding adjustment from AHR to ARC correcting the FY 2014 base transfer amount that moved the Center for Management and Executive Leadership (CMEL) approved by Congress in the FY 2014 appropriations process.

What is this Program and Why is it Necessary?

AFN enables its customers to accomplish the FAA mission by ensuring the consistent delivery of the following services to the agency:

- Financial Services (ABA)
- Acquisitions and Business Services (ACQ)
- Information and Technology Services (AIT)
- Regions and Center Operations Services (ARC)

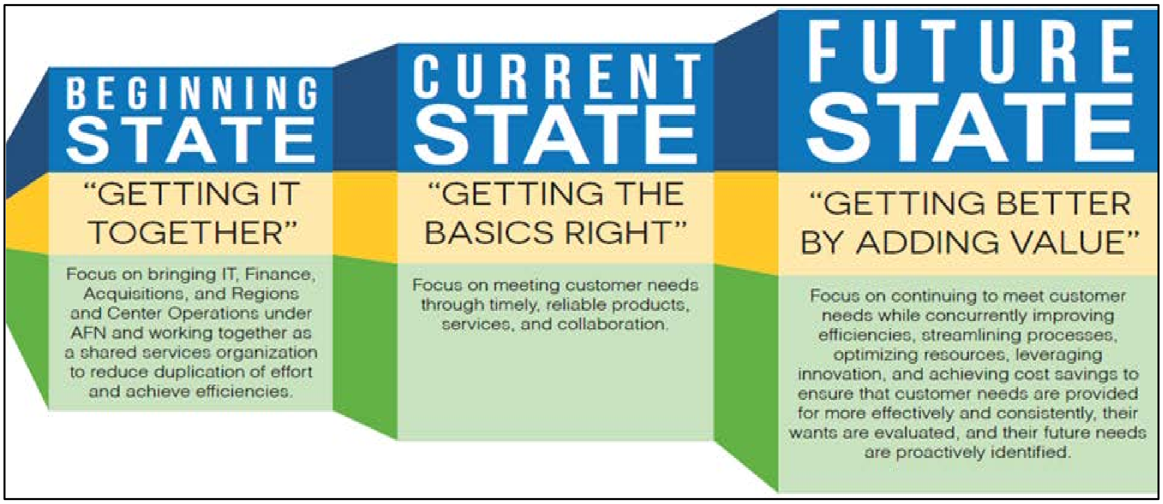
In September 2011, the agency established AFN to serve as the sole shared services provider to the FAA's 14 lines of business and staff offices. By moving the FAA's common financial, acquisitions, IT, and regions and center operations services functions out of the individual lines of business and staff offices and consolidating and centralizing them under AFN, those lines of business and staff offices are now able to fully dedicate their attention and resources to accomplishing their unique core functions in support of the FAA's aviation safety mission.

AFN leads agency-wide initiatives to:

- **Achieve cost efficiencies**: Through its centralized approach for common services, AFN has identified data-driven, value-added financial and acquisition strategies and performance measures that have increased efficiency and reduced duplication across the agency through cost controls including strategic sourcing, realignments, and facility management improvements in FY2014 and FY 2015.
- **Reduce administrative redundancies**: AFN consolidated and centralized all IT functions spread across 14 FAA Lines of Business and Staff Offices, under a single shared services organization.
- **Drive continuous process improvement**: AFN developed and manages the Community of Practice for Process Improvement (CoP PI), an agency-wide collaborative workgroup to share best practices, improve business efficiencies, eliminate redundancies and build the FAA's process improvement body of knowledge.
- **Leverage strategic sourcing**: ACQ leads the FAA's Strategic Sourcing for the Acquisition of Various Equipment and Supplies (SAVES) Program, used by all FAA lines of business, staff offices, regions, and centers to purchase selected commodities at a lower cost while maintaining or improving the quality of those products.
- **Reinvest in critical programs:** By realizing various cost avoidances as the organization was established, AFN was able to reinvest those funds not cut in critical programs and projects hampered by shortfalls or in new efforts that the agency identified as strategic priorities such as risk-based decision making and deployment of wireless capability.
- **Improve fiscal accountability:** In a coordinated, cross-organizational effort, AFN worked with the Department of Transportation to upgrade the agency's financial management system (DELPHI), over a 26-month period, providing the entire Department with a new system with new functionalities that ensure greater accountability and transparency in the accounting process, including FAA.
- **Support critical national airspace sustainment needs:** As the FAA launched its plan to hire and train more than 10,000 Air Traffic Controllers over the next decade, AFN supported Air Traffic and Human Resource Management to bring these new controllers on board, ensuring the agency's automated job application system could handle the significant influx of traffic and applications and adjusting FAA Academy training schedules to accommodate the increase in new students.
- **Leverage technology:** Impacting 52,000 users, AFN implemented the agency's and the Department of Transportation's new email and collaboration solution (EMS365), which was the first large customer-facing implementation of a Cloud Solution at the FAA.
- **Provide collaboration with speed:** After the fire at the Chicago Air Route Traffic Control Center (ZAU) in Aurora, IL, AFN provided emergency support to find the funding necessary, get the contracts in place, and identify the IT and infrastructure needs to get the center back up and running and the national airspace fully operational again as quickly and safely as possible.

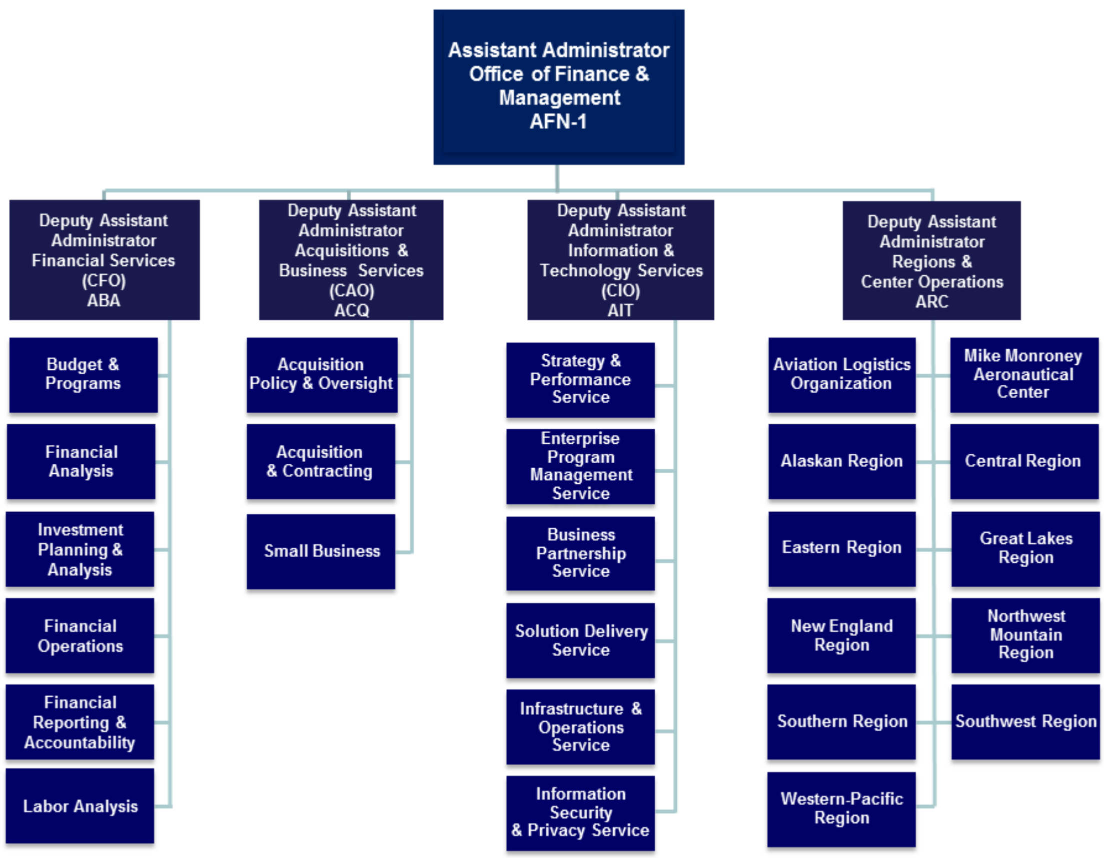
AFN's Maturation Approach:

AFN has progressed in its phased maturation approach from creating an effective shared services organization in FY 2012 and 2013 to becoming a more efficient organization in FY 2014 and 2015. Having progressed from a startup organization to a fully functioning shared services provider, AFN has matured from identifying what the customer needs and how AFN can deliver it to understanding the customer's core functions so that AFN can proactively identify and address the customer's future needs. With its basic business processes and supporting metrics now in place, AFN's emphasis has shifted to increasing its value to the agency and the American Taxpayer by consolidating duplicate work across the agency, accelerating cross-functional integration, eliminating gaps, leveraging innovation, driving accountability and identifying continuous process improvements.



Organizational Alignment:

AFN is comprised of four functional areas.



Core Services:

Financial Management – ABA	
Critical Responsibilities:	Budget formulation; budget execution; oversight; workforce planning; financial planning and analysis.
Key Activities:	▪ Serves as the agency's Chief Financial Officer. ▪ Provides accounting and financial advisory services; investment planning and analysis; and pricing associated with labor negotiations. ▪ Formulates and executes budgets for all appropriations. ▪ Establishes financial training, policy, guidance, and internal controls. ▪ Manages and implements travel and purchase card policies. ▪ Provides workforce planning models. ▪ Manages financial and accounting system processes, data standardization, and requirements.
Acquisitions and Business Services - ACQ	
Critical Responsibilities:	Acquisition and contracting support (excluding real estate, property, and transportation); acquisition policy, guidance and oversight; acquisition workforce development, planning and training.
Key Activities:	▪ Serves as the agency's Chief Acquisitions Officer. ▪ Manages contract award, administration, and review; small business development; FAA purchase card program; and earned value management. ▪ Conducts cost/price analysis and audits. ▪ Develops acquisition policy, guidance, and tools. ▪ Provides acquisition oversight and evaluation. ▪ Provides investment decision and acquisition program governance. ▪ Manages acquisition workforce planning, career management, and workforce training.
Information Services - AIT	
Critical Responsibilities:	IT solutions, services and products; IT infrastructure; cyber security; IT training; automation.
Key Activities:	▪ Serves as the agency's Chief Information Officer. ▪ Provides leadership and management for enterprise-wide IT services. ▪ Develops and maintains the agency's IT strategic plan. ▪ Manages and provides centralized governance for agency-wide IT functions, resources, and operations. ▪ Oversees the Information Systems Security Program. ▪ Provides IT-focused process engineering, training, consultation evaluation, and support. ▪ Manages and maintains all FAA non-National Airspace System (NAS) IT networks, IT infrastructure, and IT data centers.
Regions and Center Operations - ARC	
Critical Responsibilities:	Emergency readiness; property management; facilities management; transportation; space consolidation; NAS supply support; technical training.
Key Activities:	▪ Leads corporate outreach and horizontal integration efforts across lines of business and staff offices in the nine regions and aeronautical center. ▪ Manages command, control, communication support, and emergency planning. ▪ Provides property and facilities management and administrative services. ▪ Oversees NAS supply support, repair, training, and franchise business application development. ▪ Provides national policy, training, and oversight for life-cycle accountability for real, personal, and government furnished property. ▪ Leads and integrates logistics initiatives and real property management supporting both FAA and DOT. ▪ Tracks Federal real property through FAA's Real Estate Management Program. ▪ Participates in GSA Capital Portfolio Planning Program to identify opportunities for efficiencies and cost effective solutions for real property. ▪ Conducts ATO funded Technical Training courses for Air Traffic initial qualification.

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

The requested funding level will enable AFN to provide the agency with the financial, acquisitions, IT, and regions and center operations support services the FAA lines of business and staff offices rely on while managing operations and regulatory oversight of the National Airspace System (NAS).
Today, government is rethinking existing operational models and redesigning them to better support their strategic direction through shared services. As an established shared services provider, AFN is at the forefront of this effort, having implemented an operating model that helps the organization support, connect, interact, and respond to customers, stakeholders, colleagues, and resources easier and more reliably by taking advantage of innovation and driving integration and value across the agency.

As the government becomes more reliant on the end-to-end integration that is only possible with collaborative governance, common technology, repeatable processes, optimized assets, insightful analysis, skilled resources, and integrated operations, AFN's shared services approach will continue to provide increased value to the agency.

Congress approved the agency's request to establish AFN not only to consolidate, streamline, and standardize the agency's finance, acquisitions, IT, property, logistics, technical training, and regional integration services, but to serve as the subject matter experts who can help the agency work smarter, more effectively, and at lower costs while providing increased value to the American Taxpayer. Since it was first stood up in 2011, AFN has made great strides in consolidating, centralizing, right-sizing, and improving the delivery of common finance, acquisitions, IT, and regions and center operations support services, and establishing an organizational structure with the right resources in the right places to meet customer's needs as effectively and efficiently as possible. Having already capitalized on the most apparent opportunities to reduce duplication and improve processes as shared services evolved, AFN has now streamlined the four functional areas to the point where new efficiencies are becoming harder and harder to realize.

As the FAA's process improvement champion, AFN also shoulders the critical responsibility of leading efforts to identify and eliminate wasteful spending across the agency while striving to identify and implement opportunities to be more efficient and effective in accordance with Presidential mandates. In this role, AFN leads the agency's ongoing efforts to reduce the administrative footprint, leverage technology, and more effectively utilize resources in order to sustain the as-is state that ensures the agency can meet its aviation safety mission while maintaining the flexibility to accommodate ever-changing needs and requirements.

Specifically, at the requested funding level, AFN will continue to perform the following key responsibilities:

- Support the achievement of the FAA's mission and strategic priorities.
- Guide the agency through the constrained fiscal climate by finding ways for the FAA to work smarter, improve processes, and implement cost efficiencies.
- Optimize information delivery and security through technological innovation and automation.
- Improve FAA contracting and acquisitions and leverage strategic sourcing.
- Achieve a clean financial statement audit.
- Manage a portfolio of real property assets exceeding $9 billion.
- Operate Regional Operations Centers to provide 24/7, immediate command, control, and communications for all incidents related to NAS continuity.

What Benefits will be provided to the American Public through this request?

At this funding level, AFN will have the resources required to provide critical services to the agency that allow the 14 lines of business and staff offices AFN supports to focus on their individual mission requirements.

AFN's shared services approach promotes responsible stewardship, financial integrity, increased accountability, data-driven decision making, continuous improvement, and value-added products and services that support the daily operations required of the agency to regulate, oversee, and ensure the safety of America's airspace system.

Detailed Justification for-Financial Services (ABA)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Financial Services (ABA)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Financial Services (ABA)	$117,600	$118,175	$118,859	+684

The FY 2016 budget request of $118,859,000, 247 FTPs and 230 FTEs will support the Financial Services (ABA) Program. This funding will provide for salaries, benefits, annualized pay, and non-pay ABA activities including ongoing program support for continued financial operations and financial oversight for the Agency. This request also provides for the AFN staff office pay and non-pay activities including continuing program support for the centralized AFN employee and administrative services, strategic communications, and organizational performance services for all the functional areas under AFN.

What is this Program and Why is it Necessary?

Financial Services (ABA) is one of the four main functional areas under the Assistant Administrator for Finance and Management (AFN). ABA's mission is to provide timely business consulting, products, and services that promote the achievement of FAA performance goals, cost efficient operations, and FAA leadership in global aviation. ABA is responsible for overseeing FAA's financial systems and financial reporting, leading and implementing FAA's cost efficiency program, supporting FAA in labor negotiations, establishing staffing standards, financial management training, enforcing government-wide reforms, and ensuring resources are managed in accordance with all laws, policies, directives, and procedures. ABA manages all of FAA's annual and multi-year enacted appropriations. In FY 2016, ABA will oversee nearly $16 billion across its four major appropriations. ABA is constantly evaluating ways to meet current financial needs while still making smart business decisions to invest in the future. Our organization is structured to provide budget services for all appropriations. ABA ensures the effective use of agency resources, which is critical in the ever-changing budget environment. ABA is divided into six offices that support its mission.

The **Office of Budget and Programs (ABP)** develops the FAA budget requests and submits budget justifications to the Department of Transportation, Office of Management and Budget (OMB), and Congress. ABP ensures that budget needs are well justified and explained while managing Congressional activities with the appropriation committee/subcommittees including programmatic briefings, hearings, report preparations, and technical assistance. ABP leads the development and oversight of the FAA's budget ensuring sufficient funding is available to support critical strategic activities and initiatives. ABP oversees the execution of the agency's current and prior year appropriations, manages the Airport and Airway Trust Fund, and oversees the reimbursable program. This includes issuing guidance for spending, Lines of Business (LOB)/Staff Office (SO) allowances, tracking obligations versus allowances throughout the year, as well as preparing and coordinating with external authorities regarding numerous apportionment requests for all FAA organizations. ABP issues and maintains funds control policies, systems, and processes for all budgetary activities, and procedures to ensure compliance with budget-related legislation, OMB circulars, and appropriation law.

ABP also provides "end user" training to approximately 4,270 employees and contractors on budget execution processes and procedures to employees across the FAA, such as funds certification, financial management, internal controls, and purchase card use. This training assists in our Agency-wide effort to ensure standardization of financial processes that are consistently compliant with the proper usage of appropriations.

The **Office of Financial Analysis (AFA)** conducts financial analyses required by the Administrator and other stakeholders. This office reviews all contracts above $10 million to ensure cost estimates are reasonable, contract types are justified, and contracts are competitively bid. In FY 2014, AFA reviewed 76 cases with a total combined CFO approved amount of $5.6 billion. This office also manages the Agency's Cost Control and Efficiency Measures programs and has a dedicated metrics team providing reports to Agency leadership, Air Traffic Organization (ATO), and other audiences. AFA is responsible for updating several Agency user fees, including registry fees and overflight fees.

The **Office of Investment Planning & Analysis (AFI)** ensures proposed capital investments undergo a rigorous investment analysis process, resulting in business cases that support Joint Resource Council decisions. The office provides complete business case support including cost estimating, benefits analysis and operations research, business case integration, schedule assessment, and economic assessments of the proposed investments. AFI works closely with all stakeholders including ATO's Program Management Organization and the NextGen Air Transportation System (NextGen) organization to advance major capital investment decisions.

The **Office of Financial Operations (AFO)** leads all accounting operations, including financial transactions as well as managing the DELPHI general ledger system and the Procurement Requisition Information System for Management (PRISM) system. AFO purchases 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, OK, through the DOT. AFO serves as the agency lead for accounting operations and transactions processing. AFO will continue to support enhancements of the DOT's core accounting system in order to continue to provide timely and accurate financial information.

The **Office of Financial Reporting and Accountability (AFR)** is responsible for all agency external financial reporting, financial policy, and financial internal control functions across the agency. AFR prepares the agency's consolidated financial statements, ensures quality assurance over the agency's general ledger, and reconciles general ledger activity and balances. AFR also issues and maintains all agency financial and accounting policies and manages the government travel charge card program for over 43,000 travel cardholders. AFR routinely prepares a statement of net cost (a cost accounting report) that determines the cost of providing FAA services. AFR also develops financial systems training so that procedures are understood and followed.

The **Office of Labor Analysis (ALA)** supports FAA organizations for labor negotiations for nearly 34,000 unionized employees, staffing standards development, and resource optimization. ALA conducts and develops benchmarking, plans, analyses, and models for labor-related data, to support bargaining unit negotiations and cost efficiency in the FAA. ALA provides analytical support that combines workload activity standards, attrition forecasts, and other information to assist in developing both staffing forecasts and hiring plans. ALA also leads the development of the annual Controller Workforce Plan and provides increasing support for other FAA workforce plans such as the Office of Aviation Safety (AVS) Workforce Plan. The Controller Workforce Plan and AVS Workforce Plan are key business tools that drive hiring, training, and staffing requirements across all FAA air traffic facilities. ALA is also providing support in the development of the Acquisition and Commercial Space workforce plans. These plans support the FAA safety mission and the Administrator's Strategic Initiative to make aviation safer and smarter.

Anticipated FY 2016 Accomplishments

Function	Anticipated FY 2016 Accomplishments
Office of Budget and Programs (ABP)	▪ Present effective budget requests, conduct effective program oversight, and maintain required funding needs for an agency budget of $15.8 billion, including Operations, Airport Improvement Program (AIP), Research, Engineering & Development (RE&D), Facilities and Equipment (F&E), and NextGen modernization activities; ▪ Ensure Agency funds and resources are utilized effectively and that FAA maintains compliance with the Anti-Deficiency Act; ▪ Implement and improve the centralized structure for oversight of well

Function	Anticipated FY 2016 Accomplishments
	over $400 million in reimbursable work; ▪ Develop and enhance agency-wide training in financial management to ensure executives and managers understand their fiscal roles and responsibilities and employees are better equipped to meet increased efficiency and accountability objectives; and ▪ Conduct a suite of formal financial training classes hosted within the FAA to standardize operating procedures, internal controls, purchase card use, and fund certification.
Office of Financial Analysis (AFA)	▪ Serve as Lead for agency-wide cost efficiency program. Continue to collect and analyze cost control efficiency data from multiple sources to identify trends in operational and overhead costs by facility such as cost per controlled flight and ATO overhead rates; ▪ Review acquisitions of $10 million or more to ensure the procurement represents a good investment of taxpayer resources and appropriate alternatives were considered; ▪ Develop and establish, with program and management elements, numerical measures and indicators of financial performance, program performance, and the resulting public benefits achieved; and ▪ Update registry fees and overflight fees.
Office of Investment Planning and Analysis (AFI)	▪ Perform analysis of Agency investments and monitor acquisition program baselines; ▪ Support the full range of FAA acquisition decisions for both NAS and non-NAS programs; ▪ Apply business case discipline to new investment categories (e.g., facilities and variable quantity investments); and ▪ Develop and update cost estimator, schedule development, and other investment analysis training in support of the larger acquisition community.
Office of Financial Operations (AFO)	▪ Support DOT core accounting system enhancements to improve financial business processes and provide timely and accurate financial information on FAA's programs; ▪ Lead the Agency on all accounting operations and provide financial oversight and information to assist FAA organizations with making business decisions; ▪ Lead the agency replacement of Cru-ART with SISO (sign in/sign out) and Air Traffic Operations Management System (ATOMS) as the air traffic timekeeping system.
Office of Financial Reporting and Accountability (AFR)	▪ Obtain an unmodified audit opinion on Agency financial statements with no material weaknesses; ▪ Expand the internal controls function to more rigorously identify both financial and operational areas for improvement which promotes required transparent and detailed reporting to the public; and ▪ Test grant program payments (and other programs that may be considered at high risk of improper payments) as required by the Improper Payments Information Act of 2002 (as amended by the Improper Payments Elimination and Recovery Act of 2010) and Executive Order 13520, Reducing Improper Payments and Eliminating Waste in Federal Programs dated Nov. 2009 ▪ Maintain and update accounting policies and procedures and develop associated financial systems training.
Office of Labor Analysis (ALA)	▪ Produce the Controller Workforce Plan for 2016 – 2025 which is a projection of changes in air traffic forecasts, controller retirements, and staffing requirement ranges for our air traffic control facilities to support FAA's safety mission to meet external stakeholder requirements; ▪ Provide project management support for AVS Staffing Tool and

Function	Anticipated FY 2016 Accomplishments
	Reporting System (ASTARS) and the annual AVS Workforce Plan; ▪ Continue implementation of the Operational Planning and Scheduling (OPAS) System in air traffic control facilities; and ▪ Expand the role of the Labor Analysis group to include workforce planning and labor cost analysis for FAA business units.

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

ABA will continue to oversee and maintain the Agency financial systems, financial policies, financial reporting, and spearheading the Agency cost efficiency program and other agency-wide management reforms to ensure resources are managed in accordance with all laws, policies, and procedures. ABA will continue to reinforce its financial management knowledge base with the improvement of DELPHI, PRISM (or replacement system), Cost Accounting System (CAS), and Labor Distribution Reporting (LDR) system. This funding will allow us to continue to provide centralized agency-level financial functions that help improve accountability and enhance operational efficiency in the usage of FAA resources.

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

Funding below the requested level would not allow ABA to be able to adequately provide agency-wide financial support for the accounting system, and there would be potential risks in delayed and /or inaccurate reporting if we are unable to code, generate, and interpret financial management data that ensures proper management of the Agency's resources. If FAA's mixed financial and program management systems are not re-engineered to comply with the upgrade to the DOT core accounting system, we would not be able to:

- Interface procurement transactions with the core accounting system, which would result in manual processing which would 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 our financial and program systems which allow the Agency to manage its programs and financial resources, allow for increased, efficiencies & accuracy of our accounting records, track requirements from formulation to expenditures, and reduce vulnerabilities in the financial systems;
- Maintain our unmodified audit opinion with no material weakness since the Agency will not be able to track and manage its program transactions in a timely and accurate manner and on a platform that continues to be supported by Oracle; and
- Maintain our LDR system which is a key component of cost accounting data, representing labor costs which comprise about 45 percent of our total appropriated costs.

What Benefits will be provided to the American Public through this request?

ABA is the shared services provider to the FAA's 14 LOBs and SOs in the area of budget and financial management. By consolidating and centralizing the agency's common financial services, ABA is able to lead the agency in identifying cost savings, providing consistent and sound financial management processes, increasing efficiencies, and reducing duplication. This will enable the lines of business and staff offices to better focus their attention and resources on achieving their individual goals in supporting the FAA mission. Our program primarily supports the DOT goal of *Organizational Excellence* and the outcome of *Improved Financial Performance.*

In recent years, there has been an increasing recognition of the need for effective oversight of financial decision-making processes. The Agency has implemented oversight of proposed acquisitions, travel, and conferences, as well as new procedures to provide executive oversight over administrative information technology investments. This added oversight demonstrates the Agency's commitment to ensuring 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 within the Agency. ABA leads the Agency's efforts to achieve its Cost Control and Efficiency Measures and Unmodified Audit Opinion performance targets. The office has fundamental responsibilities to maintain a strong agency-wide foundation of accountability and financial management. The ability to capture this financial data ensures we achieve the President's goal of greater transparency in government.

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Detailed Justification for Acquisition and Business Services (ACQ)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 –Acquisition and Business Services (ACQ)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Acquisition and Business Services (ACQ)	$45,800	$52,166	$52,675	+509

The FY 2016 budget request of $52,675,000 for Acquisition and Business Services (ACQ) includes 244 FTPs, and 227 FTEs. This request will provide for salaries, benefits, annualized pay, and contract services. It includes adjustments for annualization of the FY 2015 pay raise and the cost for one additional compensable day in FY 2016.

What is this Program and Why is it Necessary?

ACQ is led by FAA's Chief Acquisition Officer and serves as the executive agent for FAA's Acquisition Management System (AMS). The Chief Acquisition Officer (CAO) chairs the FAA's Joint Resources Council, the FAA organizational investment review board. The CAO also manages FAA's investment management process for capital investments including Next Generation Air Transportation System (NextGen) and other major systems acquisitions. ACQ is responsible for the award and administration of all types of contracts, purchase orders, delivery orders, agreements, and aviation research grants for all FAA organizations as well as external customers. The organization conducted approximately 25,000 procurement actions in FY 2014 for more than $4.2 billion in goods and services.

In addition to awarding and administering contractual agreements, ACQ monitors contractors' quality assurance systems and accepts or rejects systems, equipment, and materials; and manages FAA's Acquisition Management System (AMS), acquisition policy, and the investment decision process. Specialists provide support and training to major programs to apply the use of Earned Value Management. ACQ also manages FAA's Small Business Program and the achievement of small business contract goals; and manages all training, certification, and workforce planning for FAA's acquisition workforce.

ACQ ensures that FAA's acquisition workforce has the right skill mix to ensure success. The acquisition workforce includes:

- Contracting Officers and Specialists
- Acquisition Analysts
- Program Managers
- Project Managers
- Researchers
- Engineers
- Systems Engineers
- Contracting Officers Representatives
- Business and Financial Analysts
- Cost Analysts
- Logistics Specialists
- Test and Evaluation Specialists
- Procurement Attorneys
- Other specialized acquisition support personnel

Acquisitions and Business Services contribute in measurable ways to each of the Administrator's strategic priorities. For example, the acquisition of critical NextGen systems and technologies contributes to the *deliver benefits through technology and infrastructure* priority; and the acquisition of other products, services, systems, and facility infrastructure programs supports the *make aviation smarter and safer* priority. Additionally, FAA's Acquisition Workforce Plan, which ACQ leads, contributes directly to the *empower and innovate with the FAA's people* priority by developing a skilled acquisition workforce. Moreover, ACQ directly supports a variety of cost savings and efficiency targets and government-wide acquisition and procurement initiatives established by OMB, DOT, and FAA. We use metrics and performance measures to assess our progress.

Sample FAA Acquisition Metrics
• Acquisition Cost and Schedule Baseline Variances • Acquisition Professional Certifications • Percent of Dollars Awarded to Small Businesses • Time to Award • Cost to Procure • Cost Savings thru Strategic Sourcing • Contractor Past Performance Reporting • Dollars/Actions Awarded through Competition

Anticipated FY 2016 Accomplishments

Function	Anticipated FY 2016 Accomplishments
Award of Contracts, Orders, Agreements and Grants	▪ Advise, plan, negotiate and award cost-effective, best value contracts, purchase orders, delivery orders, agreements, and aviation research grants for FAA headquarters, Technical Center, Aeronautical Center, and the Service Areas. Support all FAA Lines of Business and all FAA programs. Procure essential equipment, facilities, major systems, construction, research and development, supplies and services needed to maintain FAA operations and programs, and for transition to NextGen.
Contract Administration	▪ Perform a full range of Contract Administration Services in accordance with AMS Policy; ▪ Assure contractor performance in accordance with contract terms and conditions; issue contract modifications, and monitor contract deliverables; ▪ Assure that subcontracting policies and requirements are followed; ▪ Review contractor invoices for payment; and ▪ Close out completed contracts.
Implement Process Improvements	▪ Develop and implement best practices in acquisition to deliver best value for the taxpayer and increase efficiency and effectiveness of procurement methods; ▪ Streamline time to award; ▪ Reduce cost to procure; and ▪ Comply with applicable laws, regulations, policy, best practices;
Small Business Development	▪ Manage small business policy, guidance and tools, to meet agency, department, and administration goals; ▪ Conduct internal and external small business outreach/training; and ▪ Target at least 25 percent of total direct procurement dollars as Small Business awards.
Cost/Price Analysis & Audits	▪ Provide expert-level cost/price analysis tools, training, advice, and assistance to FAA contracting and program personnel; ▪ Strengthen price negotiation to ensure FAA pays fair and reasonable rates for the products and services it procures; ▪ Manage agreements with Defense Contract Audit Agency (DCAA) to perform audits of cost reimbursable, time, material, and labor hour

	contracts with an estimated value of $100 million or more; ▪ Request audits of cost reimbursable and time, material, and labor hour contracts under $100 million using non-DCAA sources; and ▪ Update/maintain FAA Pricing Handbook.
Acquisition Policy	▪ Manage, update, and strengthen FAA's AMS to ensure acquisition policy and guidance complies with applicable laws and other directives; ▪ Provide advice and assistance to Agency personnel; and ▪ Manage processes to enable timely, proper, and best-value acquisition of goods and services supporting safe and efficient operation of the NAS.
Strategic Sourcing	▪ Implement strategic sourcing contracts and other strategic acquisition initiatives to realize cost control; ▪ Establish sourcing vehicles that realize administrative efficiencies and meet agency needs in a streamlined and consistent manner; and ▪ Promote the expanded use of environmentally preferable products and services through "Green" requirements and processes embedded in strategic sourcing contracts.
Acquisition Oversight	▪ Perform nationwide contract reviews for compliance with policies and procedures, and implement corrective actions where necessary; and ▪ Track findings and recommendations to promote consistent implementation of FAA's process improvement and procurement integrity policies.
FAA's Purchase Card Program	▪ Provide oversight of FAA's purchase card program to ensure compliance with regulation and policy; ▪ Promote uniform standards and policy interpretation, and identify and take appropriate action against improper use; and ▪ Increase usage of purchase cards to gain increased cost savings.
Investment Decision Process & Acquisition Program Governance	▪ Support informed investment decisions (e.g., NextGen and other NAS system acquisitions) by managing FAA's investment decision-making process; ▪ Serve as the Executive Secretariat of the Joint Resources Council, ensuring that the AMS requirements leading to an investment decision are met prior to requests for investment decisions being presented to the Joint Resources Council. ▪ Plan and support on-going acquisition program oversight reviews; ▪ Plan decision meetings, document decisions made and action items assigned, tracking them to closure; ▪ Populate and maintain the agency's official repository of required investment decision documents and other records; and ▪ Serve as the focal point for providing documentation to internal and external stakeholders on investment decisions.
Earned-Value Management (EVM)	▪ Support the EVM process in the agency ensuring that the AMS outlined EVM policy and guidance is carried out by investment programs; ▪ Provide guidance and assistance to investment programs in the application of EVM; ▪ Ensure training is provided to investment programs in support of the application of EVM; and ▪ Conduct Integrated Baseline Reviews on investment programs along with validations of contractor EVM Systems.
Post-Implementation Reviews (PIR)	▪ Serve as the PIR Quality Officer ensuring implementation of the PIR policy as outlined in the AMS and ▪ Conduct post-implementation reviews (PIRs) of investment programs and act as independent reviewer of directorate lead PIRs to assess achievement of cost, performance, and benefits baseline expectations.

Streamline and Automate Procurement Processes	▪ Continue development of FAA's Unified Contracting System (UCS) which will be an electronic, secure, internet-based, contract lifecycle management system.
Acquisition Workforce Plan	▪ Manage annual updates of FAA's Acquisition Workforce Plan and implement Plan strategies and initiatives and ▪ Track gains, losses, and actual on-board data for personnel in the various acquisition professions, as well as tracking other workforce metrics, such as certification levels.
Acquisition Career Management	▪ Manage training and certification programs for acquisition personnel, including program/project managers, contracting officers/specialists, contracting officer's representatives (CORs), systems engineers, test and evaluation specialists, and logistics specialists and ▪ Develop and maintain an acquisition workforce portal, automated certification process tool, career path guidance, and other tools and guidance to build FAA's acquisition and program management capabilities.

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

- Improve contract management through standardization of processes, process improvement, and operating efficiency;
- Implement process improvement initiatives within the contracting operation to ensure that we are continuously improving our work operation;
- Actively work with National Acquisition Evaluation Program (NAEP) to ensure action plans and other process improvements developed in response to NAEP reviews address targeted and critical areas for improvement;
- Ensure an optimal acquisition approach has been selected for each support service acquisition over $5 million, through oversight provided by the Acquisition Strategy Review Board;
- Meet on a quarterly basis with customers to discuss programs, pertinent issues and areas to improve customer service;
- Annual update of FAA's Acquisition Workforce Plan and implementation of initiatives;
- Continue improvements resulting from oversight controls; and
- Development of effective Small Business policies and programs.
- Sustain or improve performance in key metrics, such as: Acquisition Professional Certifications, Dollars/Actions Awarded through Competition, Percent of Dollars Awarded to Small Businesses, Time to Award, Cost to Procure, Cost Savings thru Strategic Sourcing, Contractor Past Performance Reporting

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

- Meet or exceed time-to-award metrics for contracts, purchase orders, and Task and Delivery Orders in accordance with Customer Commitment Performance Measures, for example, 90% of contracts awarded within 180 days, 90% of purchase orders awarded within 45 days, and 80% of Task and Delivery Orders awarded within 60 days;
- Increase the use of eFAST procurement vehicles to streamline procurement lead times and deliver competitively-priced services;
- Increase the use of construction services Basic Ordering Agreement (BOA) vehicles by the Service Area Acquisition Offices and improve nationwide planning for construction contracts;
- Ensure acquisitions have oversight by a Senior Acquisition and Contracting leadership team (via Contract Administration Reviews);
- Maintain a fully compliant ISO 9000 Quality Management System for our Quality Management System;
- Achieve cost savings/efficiencies due to improved contracting practices;
- Ensure 80 percent of invoices are paid on time;
- Close 85 percent cost reimbursable contracts eligible for close-out and report on these quarterly;
- Award 25 percent of the total direct procurement dollars to small businesses;
- Improve cost and pricing support to the Contracting Officers/Program Offices to ensure that the FAA receives the best price/value for goods and services;
- Expand features of procurement automation being delivered through UCS;

- Strengthen Agency capability and performance to effectively manage acquisitions; and
- Achieve increased cost savings through strategic acquisition/sourcing initiatives.

ACQ serves as the executive agent for FAA's:

- Lifecycle acquisition and procurement policy,
- 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.

ACQ manages the investment decision-making process for all investment decision authorities, including the Joint Resources Council (JRC), which assists Agency executives in making timely and better-informed investment decisions. Additionally, we manage the EVM and post-implementation review processes on behalf of the Agency in accordance with OMB, GAO, and AMS policy requirements.

The UCS Program will provide an end-to-end electronic contracting system to produce, route, manage, store, retrieve, and report against the roughly 50,000 contractual documents that are produced yearly by the FAA. It is being developed and deployed in an iterative, modular approach. UCS will improve oversight, standardization, information management, and reporting capabilities. This is particularly important considering the growing complexity and volume of contracting actions.

Congress directed FAA to establish an acquisition system that would meet the unique needs of the Agency, and prohibited the Agency from applying the Federal Acquisition Regulation or any law authorizing implementation in the Federal Acquisition Regulation. It is critically important 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 ensures 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. In FY16, ACQ is leading a comprehensive review of the brand, delivery, training, structure and content of AMS. The effort, called AMS 2016, will analyze AMS and its processes to confirm it represents best practices across Government and private industry, effectively supports the changing business needs of FAA stakeholders and efficiently delivers requirements to achieve Agency mission.

The quality and effectiveness of the acquisition process depends on the development of a capable and competent acquisition workforce. Because FAA is exempt from the Federal Acquisition Regulation (FAR) and has its own Acquisition Management System (AMS), FAA provides AMS-specific training that builds upon Federal acquisition training and certification standards. The Acquisition Career Management Program provides Agency contracting officers and specialists with competency-based training and certification, at progressive career levels, and continuous learning training that meets and/or exceeds government-wide standards. In FY16, ACQ will complete the update of AMS-specific training (as part of the AMS 2016 effort) and begin delivery of the new content to the entire acquisition workforce. The training will be designed to strengthen the knowledge and use of AMS by the acquisition workforce. Having a comprehensive Acquisition Workforce Plan is critically important as FAA transitions to NextGen while simultaneously maintaining the current system safely and effectively. Today, FAA's acquisitions are more complex than ever and require new approaches and skills to support NextGen acquisition work. The Acquisition Workforce Plan is integral to ensuring FAA's acquisition workforce staffing and professional development requirements are met in the coming years. The plan serves as FAA's guide for workforce staffing and development decisions and provides strategies for hiring, training, developing, and retaining acquisition employees.

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 more than $4.2 billion in contract awards in FY2014. The complexity of the contracts associated with the NextGen effort coupled with the need to find innovative methods of acquiring the goods and services needed by the Agency at less cost necessitates a highly skilled cadre of acquisition professionals and an organizational infrastructure that provides a robust foundation of policy and guidance, individual and organizational learning, internal controls and oversight.

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

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 a large extent supports all of the DOT and FAA Strategic Plan Goals. However, there are two goals that are specific to acquisition that are heavily supported by the Office of Acquisition and Business Services: Major System Investments -90% of major baselined acquisition programs must be maintained within 10% of their current cost and schedule acquisition performance baseline, and obtain an Unmodified Audit Opinion all of which tie to the Department efficiency and effectiveness goals.

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

The FAA contracted for more than $4.2 billion in goods and services in FY 2014 through approximately 25,000 procurement actions. These procurement actions were accomplished by warranted and certified Contracting Officers and involved the procurement of essential equipment, facilities, major systems, construction, research and development, supplies, and services needed to maintain FAA operations and programs, and for transition to NextGen. ACQ provides Quality Reliability Officers to ensure all systems, equipment, material and services conform to the technical requirements established in the contract. ACQ provides policy, oversight, training, and services to the acquisition workforce.

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

The FY 2016 budget request will allow us to perform our mission. Our current staff has already assumed a larger work load because of NextGen activities and increased support to the Program Management Office in the ATO. Reduction to the ACQ budget will result in: 1) bottlenecks and delays in providing procurement support to NextGen investments and other agency investments; 2) a corresponding increase in the cost of these programs; 3) a reduction in the training supplied to our workforce; 4) a reduction of our over-all capability; 5) slowing the acquisition process, and 6) increasing the financial risk to the taxpayers.

What Benefits will be provided to the American Public through this request?

Acquisition and Business Services acquires the goods and services to support the safe and efficient operation of the NAS. In FY 2014, 90 percent of our major system investments were on budget and schedule. Our goal is to continue to meet or exceed this percentage for FY 2015 and 2016. In ACQ, we have undertaken initiatives that are intended to strengthen our capabilities in managing our systems acquisition programs. We have incorporated key practices into our investments and operational review processes. We have established Performance Metrics to measure the length of time taken to award particular categories of contracts. These metrics will allow us to report progress over time.

Through our National Acquisition Evaluation Program, we conduct reviews of contract files to assess compliance with procurement laws, regulations, and agency policy. We share best practices and take actions to address areas requiring more focus.

We conduct customer satisfaction surveys as one means to assess quality and responsiveness in meeting Agency requirements, and we use employee attitude surveys to assess employee engagement. 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 staff, including gains and losses, and training and certification data by discipline.

UCS will allow us to easily track and monitor contract data and contract processing time. Anticipated improvements from this system will streamline document processing and storage, converting a manual process into a more efficient automated process. This will avoid time and labor costs associated with manual contract management processes as a whole. Efficiencies generated by this program will be realized across all FAA Lines of Business and Staff Offices, including budget, finance, security, and program management offices. UCS will allow FAA to make process changes and managerial decisions to improve the acquisition processes. Given the increase in workload, budget reductions that demand fewer federal staff, and complexity anticipated for the implementation of NextGen, such efforts will be critically important to maintain a safe and secure national airspace system.

We have established mechanisms for monitoring and evaluating the effectiveness of the Small Business Development Program to ensure FAA-wide implementation and accomplishment of the Program's objectives. Program metrics include the percentage of the total contract dollar obligations awarded to small businesses. In Fiscal Year 2014, the FAA exceeded all small business goals including small disadvantaged, women-owned and service-disabled veteran-owned small business goals. The effectiveness of the Small Business Program is determined by the 25% Small Business Goal achievement as indicated in Figure 1 below.

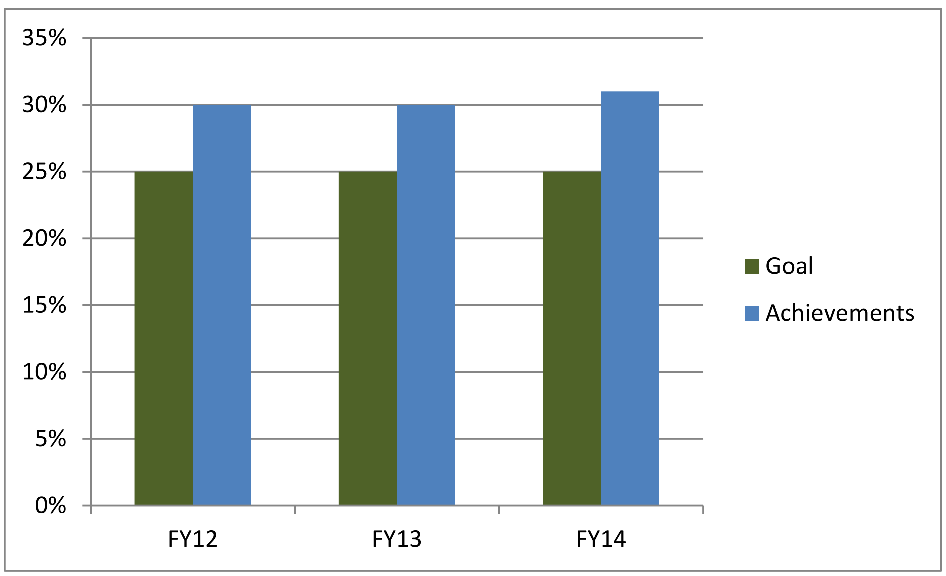

Figure 1 - Small Business Goals and Achievements

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.

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Detailed Justification for –Information Services (AIT)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Information Services (AIT)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Information Services (AIT)	$301,200	$298,609	$300,651	+2,042

The FY 2016 funding request of $300,651,000 including 717 FTPs, 9 OTFTP, with 667 FTEs balances the costs of sustaining critical operations and systems, integrating effective new technology, and achieving efficiencies throughout AIT. Base funds cover Information Technology (IT) federal staff, contract IT services, purchase and maintenance costs for hardware and software technology and IT (non-NAS) infrastructure operations in Headquarters, Centers, Regions and Lines of Business (LOB) field facilities. The FY 2016 request includes $942,000 for pay inflation, $221,000 annualizing the FY 2015 pay raise, $410,000 for one additional compensable work day, and $302,000 for FERS Contribution. The request also includes an increase of $167,000 in anticipated DOT Working Capital Fund (WCF) charges.

What is this Program and Why is it Necessary?

As the information and technology arm of the AFN team, AIT is responsible for providing uninterrupted, reliable, and consistent IT services including information security, application development, enterprise infrastructure (hardware & software) support and help desk services to all employees, LOB, and Staff Offices across the agency.

Officially established in November 2013, AIT merged all of the IT organizations, functions, and personnel from across the FAA into one shared service. In FY 2014, AIT focused on executing and solidifying an operating model to create an organization that seamlessly delivers consistent, reliable and efficient IT services to the agency.

The transition to a shared service environment requires the transformation of IT delivery channels. AIT is in the process of leveraging Open Government initiatives such as cloud computing and enterprise directory service development to support increased levels of efficiency and quality of service to our customers. For example, the FAA Enterprise Messaging Service (EMS) has been enabled by cloud infrastructure technology allowing our customers enhanced access to email and collaboration capabilities while delivering the service more efficiently.

The AIT organizational structure is depicted in Figure 1 below:

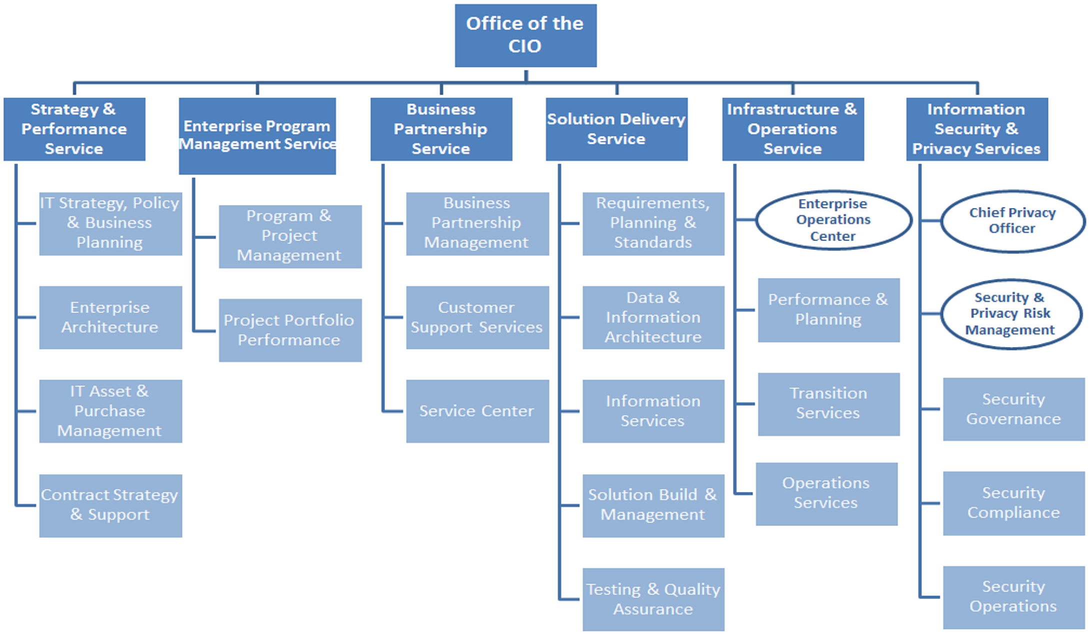


Figure 1 – AIT Organizational Chart

The goals of AIT are:

- **Innovate** – Foster a culture of innovating and forward thinking IT solutions that result in customer benefit realization.
- **Customer Focus –** Proactively improve our products and services through an understanding of how IT can support mission performance often as business partners to achieve the mission of the FAA.
- **Operational Excellence** – Provide consistent and reliable IT products and services that are continuously improved and optimized. Adopt, adapt and apply new technology to fit FAA business needs.
- **Organizational Excellence** – Establish and maintain a high-performing organization of capable, collaborative IT managers and practitioners. Attract and retain talent by encouraging professional development to foster career progression.

AIT will achieve these goals through implementation of the four major initiatives identified in its FY 2015 – FY 2017 Strategic Plan.

- **Cloud** - Advancing the FAA in data access, storage and "as-a service" capability; to provide secure cloud-based services and solutions, collaboration, and development environments.
- **Total Access** - Providing FAA applications and data seamlessly via mobile devices and workstations, streamlined authentication via My Access /FAA Access, and a telework toolkit and video teleconference capability as a mobile service.
- **Collaboration** - Providing the tools that bring people together to create value; deploy sophisticated enterprise search capabilities, pilot co-authoring and collaboration capabilities, and implement community storage and document libraries.
- **Enterprise Information Management (EIM)** - Establish the EIM center of excellence to support Agency insights and innovation, enable information-as-a-service for critical decisions backed by big data analytics, implement Dynamic Regulatory System to support Risk-Based Decision-Making, and establish data and information governance support processes.

The AIT FY 2015 – FY 2017 Strategy is summarized in Figure 2, below:

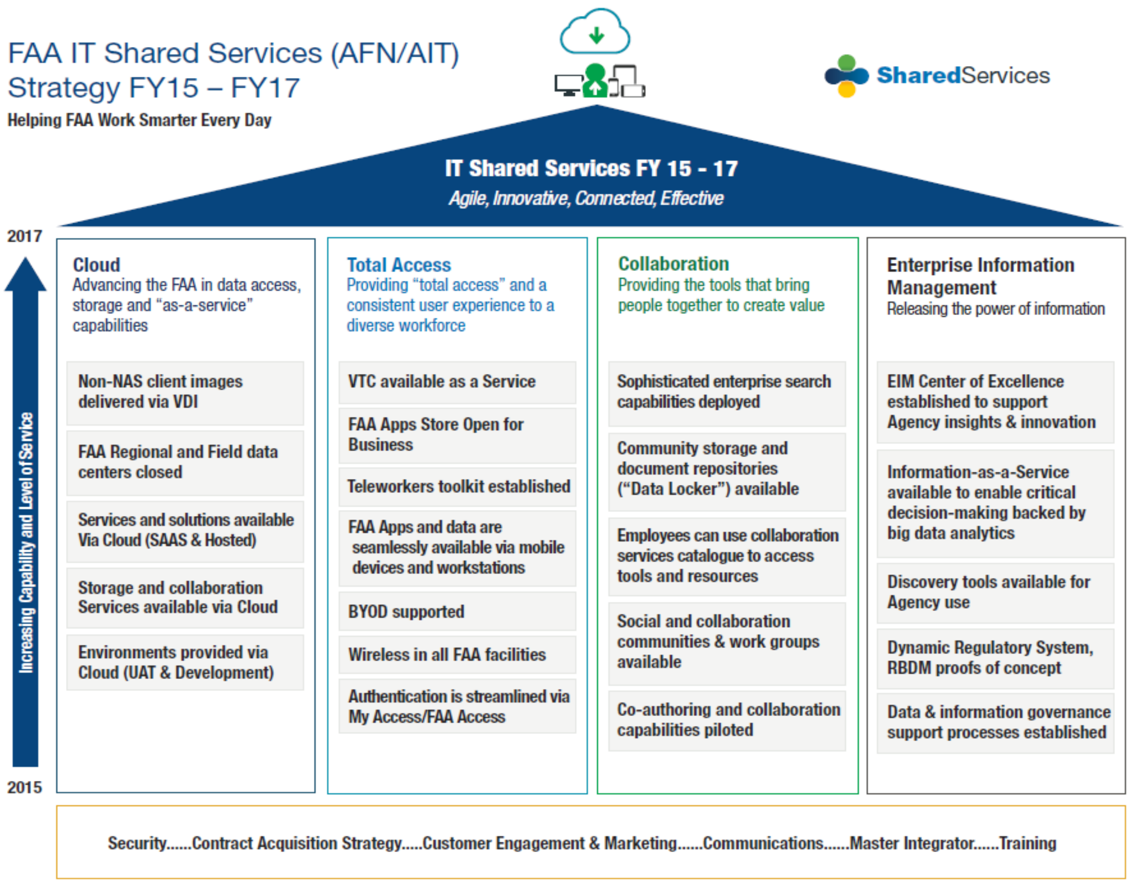


Figure 2 – AIT Strategy FY 2015 – FY 2017

FY 2014 Major Accomplishments:

- Consolidated numerous redundant and overlapping contracts thus reducing labor costs and oversight for security.
- Developed the agency's three-year IT strategy (FY 2015 – FY 2017).
- Realigned 700+ employees under the new IT shared services organizational structure; identifying and addressing training needs, developing new employee performance plans, and conducting senior and mid-level management meetings to ensure alignment to the organization's vision.
- Deployed EMS365, the new cloud-based system that features Outlook 2010 as the replacement for Lotus Notes email, calendaring and contact management, and Lync 2010 as the instant messaging and online meeting replacement for Lotus Notes SameTime.
- Upgraded all FAA computers to Windows 7, securing operating systems from hacking vulnerabilities.
- Developed an enterprise wireless network design and implementation plan for 435 FAA facilities.
- Planned and executed the consolidation of 10 FAA LOB specific computer images to two images for the agency.
- Upgraded DELPHI, the agency's financial management system, on schedule and within budget. This 26-month project required the combined efforts of representatives across finance, acquisitions, IT, and

regions and center operations. By leveraging the Shared Services Model, AIT achieved significant efficiencies for all DELPHI users, including 21 Federal agencies that are supported by the Enterprise Services Center.

- Launched the AIT Service Catalog, the first consolidated list of IT service offerings available across the agency. Created a "one-stop-shop" for IT services and products and improved the overall customer experience.

FY 2015 Anticipated Accomplishments:

- Support OMB's "Cloud-First initiative: Award a new cloud contract to include a private, government community, and a public cloud offering for the agency's hosting requirements. Provide NAS and Mission Support tenant applications greater flexibility and stability when developing, testing, and implementing applications. Allow FAA to economize on procuring infrastructure hardware.
- Deploy wireless networking in 100 FAA facilities to support Total Access strategy of 90% FAA employees having wireless access by FY17.
- Complete a pilot of the Bring Your Own Device (BYOD) capability.
- Complete PIV implementation for required log on to all employees excluding the Tech Ops organization and air traffic controllers.
- Risk Based Decision Making (RBDM): Build on safety management principles to proactively address emerging safety risk by using consistent, data-informed approaches to make smarter, system-level, risk-based decisions.
- Implement Continuous Diagnostics and Mitigation (CDM): Begin implementation of the Department of Homeland Security Phase One CDM capabilities within the FAA to provide near real-time information about the agency's hardware, software, and vulnerabilities. By the end of the fiscal year, address 80% of all high risk vulnerabilities within 30 days.
- Complete the Navigation Procedures Project (NAVLean) to improve and streamline our Instrument Flight Procedures (IFP).
- Pilot Enterprise Information Management (EIM): Develop four proofs of concepts and establish an agency EIM executive steering committee to set priorities for investments in EIM projects.
- Reduce sustainment costs by 5% to provide much needed funding for new investments.

In FY 2016, FAA anticipates a continuing IT organizational evolution to provide a customer-driven service organization that is efficient and effective in providing secure access to support enterprise organizational and operational excellence. Key Open Government initiatives and mandates that the organization must deliver include:

- Cloud computing;
- Widespread deployment and use of mobile devices and increasing access to FAA data and information;
- More effective and efficient IT solution delivery in the areas of data management, document management, business intelligence and collaboration;
- Enterprise Architecture alignment in both the National Airspace (NAS) and non-NAS environments; and
- Continued information system security and privacy protection and response by our Cyber Security Management Center/Security Operations Center (CSMC/SOC) and consolidated Information System Security (ISS) personnel.

FY 2016 Anticipated Accomplishments:

- Develop a master data management strategy to guide long-term system/service and security architecture, reduce data sources, support the mobility strategy by identifying and making accessible data and information that the public wants, and support enterprise content management including records management.
- Focus innovation efforts to develop IT to-be enterprise architecture components; implementing economy of scale IT services; and rapid, effective transition to use emerging technologies that will improve FAA business results while reducing their cost and cycle time.
- Conduct Business Intelligence activities that continue to consolidate multiple data repositories, bring more data sets into the warehouse, consolidate duplicative data feeds, and fulfill a growing number of

customer requests for data visualization tools, financial dashboards, and air traffic decision support tools that contribute to the agencies safety and efficiency goals.

- Address 80% of high value risks within 30 days. Establish oversight by the Cybersecurity Steering Committee to assure consistent risk acceptance decisions. Visualize vulnerabilities on all IP based systems.
- Continue expanding the FAA's Cloud capability by implementing Cloud-based environments for user acceptance testing and application development.
- Expand wireless capabilities to an additional 150 FAA facilities.
- Implement standard client configuration across the entire FAA enterprise.
- Increase the number of applications that utilize MyAccess for authentication by 33%.
- Increase mobile device access to information by 20%.
- Begin extending a Bring Your Own Device (BYOD) capability to FAA application and data users.
- Reduce the cost of sustaining IT applications by 10%.
- Implement a social collaboration tool to at least five communities.
- Fully implement Enterprise Information Management (EIM) solutions for four FY15 proof-of-concepts.
- Improve IT policies, capital planning and investment control plans to assist the agency in meeting its financial and performance goals.
- Implement a standard client configuration enterprise wide.

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

AIT has absorbed funding increases in the past few years due to pay raises, general enterprise service and core operational contract inflation. Despite this, organizational changes and efficiencies gained throughout our transition to shared services have afforded AIT the ability to develop enterprise-wide initiatives and apply solutions to multiple lines of business and staff offices. For example, the agency-wide effort to migrate to Windows 7 ensured resources from across AIT addressed the transition efficiently and effectively. The Windows 7 migration demonstrated how AIT benefits from IT resources from across the country with specific skillsets and experience.

Funding at the requested level will allow AIT to implement new shared services operations – supporting both the NAS and non-NAS functions of the FAA mission.

Currently, in FY 2015, approximately 85 percent of the AIT budget is focused on sustainment costs. The effort to simply maintain the status quo does not allow the organization to invest in new technologies that would further reduce costs and increase efficiencies. AIT is striving to better align the IT budget with industry best practices. On average, industry retains 1/3 of its operating budget to invest in new technologies and ideas. Industry uses those investments to grow and transform their businesses and remain competitive. Through planned activities in FY 2015 and FY 2016, such as application consolidation, Cloud implementation, and process improvements, AIT will reduce IT sustainment costs and increase the percentage of funding available for new investments. AIT will invest in new technologies to modernize IT capabilities and to better facilitate the FAA mission.

Ensuring cyber security for our networks and data also remains an ongoing challenge. We continue to strengthen ties with our cyber security partners in the Departments of Transportation and Homeland Security in our efforts to harden our systems from attack. Our transition to a continuous diagnostics and mitigation (CDM) program will inform Agency leaders, and provide timely, targeted, and prioritized information to system administrators and process owners to enable high-risk vulnerability identification and mitigation. The Security Operations Center contains an Advanced Threat Analysis Group (ATAG) of subject matter experts that provide comprehensive cyber threat intelligence analysis capability in response to a range of advanced and sophisticated cyber threats.

The monthly trend by number of FAA Cyber incidents is shown in Figure 3:

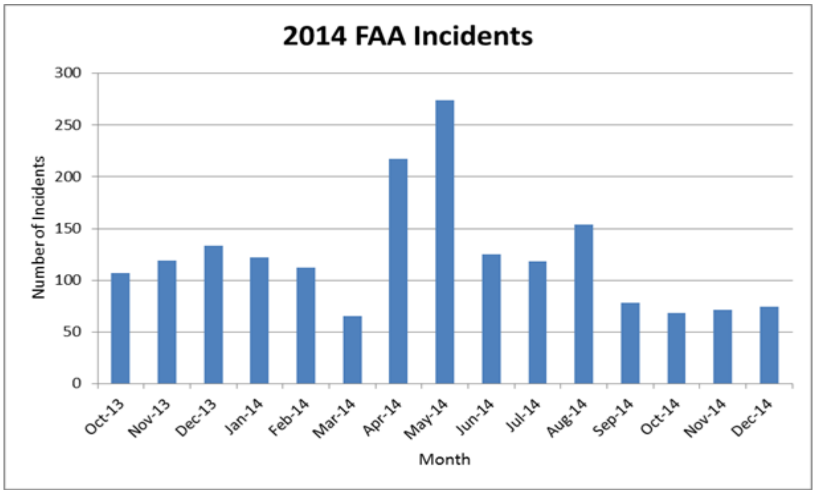


Figure 3 – New FAA Cyber Incidents, by Month, (2012 - 2014)

The relative and increasing number of Alerts to Investigated Alerts is shown in Figure 5 below:

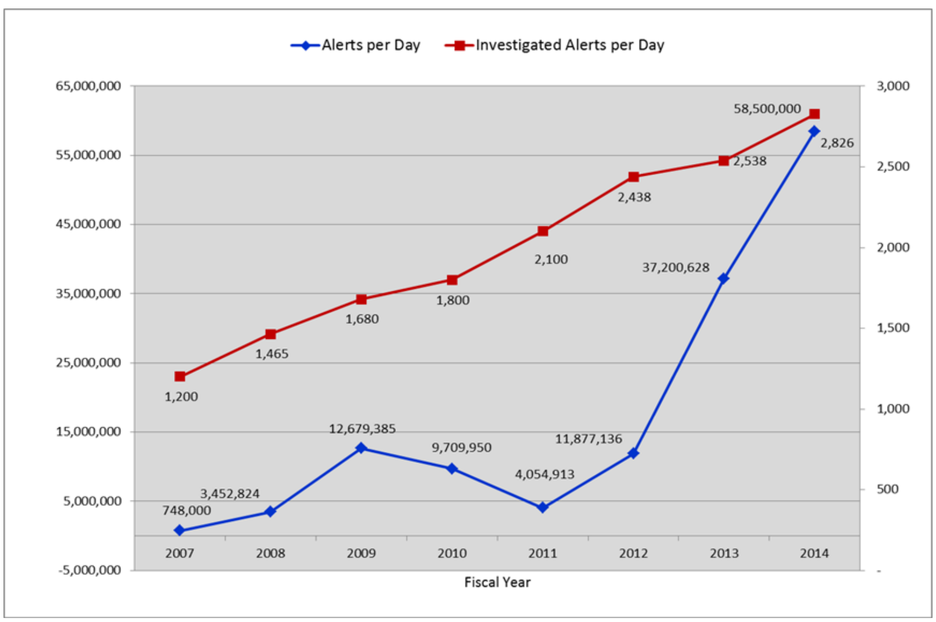


Figure 4 –Alerts and Investigated Alerts, by year (2007-2014)

Funding at the requested level will allow AIT to:

Strategy & Performance ▪ IT Strategy ▪ Enterprise Architecture ▪ Evaluation of New and Emerging Technologies **Business Partnership Service** ▪ Customer Engagement ▪ Collect, Analyze and Coordinate Business Needs ▪ Business Partnership Management ▪ Training Services ▪ Service Desk ▪ Desk side Services **Solutions Delivery** ▪ Application Development ▪ Information Delivery ▪ Business Intelligence ▪ Collaboration ▪ Master Data Management	▪ Align business plan goals and IT investments with the IT Strategy ▪ Align new IT investments to the target state architecture ▪ Deliver at least two new cutting edge technology capabilities ▪ Maintain existing capabilities and increase efficiencies ▪ Implement a new Integrated Service Center that provides better customer service ▪ Improve customer communications and engagement leading to higher customer satisfaction ▪ Meet agency performance metrics for service desk and desk side services ▪ Implement new Collaboration Services ▪ Continue to implement new Enterprise Content Management and Business Intelligence Services ▪ Improve email efficiencies post-cloud-based messaging services (SharePoint, EMS 365) implementation ▪ Continue to implement mobile services that provide access to timely, useful, accurate, and actionable information anywhere, anytime, via any device
Information Security & Privacy (IS&P) ▪ Privacy Management; ▪ Security & Privacy Risk Management ▪ IT Security & Privacy Governance; ▪ Security & Privacy Compliance (FISMA and C&A); ▪ Mitigation of Security Issues **Infrastructure & Operations** ▪ Maintain Operational Environments (backbone, networks, systems, data centers, cloud) ▪ Recovery Operations ▪ Client Devices and Configuration Standards ▪ Mass Storage ▪ Backup Services	▪ Protect, detect, and respond to cyber-attacks and ensure NAS systems and FAA networks sustained reliability and integrity. ▪ Meet all mandatory statutory requirements for IT system authorizations and continuous diagnostics and mitigation program. Close all high and moderate system risk vulnerabilities due in FY 2016. ▪ Reduce risks to Personally Identifiable Information (PII) and Sensitive information for data-at-rest, data-in-use, and data-in-motion. ▪ Operate data centers, local and wide area networks at 99 percent uptime ▪ Complete full implementation of an enterprise cloud solution ▪ Test all IT continuity of operations plans ▪ Implement enterprise-wide backup and recovery services ▪ Implement standard client configuration enterprise wide
Enterprise Program Management ▪ Program Management, Oversight and measurement ▪ Implement Solution Delivery Life Cycle (SDLC) ▪ Manage and Address IT Risk ▪ Manage and Coordinate IT Audits	▪ Continue to improve and update standards and guidelines for program management ▪ Fully use IT Portfolio Management across AIT to rationalize and optimize the FAA application and solutions portfolio ▪ Improve IT policies, capital planning and investment control plans and assist the Agency in meeting its goal of no less than 10 percent variance of baseline budget for major system investments ▪ Continue to reduce redundancy and duplication to improve efficiency and effectiveness in service delivery

- Create a comprehensive Talent Management Strategy that ensures both a qualified workforce and employee career progression paths
- Improve consistency in response to external audits

What Benefits will be provided to the American Public through this request?

AIT is on course to enable the FAA to achieve significant improvements in the effectiveness and efficiency of non-NAS IT services and equipment.
AIT supports key government initiatives, including:

- **Cloud computing** to enable secure and convenient, on-demand network access to a shared pool of configurable networks, servers, storage, applications, services, and other computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction.
- The **Federal Data Center Consolidation** to migrate from dedicated data centers to consolidated federal data centers to: (1) promote the use of Green IT reducing the overall energy and real estate footprint of government data centers; (2) reduce the cost of data center hardware, software and operations; (3) increase the overall IT security posture of the government; and (4) shift IT investments to more efficient platforms and technologies.
- The **Open Government** directive to establish a system of transparency, public participation, and collaboration to promote efficiency and effectiveness in Government.

Prior year investments will continue to increase IT efficiency and quality of service in FY 2016. AIT is leveraging access to centralized expertise and infrastructure, and achieving a higher degree of transparency and accountability. We are enabling economies-of-scale within each IT function, while standardizing processes and eliminating redundancies. Providing comprehensive IT services through an Enterprise Shared Services approach enables AIT and the Security Operations Center (SOC) to remain focused on maintaining the safest air transportation system in the world.

Detailed Justification for –Regions and Center Operations (ARC)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Regions and Center Operations (ARC)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Regions and Center Operations (ARC)	$297,862	$287,097	$292,784	+5,687

ARC provides ongoing regional facility and emergency operations, training, logistics support, and other critical services to both internal and external customers for the FAA. FAA real property management, logistics/materiel management, and personal property management functions are now consolidated and fully aligned under ARC. The Deputy Assistant Administrator for Regions and Center Operations has the role and responsibility of Property Management Officer for FAA as currently defined in FAA Order 4600.27A "Personal Property Management."

For FY 2016, $292,784,000, 581 FTPs, 9 OTFTPs and 540 FTEs are requested for FAA's Deputy Assistant Administrator for Regions and Center Operations. The request provides for base salaries and benefits and requests additional funding for FY 2016 pay-related increases. Non-pay inflation covers cost associated with critical agency requirements. Also included is a $367,000 reduction associated with the Department of Transportation's Working Capital Fund (WCF). ARC's budget request also includes a transfer of personnel and associated salary costs of $164,000 from ARC to AHR and a transfer of $512,000 from AHR to ARC.

What is this Program and Why is it Necessary?

As an integral part of AFN, the Office of the Deputy Assistant Administrator for Regions and Center Operations (ARC) provides critical business and aviation leadership, integration, and other services to internal and external customers.

ARC offices are located at the Washington headquarters, each of the nine regions, and the Mike Monroney Aeronautical Center (MMAC) in Oklahoma City, Oklahoma. ARC is responsible for:

- Overseeing and managing infrastructure operation and maintenance programs in Washington, D.C., nine regional office facilities, and the MMAC;
- Operating Regional Operations Centers (ROCs) that provide around-the-clock, immediate command, control, and communications for all incidents related to National Air Space (NAS) continuity;
- Conducting real estate, materiel management activities, and identifying excess real property assets that are candidates for disposal, termination, replacement, renovation, or transfer;
- Managing payments on all General Services Administration (GSA), FAA Office of Security and Hazardous Materials (ASH), and FAA Office of Aviation Safety (AVS) leases, including rent, operational costs, taxes, utilities, and guard services;
- Providing the architecture and design technical support to all Headquarters and Regional administrative facility projects. This office provides project management, architecture and design review, engineering, and oversight, including the Southwest Regional Office scheduled for completion in FY 2016, and the Northwest Mountain Regional Office scheduled for completion in FY 2017. These prospectus projects will consolidate space used to house approximately 3,300 employees;
- Providing personal property policy and guidance as the Property Management Officer;
- 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;
- 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; and
- Delivering technical training, and related support services for the Agency and other aviation organizations.

Function	Functional Description	Key Actions
Facilities	Oversee and manage infrastructure operation and maintenance programs in Washington, DC, regional office facilities, and the MMAC	▪ Maintain a safe, secure, professional, and environmentally compliant work environment for FAA employees, contractors and tenant organizations.
Regional Operations Centers	Operate ROCs	▪ Provide 24/7, immediate command, control, and communications for all incidents related to NAS continuity.
Real Estate / Materiel Management / Personal Property	Provide real estate, materiel, and personal property management	▪ Manage a portfolio of real property assets exceeding $9 billion; ▪ Manage FAA personal property assets valued at $11.4 billion from capitalization to disposal; and ▪ Provide policy and oversight as the FAA Property Management Officer.
Horizontal Integration	Provide integration services for FAA-wide projects to address congestion and flight delays	▪ Identify and coordinate expert resources within the Agency; ▪ Ensure successful, on-time completion of large-scale aviation projects; and ▪ Ensure compliance with Federal and State legislation, identify political impacts, recommend strategies for conflict resolution, manage FAA communications / expectations among aviation organizations, and develop collaborative internal and external partnerships.
Training	Provide technical training at the FAA Academy for safety-related occupations.	▪ The Academy has 306 Classroom/Labs to provide Resident training for approximately 1,950 scheduled classes which trains 19,500 students each year including ATC new hires. Student Customer Satisfaction each year averages 98 percent favorability rate.
Information Technology / Financial Services	Conduct financial operations and system support at MMAC	▪ Provide financial services processing and reporting of financial information, including accounting data for FAA, DOT, and other federal government agencies.

ARC plays a critical role in FAA's overall emergency preparedness by coordinating programs and exercises aimed at increasing emergency response readiness and capability. The ROCs are 24/7 information and communications hubs that provide voice and data dissemination necessary to direct management and operation of the NAS. They 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.

ARC facility and real estate offices are responsible for the acquisition of leases and operations and maintenance of 150+ administrative facilities that house all Lines of Business (LOB)--safety, legal, contracting, human resource, operational, and regional personnel--throughout the NAS. The operation and maintenance of these facilities include rent and lease contracting, program oversight, guard services, utilities, environmental monitoring and occupational safety and compliance audits, sustainability (greening) efforts, emergency training and coordination, and ongoing repairs and renovations.

ARC is responsible for maintaining the inventory of the DOT-wide real property asset portfolio and all data associated with more than 60,000 buildings, structures, and land parcels encompassing over 26 million square feet of space. This responsibility includes the annual reporting of DOT real property data to the Federal Real Property Profile (FRPP) as required by the Office of Management and Budget's (OMB) Federal Real Property Council (FRPC).

Regional Administrators and their staffs represent the Agency in regional contacts with, aviation industry, government agencies, military services, 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 staff, 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.

The Regional Administrators and Center Director serve as the senior Agency aviation officials in the regions/center, providing cross-functional oversight and integration for the Agency, as well as leadership for the LOB support programs. ARC ensures Horizontal Integration for large-scale aviation projects that reduce congestion and flight delays. Our personnel provide leadership and coordination for teams from various FAA organizations and external stakeholders on projects such as the New York Area Program Integration (LaGuardia, John F Kennedy International and Newark Liberty International airports), O'Hare Modernization Program, Philadelphia International Airport Capacity Enhancement Program, and Houston Airspace Expansion Plan. All of these projects directly relate to NextGen initiatives that will reduce flight delays and congestion in the National Airspace System.

The FAA Academy at the MMAC in Oklahoma City is the primary provider of technical training for the Agency and is the largest training facility within the DOT. The FAA Academy delivers training and related support services to the Agency and other aviation organizations, both domestic and international.

Mike Monroney Aeronautical Center (MMAC) Key Customer Performance Indicators

A number of key performance measures are used to determine if projects are achieving their objectives. Improvement projects are prioritized and selected based on their potential contribution to our objectives. Customer satisfaction surveys are routinely distributed and gathered for feedback, and we continue to act upon that feedback always looking for ways to proactively address our customers' mission needs. Several industry best practices provide a framework for monitoring process performance. Hundreds of process measures are captured and reviewed for trends to assess effectiveness. Quarterly management reviews to maintain current ISO 9001, 14001, and 18001 certifications are held to ensure policy and management systems remain suitable, adequate, and effective. Our challenge will be to maintain quality, service, schedule, and performance while managing an increasing workload with fewer resources. A few key customer performance indicators are shown in the sections below.

Enterprise Services Center (ESC) Function:

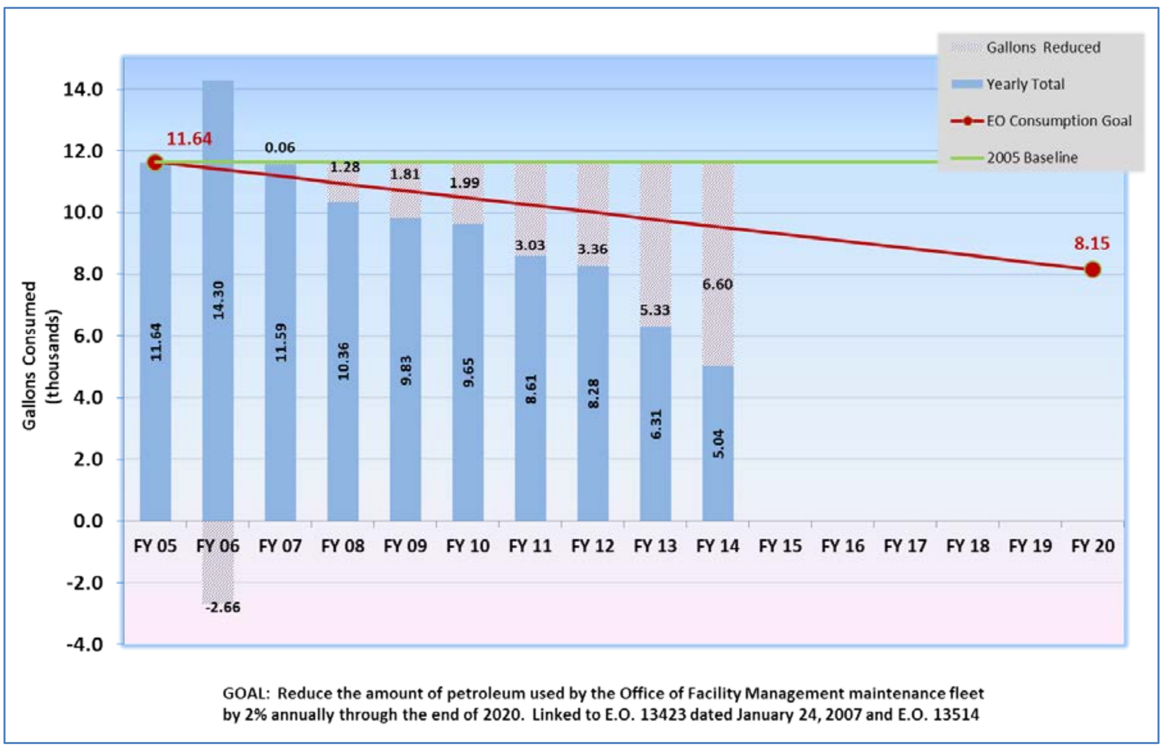
Performance metrics utilized by ESC to support their customers in financial management which establish key customer (FAA, DOT, and many other government agencies) expectations and service provider priorities and responsibilities:

Description	Target	Metric for 2014
Year-to-date commercial payments are paid within 30 days of receipt	98%	98.13%
Travelers reimbursed within 8 calendar days of receipt of proper documentation by the accounting office	95%	99.33%
Delinquent Accounts Receivable from the public >180 calendar days	Less than 10%	0.2714%
Overall system availability during core business hours	99%	99.99%

Reduction in Petroleum Consumption at MMAC:

To meet the goals specified in E.O. 13423 and 13514, the MMAC has achieved reductions in the amount of petroleum used by the facility maintenance fleet each year since FY 2005. ARC anticipates a reduction in FY 2016 continuing the downward trend shown on the chart below.

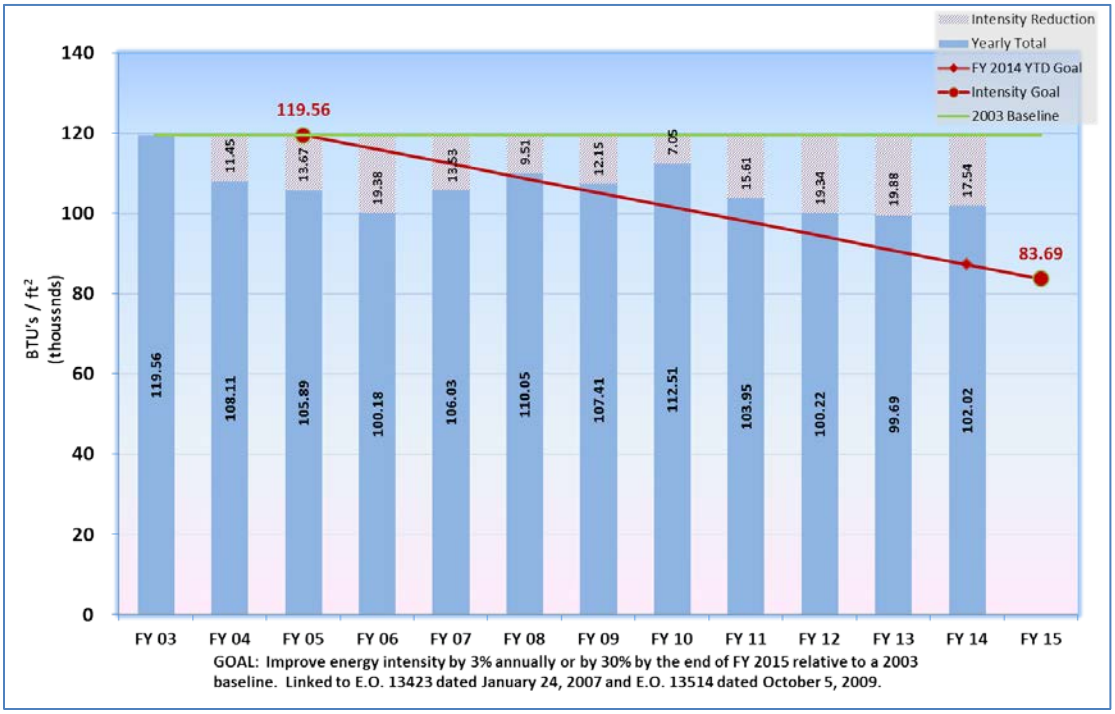
MMAC Petroleum Consumption
FY 2005-FY 2020



Energy Conservation at MMAC**:**

Executive Order 13514 requires federal agencies to reduce energy consumption by 30 percent through the end of FY 2015, as compared to energy consumption in FY 2003. The MMAC continues to achieve significant reductions in energy consumption.

MMAC Energy Intensity
FY 2003 – 2015



Anticipated Regions and Center Operations FY 2016 Accomplishments

Function	Anticipated FY 2016 Accomplishments
Facilities	▪ Integrate environmental, occupational safety and health requirements, minimize pollution and waste, conserve natural resources, and prevent injury and illness while at work through utilization of a Quality Management System with management reviews and internal and external audits.
Regional Operations Centers	▪ Conduct two successful 8-hour national ROC simultaneous transfer of operations exercises to maintain and enhance emergency preparedness; and ▪ Conduct yearly test transferring DOT Crisis Management Center (CMC) system to the DOT alternate site as the Southern Region's ROC transfers its operations to another operations center.
Real Estate Management and Acquisition/ Materiel Management	▪ Ensure that all FAA employees engaged in real estate are trained in the latest real estate law and policies throughout the real property lifecycle; ▪ Realize savings of the annual real property lease and purchase costs through improved business processes; ▪ Develop and deliver corporate materiel and personal property training to ensure competency of Logistics Management Specialists; ▪ Standardize the knowledge and skills required to serve as a Personal Property Custodian or Delegate within the agency; ▪ Complete 95 percent of the annual real property inventory target and report to DOT; and ▪ Improve contract cycle time and quality of contracting office support ▪ Deploy FAA's Utility Management Program Office Pilot to 1) Collect and manage utility information, 2) Improve utility contracting

Function	Anticipated FY 2016 Accomplishments
	execution (e.g., reduce billing errors, acquire competitive rates), and 3) Provide actual consumption data to respective lines of business (LOBs) to manage the performance and evaluate future projects. The first year is expected to result in 2-3 percent utility savings and 1-2 percent each year after, if utility information is consistently benchmarked and managed.
Training	▪ Conduct 100 percent of planned, programmed, and funded ATO Technical Training courses (100 percent of Air Traffic initial qualification); and ▪ Ensure ATO/AVS training continues to meet FAA requirements and is NAS-compliant
Information Technology / Financial Services at MMAC	▪ Manage overhead costs through establishment of targets and monitoring; ▪ Improve service provision through timely mitigation of audit findings focusing on strengthening processes and closing process gaps; and ▪ Maintain 99.5 percent availability for IT systems as defined in service level agreements with customers.

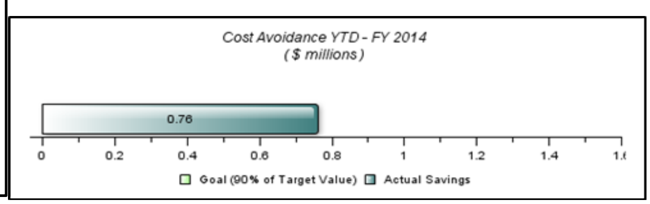
We provide a variety of real estate and personal property management services in support of the FAA. As part of the shared services realignment, personal property, government furnished equipment, and logistics/material functions were consolidated under ARC from multiple organizations in order to gain efficiencies and reduce redundancies.

We also have lead responsibility for the Federal Real Property Asset Management throughout the life cycle process. ARC maintains the Department-wide inventory of real property and the data and performance measures associated with more than 59,000 buildings, structures, and land parcels. Federal real property is tracked in FAA's Real Estate Management System (REMS), which also is the repository for DOT's entire real property inventory. We have made steady progress in disposing of assets that are surplus, in poor condition, or are under-utilized. Since 2006, these efforts have resulted in the removal of more than $763 million of real property assets from the FAA portfolio and have reduced the Agency's operation and maintenance costs by more than $77 million (Figure 1).

Figure 1 - Real Estate Management System Cost Avoidance Savings as of FY 2014

REMS Inventory

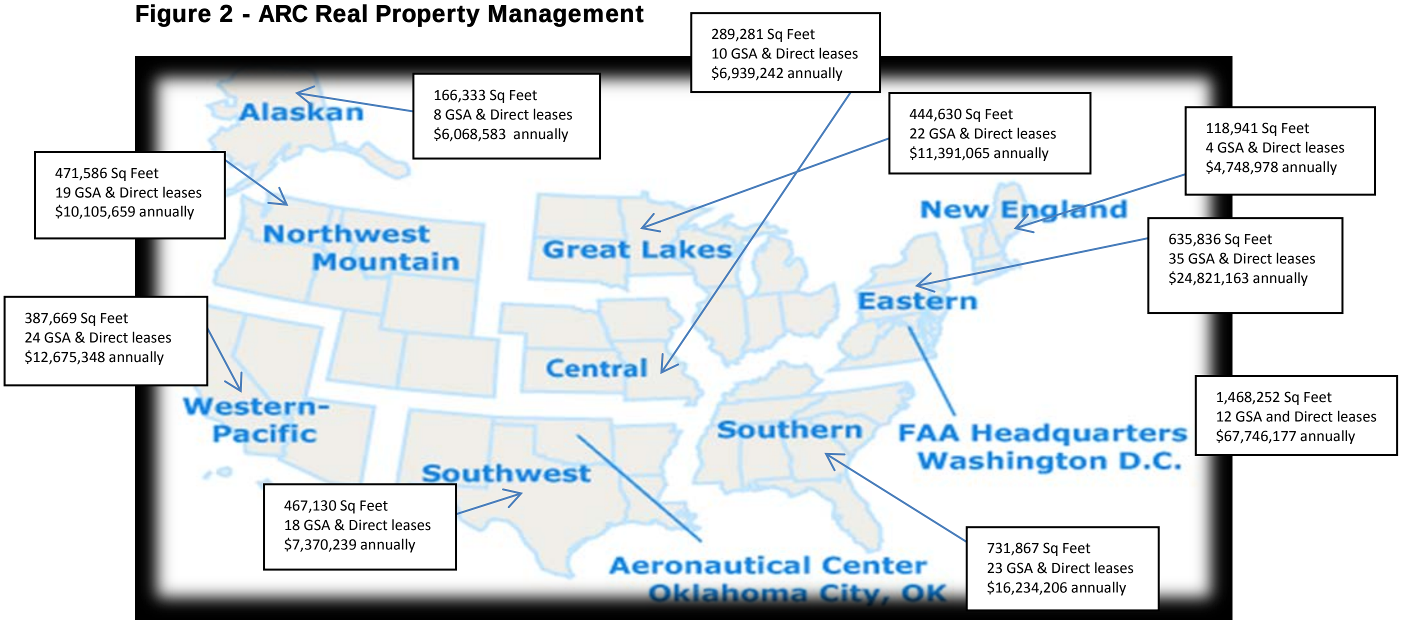
	FAA	Non-FAA	Total
Land	6,782	17	6,799
Buildings	10,912	448	11,360
Structures	41,515	91	41,606
Total	59,209	556	59,765



As part of our real property management responsibilities, we establish service level agreements with our customers. This includes overseeing administrative space leases within each of the nine regions administered by the GSA and field facilities for the Agency's AVS and ASH organizations.

Our facilities management staffs provide administrative and operational support for FAA employees at Headquarters and at the regional level. These facilities, located throughout the nation, house approximately 26,000 personnel in 7,933,827 square feet. Although designated as administrative space, these facilities are for personnel that directly support NAS safety and operations. There are 43 GSA leases in 18 states and the District of Columbia and 130 direct leases across the nine regions for safety, security, and airports personnel. Figure 2 provides an overview.

Figure 2 - ARC Real Property Management



Notes: Total square footage is reported as it appears in REMS and may also include non-office space such as storage, equipment rooms, and common shared space. Included in the number of leases and related cost is antennas, parking leases, service contracts, and operating expense contracts.

ARC support provides for monitoring all GSA building operations activities; overseeing and managing the nationwide rent, personal property, and government furnished property programs; and managing the motor vehicle program, parking, and transit benefits. We also manage the Agency's mail and printing program, the graphics department, the National Wireless Program, and the design and construction of all space occupied by the FAA.

Additionally, ARC is responsible for the safety and well-being of FAA employees by providing building security, emergency evacuation plans, and monitoring and addressing safety and environmental issues in the buildings. Equally important, our management oversees the maintenance customer service desk, janitorial requirements, building repairs, and maintenance. 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.

For example, in FY 2014 we ensured all Real Estate Contracting Officers, Realty Specialists and employees identified to support Real Property received training in accordance with Acquisition Management System competency requirements to meet their 80 hours of continuous learning hours.

FAA recognizes the austere budget environment and is supportive of OMB's Memorandum "Freeze the Footprint" to reduce the Federal footprint to manage total square footage usage and spending. We have implemented space standards across the Agency to gain efficiencies, minimize our occupancy and overall costs. The FAA has completed and planned several consolidations over the next two fiscal years, which will provide the agency with cost savings. The lease consolidations include:

- Headquarters satellite lease 1500 K Street NW Washington, DC into Headquarters Office in May 2014 for an annual savings of $2 million.
- Reduced Glendale, Maryland space by 28,000 square feet in 2014 for an annual savings of $732,000
- New York Airports District Office into the Eastern Regional Office in December 2014 for annual savings of $172,000.
- Multiple LOBs in the Alaska Mod G Annex into the Alaska Regional Office in August 2015 for annual savings of $428,000.

We are currently in progress with similar consolidations in our Northwest Mountain, Western Pacific, New England and Southern regions and are working collaboratively with GSA on a Client Portfolio Plan to identify additional areas for increased efficiencies, consolidation and savings.

There are three major Regional Office consolidations in process:

- The new Southwest Regional Office building located in Fort Worth, Texas is scheduled for completion and occupancy in FY 2016. The consolidation of multiple buildings into the Regional Office improves the space utilization from almost 180 square feet per person to less than 150 square feet per person for 1,600+ FAA personnel in all lines of business.
- Additionally, the Northwest Mountain Regional Office building prospectus project is underway and the facility is scheduled for occupancy in FY 2017. The consolidation of five leases into the new facility improves the space utilization rate significantly to 163 square feet per person.
- The planned relocation of the Western Pacific Regional Office is primarily for safety purposes but also reduces space by approximately 11,000 square feet.

Even though ARC has gained efficiencies and continues to work to find additional ones through space reduction and consolidations, the Agency is struggling to keep up with the escalations in rent, utilities and taxes. ARC continues to make extensive efforts to evaluate and reduce building support, maintenance, and service expenses; however, the ongoing escalations continue to be a challenge.

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

The Northwest Mountain Regional Office building lease expired in August 2010 and was authorized for an extension through FY 2017. Authorization to continue in the current space was granted by Congress through a prospectus lease approval for the new consolidated lease project. The lessor for the current regional office lease has indicated that an extension will not be granted beyond August 2017.

This project consolidates the regional office as well as four other leased facilities which were required due to the ATO service center realignment and growth in service center personnel. The one-time cost is a critical component of the FAA regional consolidation plan and will cover furniture needed prior to occupancy in FY 2017. ARC evaluated existing furniture suitable for re-use and identified furniture that could be re-used to help reduce this expense.

Additionally, $4,320,000 is required for annual escalations in rent, utilities and taxes that outpace base funding. Cost escalations are projected to continue as real estate market conditions improve and utility costs increase.

Due to the ongoing financial pressures, continued efforts are underway to identify cost reductions across the entire lease portfolio and target areas such as consolidations, market lease analysis, and workplace flexibility strategies. A joint study with the Office of the Secretary of Transportation (OST) to help identify groups of DOT buildings for potential consolidation is analyzing the utilization and proximity of all Owned, Direct Leased and GSA leased Buildings by Operating Administrations from the REMS database. Previously data was provided to OST, grouping DOT assets into their Core Based Statistical Areas (CBSA), to help identify groups of buildings for potential consolidation. Once buildings are identified, logistics service area Real Estate Contracting Officers (RECOs) will conduct market analysis in the identified cities. Any collocation will take into account telework, hoteling and other workplace flexibility as per agency and Office of Personnel Management policies.

Executive branch departments and agencies are required to establish clear goals and objectives to promote the efficient and economical use of America's real property assets and to assure management accountability for improving Federal real property management. Between FY 2006 and FY 2014, the Agency disposed of more than 19,000 real property assets with an equivalent replacement value of $763 million and has reduced the Agency's operation and maintenance costs by more than $77 million. Savings resulting from the disposition of property have been applied toward updates, upgrades, repairs, and renovations of current assets. Any funding reductions would jeopardize this effort's ongoing success.

The FAA has the lead responsibility for the DOT, and within the FAA, ARC leads the Federal Real Property Asset Management initiative. ARC maintains the Department-wide inventory of real property and the data and performance measures associated with more than 60,000 buildings, structures, and land parcels. Federal real property is tracked in FAA's Real Estate Management System (REMS) which also is the repository for DOT's entire real property inventory. Assets that are surplus, are not mission critical, are in poor condition, are under-utilized, and/or reflect high annual operation and maintenance costs are considered candidates for disposition.

ARC is also responsible for leading and integrating logistics initiatives and real property management in support of FAA and DOT. ARC's facility management responsibilities include planning, programming, policies, and processes associated with Washington D.C. Metropolitan Area FAA buildings and structures including building security, parking management, and space and property management. ARC is also responsible for funding administrative space leases within each of the nine regions administered by the GSA, in addition to field facilities for the Agency. Most of the leases contain early termination penalties and escalation clauses placing additional financial pressure on the Agency.

ARC's role as the Horizontal Integrator provides the ability to move swiftly within the FAA's larger vertically integrated business units to identify and coordinate expert resources within the Agency to move large-scale aviation projects forward and facilitate communications across multiple government branches or with external stakeholders. This includes working cross-functionally and developing solutions to remove project roadblocks, ensuring compliance with Federal and State legislation, identifying political impacts, recommending strategies for conflict resolution, managing FAA communications/expectations among aviation organizations, and developing collaborative internal and external partnerships.

The request of $293 million supports $241 million in rental costs and operating expenses for existing space and leases and funding for on-board personnel expenses. The balance of our request funds travel, training, mail and printing services throughout the regions and Headquarters, support contracts, and payments to the DOT working capital fund.

What Benefits will be provided to the American Public through this request?

ARC is responsible for the acquisition of leases, operations and maintenance that house all LOBs throughout the NAS. This includes key personnel safety and security services including guard services, environmental monitoring and occupational safety, and emergency training and coordination. These services ensure a secure and well trained workforce is working for the flying public to support the safe and efficient operation of the National Airspace System.

The FAA Academy is the primary provider of technical training for the Agency. We train approximately 20,000 students in safety related occupations annually, including air traffic control new hires. The FAA Academy delivers training and related support services to the Agency and other aviation organizations, both domestic and international.

ARC helps facilitate large-scale aviation projects that reduce congestion and flight delays; coordinates communications response for aircraft accidents, emergencies, missing aircraft, hijackings, security threats, facility and system outages, airport closures, severe weather impacts, and earthquakes; and plays a critical role in FAA's overall emergency preparedness by providing 24/7 immediate command, control, and communications for all incidents related to NAS continuity.

The Regional Optimization project further enriches the "Shared Services" concept. It has identified multiple areas for streamlining managerial functions and improving work processes to increase cost effectiveness, efficiency, and standardization of services. Implementation of these initiatives began in FY 2014 and will continue over a five-year period through FY 2018. The end-state regional structure will result in efficiencies in the following areas:

- Regional Operations Centers,
- Acquisition Services,

- Logistics and Real Estate Acquisitions,
- Aviation Education,
- International Work,
- Budget,
- Freedom of Information Act, and
- Human Resource Management.

The implementation will enable ARC regional offices to focus on core functions and reduce the workload created by activities better suited for other FAA and AFN organizations. Providing corporate services from centralized locations will allow for staff consolidation and process streamlining, increasing overall efficiency. The structure will place the Regions and Center Operations (ARC) organization in a better position to meet present and future fiscal constraints as well as the demand for increased responsiveness to customers and stakeholders.

Embracing environmental greening initiatives not only benefits the American public now, it helps protect generations to come throughout the world. ARC continues to make progress in greening by minimizing pollution and waste, and conserving natural resources. ARC has reduced petroleum fuel usage in its facility maintenance fleet since 2005 and expects the downward trend to continue through 2016 and beyond. Also, the MMAC has achieved significant energy conservation goals and continues to work towards meeting all Executive Order goals. Environmentally friendly improvements continue to be a priority for ARC.

Explanation of Funding Changes

	Dollars ($000)	FTE
Finance and Management	**$8,922**	**-1**
Overview: For FY 2016, the Assistant Administrator for Finance and Management (AFN) requests $764,969,000 and 1,664 FTE to meet its mission. The FY 2016 request level reflects adjustments to base, other changes and base transfers.		
Adjustments to Base	**$8,774**	**-**
Annualized FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	514	
FY 2016 Pay Raise: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	2,190	
Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	953	
FERS Contribution: OMB Circular A-11 has increased the agency's contribution rates to the Federal Employees Retirement System (FERS). This increase in cost to the FAA represents the increased rates for both Air Traffic Controllers and other agency employees.	797	
Non-Pay Inflation: While the FY 2016 GDP price index (year over year) is 1 percent, the FAA will only apply a non-pay inflationary increase on critical Agency requirements.	4,320	
Other Changes	**-$200**	**-**
Working Capital Fund: This cost adjustment is requested to support the Department of Transportation's (DOT) Working Capital Fund (WCF) profile. These adjustments are being made to best align each office's resources within their expected WCF costs.	-200	
Base Transfers	**$348**	**-1**
Aviation Education (AFN to AHR): This request transfers funding and 1 FTP/FTE from the Office of Finance and Management to the Office of Human Resources (AHR) in support of the Aviation and Space Education Outreach Program (AVSED). The AVSED program was identified as one that that would be strengthened by the transfer to AHR under its Office of Talent Development (AHD).	-164	-1
FAA Leadership & Learning Institute (AHR to AFN): Formerly titled Center for Management and Executive Leadership (CMEL), this adjustment transfers funding from the Office of Human Resources (AHR) to the Office of Finance and Management. This funding adjustment is associated with the FY2014 base transfer, which transferred responsibility of the Center for Management and Executive Leadership (CMEL) from AFN to AHR, approved by Congress in the FY 2014 appropriations process.	512	

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NEXTGEN (ANG)

NextGen and Operations Planning (ANG)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$60,089**	**201**	**7**	**201**
Adjustments to Base	**$493**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$59			
FY 2016 Pay Raise (1.3%) (.75)	$227			
Additional Compensable Day	$113			
FERS Contribution	$94			
FY 2016 Request	**$60,582**	**201**	**7**	**201**

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Executive Summary: NextGen and Operations Planning (ANG)

What Is The Request And What Funds Are Currently Spent on the Program?

The NextGen Organization requests $60,582,000 and 201 FTE in FY 2016 to manage the day-to-day operations and maintenance of the FAA's William J. Hughes Technical Center (WJHTC) campus and laboratory's and provide management and direction to the FAA's NextGen portfolio.

What is this Program and Why is it Necessary?

NextGen is our evolutionary blueprint for modernizing air transportation with revolutionary technologies. It represents a wide-ranging transformation of the entire National Airspace System (NAS) to meet future demand and support the economic viability of aviation, while improving safety and protecting the environment. The NextGen organization champions the evolution of NextGen through program management, enterprise system engineering, and technical integration expertise. The WJHTC is FAA's national scientific test base for the research, development, test, and evaluation of air transportation systems. The research, testing and prototype development conducted by WJHTC staff helps shape the future of our Nation's air transportation system and make NextGen a reality.

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

Nearly 48 percent of ANG's Operations budget is for payroll. In addition, annual operations and maintenance costs for WJHTC are approximately $26,605,000, or 44 percent, of ANG's operations budget. Non-pay costs are primarily for management of WJHTC properties that provide the necessary technical platforms for research, development, and testing of NextGen programs, as well as the around the clock operational support to En Route, Terminal, and other Air Traffic Control (ATC) facilities throughout the nation.

What Benefits will be provided to the American Public through this request?

Through a continuous roll-out of improvements and upgrades, NextGen builds the capability to more precisely and efficiently guide and track air traffic, while saving fuel and reducing noise and pollution. The successful research, development, testing and evaluation lead to deployment of NextGen systems, capabilities and intended benefits to stakeholders. Other measures include Research and Development accomplishments indicated in the R&D Annual Review document published with the National Aviation Research Plan (NARP), 24x7x365 second level support of the National Airspace System (NAS), and Technology transfer of research to industry and academia via Cooperative Research and Development Agreements and Grants.

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Detailed Justification for – NextGen (ANG)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – NextGen and Operations Planning (ANG)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015-FY 2016
NextGen and Operations Planning	$59,696	$60,089	$60,582	+$493

The NextGen Organization requests $60,582,000 and 201 FTE to support operations at the WJHTC and to further the successful transition to NextGen. It provides $59,000 for the annualized cost of the FY 2015 pay raise, $227,000 for the cost of the FY 2016 pay raise, $113,000 for one more compensable day in FY 2016, and $94,000 for the FERS contribution increase.

FY 2016 anticipated key outcomes:

- Continued NextGen Program Performance measurement and benefits analyses.
- Development and coordination of annual publication of the NextGen Implementation Plan.
- Provide the technical platform for research in aircraft safety (fire, structural, unmanned aircraft systems, etc.), airport technologies (safety, capacity), human factors, and weather.
- Provide laboratory systems for:
  - Conducting integrated concept evaluations, modeling and simulations, and test and evaluation for all NextGen technologies in the National Airspace System (NAS).
  - 24x7x365 field support for all operational systems within the NAS.
- Provide analytical studies and related safety monitoring services in support of separation reductions in U.S. sovereign airspace and international airspace where FAA has delegated authority to provide air traffic services.
- 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.
- Conduct maintenance and operations of independent performance based monitoring for Altimetry System Error (ASE), a key component to the implementation of RVSM.
- Provide facility operations and maintenance, environmental management and maintenance, and engineering support for all facilities located at the WJHTC.
- Safeguard both employees and campus infrastructure by ensuring compliance with environmental laws, policies, directives, and initiatives.

What is this Program and Why is it Necessary?

Realizing the future vision of aviation through integrated strategies and solutions that achieve national and international goals encapsulates the mission of the ANG organization. The organization champions the evolution of NextGen through program management, enterprise system engineering, and technical integration expertise. The William J. Hughes Technical Center (WJHTC) is FAA's national scientific test base for the research, development, test, and evaluation of air transportation systems. The research, testing and prototype development conducted by WJHTC staff helps shape the future of our Nation's air transportation system and make NextGen a reality.

NextGen supports the Department of Transportation's (DOT) Economic Competitiveness Goal: Promote transportation policies and investments that bring lasting and equitable economic benefits to the Nation and its citizens.

NextGen is FAA's evolutionary blueprint for modernizing air transportation with revolutionary technologies. It represents a wide-ranging transformation of the entire NAS to meet future demand and support the economic viability of aviation, while improving safety and protecting the environment. Through a

continuous roll-out of improvements and upgrades, NextGen builds the capability to more precisely and efficiently guide and track air traffic, while saving fuel and reducing noise and pollution.
Anticipated FY 2016 accomplishments include, which are not necessarily funded by this Operations account:

- Digital flight-path and weather data transmission will begin in FY 2016
- Provide improved advisories for Flight Operators Center (FOC)/Airline Operations Center (AOC)

The WJHTC owns and operates approximately 1.6 million square feet of test and evaluation facilities, NAS field support facilities, research and development facilities, administrative facilities and numerous project test sites. As the FAA's Federal Laboratory, WJHTC is the principal source for conducting NextGen research, test, and evaluation. These sites and facilities provide the necessary technical platforms for research, development, and testing of NextGen programs. However, WJHTC also provides the around the clock operational support to En Route, Terminal, and other Air Traffic Control (ATC) facilities throughout the nation. Annual operations and maintenance costs for WJHTC are approximately $26,605,000 or 44 percent of ANG's operations budget.

This Program maintains facilities and support services for all properties at the William J. Hughes Technical Center including land, buildings and infrastructure. These facilities support:

- Providing operational test and evaluation, including flight testing, of all FAA systems prior to implementation in the NAS.
- Providing world class laboratories for research, engineering, development, test, evaluation, and maintenance of air navigation, air traffic management, and future air transportation system capabilities.
- Developing long-range innovative aviation systems and concepts, development of new air traffic control equipment and software, and modification of existing systems and procedures.
- Conducting, coordinating, and supporting domestic and international research and development of aviation-related products and services.
- Characterizing performance of current system and effects of proposed NextGen changes on pilots, controllers, aircraft, and related system components.
- Addressing and meeting the rapidly changing needs of the aviation industry by introducing innovative concepts and technologies in the air traffic system through extensive work in evaluations, concept development, and demonstrations in a real-time environment.

Managing program performance and resource utilization, analyzing and measuring implementation benefits and testing new NAS capabilities are all essential elements of a successful transformative program. Program benefits assessment and resource management elements perform continuous analyses to support optimal NextGen resource investment decisions.

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

Nearly 48 percent of ANG's Operations budget is for payroll. The requested FY 2016 level for Operations funding covers the salaries of 201 FTP personnel assigned to manage the WJHTC and provide direction and oversight to the NextGen portfolio. The remaining 52 percent of the funding supports non-pay costs which are primarily for management of facilities and properties located at the WJHTC and include operation and maintenance support services, custodial, security, and utilities.

The successful research, development, testing and evaluation lead to deployment of NextGen systems, capabilities and intended benefits to stakeholders. The deployment of several NextGen transformational programs, which are funded through the Facilities and Equipment account, are ongoing:

- 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. 658 of the 660 planned ADS-B ground radio stations will enter service in 2014, including all 601 being installed in the lower 48 states.
- System Wide Information Management Segment 1 is in implementation with its second segment in the investment phase.

- Collaborative Air Traffic Management, Work Package 3, is also in implementation and will continue to improve the management of operations when there is disruption, especially due to weather.
- WJHTC capabilities include research and development, verification and validation, test and evaluation, and sustainment of the FAA's full spectrum of aviation systems. The Center specializes in sustaining and modernizing air traffic control automation, communications, surveillance, navigation, traffic flow management, and weather systems; and supports advancements in airport and aircraft safety, human factors, and separation standards.
- The latest implementation program, Optimization of Airspace and Procedures in the Metroplex (OAPM)/Performance Based Navigation, is bringing new, near-term benefits by leveraging the increasing navigational capability of today's modern aircraft to fly more efficiently.

Other measures indicating this program works are:

- Research and Development accomplishments indicated in the R&D Annual Review document published with the National Aviation Research Plan (NARP).
- 24x7x365 second level support of the NAS.
- Technology transfer of research to industry and academia via Cooperative Research and Development Agreements and Grants.

What Benefits will be provided to the American Public through this request?

Aviation sustains millions of jobs each year and accounts for more than 5 percent of the gross domestic product. Aviation enables the economic benefits of tourism, shipping and travel for business or pleasure. Airports provide economic impact to large and small communities across this country. Continued economic growth in the aviation industry is supported through the ongoing implementation of NextGen technologies, policies and procedures.

Through a continuous roll-out of improvements and upgrades, NextGen builds the capability to more precisely and efficiently guide and track air traffic, while saving fuel and reducing noise and pollution.

FAA estimates NextGen improvements will reduce delays 11 percent by 2020, compared to what would happen were planned NextGen improvements not implemented. These delay reductions will provide an estimated $18 billion in cumulative benefits through 2020. NextGen delay reductions are in addition to any reduction from future runway construction or expansion.

Explanation of Funding Changes

	Dollars ($000)	FTE
NextGen	**$493**	**-**
Overview: For FY 2016, the Office of the Assistant Administrator for NextGen requests $60,582,000 and 201 FTEs to meet its mission to realize the future vision of aviation by providing integrated strategies and solutions that achieve national and international goals.		
Adjustments to Base	**$493**	**-**
Annualized FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	59	
FY 2016 Pay Raise: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	227	
Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	113	
FERS Contribution: OMB Circular A-11 has increased the agency's contribution rates to the Federal Employees Retirement System (FERS). This increase in cost to the FAA represents the increased rates for both Air Traffic Controllers and other agency employees.	94	

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SECURITY AND HAZARDOUS MATERIALS SAFETY (ASH)

Office of Security and Hazardous Materials Safety (ASH)
($000)

	Dollars	FTP	OTFTP	FTE
***FY 2015 Enacted**	**$88,672**	**482**		**430**
Adjustments to Base	**$1,267**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$155			
FY 2016 Pay Raise (1.3%) (.75)	$603			
Additional Compensable Day	$269			
FERS Contribution	$240			
Other Changes	**-$395**			
Working Capital Fund	-$395			
Discretionary Adjustments	**$11,336**	**40**		**21**
Insider Threat Detection and Mitigation (ITDM)	$1,038	4		2
Security Review (ZAU)	$8,820	35		18
Emergency Notification System (ENS)	$1,478	1		1
FY 2016 Request	**$100,880**	**522**		**451**

*In previous budget submissions, the Office of Security and Hazardous Materials Safety (ASH) was displayed within the Staff Office (SO); in FY 2016 ASH is displayed as a Line of Business (LOB). The FY 2015 Enacted amount reflects a realignment of funding from Staff Offices to ASH as an LOB in the amount of $88,672 for the FY 2016 President's Budget request.

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Executive Summary: Office of Security and Hazardous Materials Safety (ASH)

What Is The Request And What Funds Are Currently Spent On The Program?

The FY 2016 request for the Office of Security and Hazardous Materials Safety is $100,880,000 and 451 FTEs. This includes discretionary increase requests totaling $11,336,000 and 21 FTEs to support the necessary development of the FAA Defensive Counterintelligence and Insider Threat Detection and Mitigation Program, and implement changes needed to adjust and enhance facility and personnel security measures for critical NAS operations facilities. This will allow ASH to meet its core safety and security inspection / investigative mission requirements.

What Is This Program And Why Is It Necessary?

The Office of Security and Hazardous Materials Safety (ASH) ensures aviation safety, supports national security, and promotes an efficient airspace system through policy development and administering safety programs. ASH develops and implements policy to protect FAA employees, contractors, information, facilities and assets; provides Agency crisis management coordination, manages continuity of operations / continuity of government facilities and communications, executes and supports FAA national security responsibilities and protects the flying public through the safe air transport of hazardous materials. Any failures or lapses in implementing these programs directly impacts NAS safety and security and FAA's ability to execute its functions as one of the key components of our country's transportation infrastructure and emergency response.

Recent high-profile personnel and information security-related events across the nation have underscored the need to highlight the criticality of ASH's security role within the agency. Active shooter events at the Navy Yard (2013) and Fort Hood (2009) and the release of sensitive classified information have each demonstrated the potential damage they can cause to government operations and to human life. In September 2014, an FAA contract employee deliberately set a fire in a critical area of the Chicago Air Route Traffic Control Center (ARTCC), destroying the Center's telecommunications structure that enables communication between controllers and aircraft and the processing of flight plan data. In part, these events have led to the decision to move the ASH's organization out of the Staff Offices and to establish it as a separate Line of Business. The comprehensive security review conducted after the Chicago ARTCC fire incident resulted in 42 recommendations – 24 of them significant – to improve security. This request includes additional funding for facility security, personnel security, and insider threat countermeasures to improve security and support FAA critical operations resiliency, especially at NAS Service Tier 1 facilities.

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

The requested funding is needed to maintain critical safety and security mission responsibilities that protect FAA personnel, systems, information and facilities, and to promote the safety of the flying public.

The security changes recommended for immediate implementation reflect an increased level of protection for FAA critical NAS operations facilities based on the findings of the ASH security review after the ZAU fire incident. Without an increase, ASH will not be able to implement the following security measures at NAS Service Tier 1 facilities – increase inspection frequency and complexity, changes to screening of people and vehicles entering facility, accelerate installation of PIV-compliant Physical Access Control Systems (PACS) , comply with new Federal Investigative Standards (FIS), conduct investigations necessary for people currently working in low-risk positions that are likely to be changed to moderate-risk (due to their ability to access controlled areas, sensitive information or critical systems), or procure the hardware/software needed to monitor FAA systems for potential insider threats.

What Benefits Will Be Provided To The American Public Through This Request?

ASH programs directly contribute to the safety and security of the flying public. In addition, ASH has consistently met our projected targets for success each year as well as required cost efficiency and program effectiveness measures, demonstrating we are good stewards of public funds. We adhere to all regulations and laws pertaining to our work and ensure this through our internal auditing. ASH's execution of its safety and security missions minimizes the safety risk in the NAS and for the flying public globally and protects the nation's economic and national security.

Detailed Justification for – Security and Hazardous Materials Safety (ASH)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Security and Hazardous Materials Safety (ASH)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015-FY 2016
Security and Hazardous Materials Safety	$88,672	$88,672	$100,880	+$12,208

The FY 2016 request for the Office of Security and Hazardous Materials Safety (ASH) programs is $100,880,000 and 451 FTEs. This reflects an increase of $1,267,000 in pay-related costs, a $395,000 reduction in ASH's payment to the Department's Working Capital Fund and discretionary increases totaling $11,336,000 and 21 FTEs supporting safety risk management and safety. This will allow ASH to meet its core safety and security mission requirements.

The $11,336,000 and 21 FTEs in discretionary increases will allow ASH to:

- Address the findings of the ASH security review after ZAU fire incident by implementing policy, process, technical, and training changes necessary to improve security of the FAA critical NAS operations facilities, including:
  - Facility security inspections – ASH is currently reevaluating the security levels and associated measures needed at critical NAS operations facilities. As a result of this reevaluation, ASH anticipates reducing facility security inspection intervals, depending on a facility's mission criticality, and increasing their complexity, due to additional risk factors ($927,000).
  - Increased facility security measures – ASH recommends changes to the current process of screening people and vehicles entering FAA critical NAS operations facilities. This enhanced screening also increases contract security officer contract costs ($782,000).
  - Accelerated installation of Personal Identity Verification (PIV) card-compliant Physical Access Control Systems (PACS) – The current implementation plan does not accomplish PIV compliance until October 2017. Additional resources are requested to enable enhanced management of PIV cards and associated access to FAA critical operations facilities, controlled areas, sensitive information, and critical systems when an FAA employee or contractor stops working at their assigned facility ($859,000).
  - Federal Investigative Standards (FIS) Compliance – These new standards became effective in October 2014 and create the need for additional and more frequent reinvestigations for all positions other than those designated as low-risk. This change increases the workload for personnel security specialists by more than 100% ($3,677,000).
  - Personnel security investigation changes – ASH is planning to reevaluate the risk level of employees and contractors working at FAA critical NAS operations facilities. For FY 2016, we estimate approximately 1,500 positions will need to be raised from low-risk to moderate-risk, requiring a more in-depth background investigation in accordance with new FIS ($2,575,000).
- Insider Threat Program changes – Procure hardware, software, and personnel needed to audit, monitor, and analyze network traffic for FAA systems ($1,038,000).Provide emergency messages to FAA employees, nationwide, or to targeted groups of employees, during real-world incidents via an FAA-wide Emergency Notification System (ENS) ($1,478,000)
- Support protection of the FAA from foreign-based cyber-espionage and computer network exploitation (CNE) attacks, which threaten FAA and proprietary information and data networks.

- Allow for development of and provide workforce education activities for Defensive Counterintelligence training and situational awareness of foreign intelligence threats / vulnerabilities.
- Enable FAA to provide continuous analysis and sharing of cyber threat intelligence with the Cyber Security Management Center (CSMC), National Security Council (NSC), and interagency partners to enable effective response and mitigation actions.
- Provide FAA with the initial minimum manning to comply with the Executive Order, Presidential Memorandum and DOT Order on Insider Threat to work towards deterring, detecting, and mitigating actions by employees who may represent a threat to national security or aviation safety.

The FY 2016 request will allow us to meet these milestones and anticipated outputs / outcomes:

- Continue development of a Safety Management System (SMS) oversight program that provides the Hazardous Materials Safety Program (HMSP) with resources to conduct surveillance activities on large Part 121 air carriers in coordination with FAA certificate management teams and conduct safety risk analysis of some Part 135 and Part 129 air carriers according to SMS principles.
- Provide oversight of shippers, air carriers and repair stations in accordance with the Hazardous Materials Regulations (49 C.F.R. Parts 171-180), hazardous materials related requirements in 14 C.F.R., and provide outreach to the regulated community.
- Continue global safety oversight activities including support of State Civil Aviation Authority (CAA) and International Safety Organizations for air transportation.
- 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.
- Conduct outreach through letters to over 15,000 airline passengers found with suspected hazardous materials during screening.
- Manage the Personnel, Information, and Facility Security Programs that protect critical FAA personnel, infrastructure, and information in the NAS.
  - Provide oversight to ensure FAA facilities are in compliance with facility and information security requirements that protect agency employees, visitors, and information.
  - Conduct no fewer than 350 FAA facility inspections and assessments.
  - Implement consistent active shooter threat response awareness program at FAA facilities.
  - Process over 6,800 background investigations and 8,400 fingerprint checks for FAA employees and contractors.
  - Provide oversight and ensure compliance with protection of Classified and Sensitive Unclassified Information (SUI).
- Use the Personal Identity Verification (PIV) card to authenticate persons attempting to access FAA facilities, as required by Presidential Directive HSPD-12 and OMB Memo M-11-11.
  - Provide oversight to expand the use of PIV card for physical access control at FAA regional offices, Aeronautical Center and Technical Center.
  - Issue approximately 20,000 PIV cards to new employees and contractors, or to renew expired ones.
  - Enable 100 percent of issued PIV cards for use within FAA facilities and information systems.
- Provide real-time notifications of over 6,000 significant aviation events to FAA, DOT, and White House leadership, as well as provide Agency coordination and situation reporting for National Special Security Events and significant incidents.
- Provide 12,000 teleconferences per year for Executives, Lines of Business (LOBs) and Staff Offices (SOs).
- Maintain emergency operations network capability and ensure continued situational awareness of daily and emergency events. The planned capabilities include fully integrating the Washington Operations Center Complex (WOCC) and Cornerstone Regional Operations Centers (CROCs) with the Emergency Notification System (ENS).
- Extend Emergency Notification System coverage FAA-wide through the acquisition of licenses and manage the system.
- Operate 24/7 Intelligence Watch to ensure the WOCC and the Air Traffic Security Coordinators, who manage the Domestic Events Network (DEN), maintain situational awareness of all threats impacting aviation and the NAS.

- Provide FAA subject matter expertise and analysis to more than 1,000 daily Intelligence Community secure video teleconferences on an annual basis.
- Continue the development of FAA Counterintelligence and Insider Threat Detection and Mitigation programs to detect and respond to foreign intelligence and insider threats.
- Develop and provide workforce education activities, such as Insider Threat, Defensive Counterintelligence training, to provide situational awareness regarding foreign intelligence threats / vulnerabilities.
- Investigate over 4,100 Laser events in support of law enforcement and Flight Standards actions against violators.
- Conduct over 200 Investigations regarding airmen convicted of drug related offenses.
- Conduct over 25 Office of Audit and Evaluation (AAE) related investigations.
- Assist and support Federal, state, local, territorial, tribal, and international law enforcement agencies that investigate and interdict illicit use of aircraft in narcotics, weapons, and human trafficking.
- Complete agreements to obtain Federal and State prison information to compare against the Airman Registry, identify matches and recommend enforcement action as appropriate to prevent safety threats to the NAS.
- Manage the Agency's Continuity of Operations Program, providing the minimum communications requirements for Executive Department and Agency headquarters and operating continuity facilities that support the continuation of the Agency National Essential Functions (NEFs).
- Test and train all emergency response personnel with communication responsibilities on the satellite telephone emergency network (STEN). Current system consists of 171 satellite phones.
- Provide Classified Telecommunications services to Executives, Lines of Business (LOBs) and Staff Offices (SOs).
- Deploy the Emergency Response Vehicle (ERV) to no fewer than 3 pre-planned National Special Events.
- Manage FAA participation in National Exercise Program (NEP) activities, including NEP Capstone exercise.
- ASH conducted a comprehensive security review after the Chicago Air Route Traffic Control Center (ZAU) fire incident on September 26, which resulted in identification of 42 recommendations – 24 of them significant – to improve security. Specific outcomes for FY16 include:
  - Complete reevaluation of 77 NAS Tier 1 facilities.
  - Initiate adjustments to personnel and vehicle screening at identified 77 NAS tier-1 facilities.
  - Accelerate installation of a PIV-compliant physical access control system for 77 NAS tier-1 facilities.
  - Comply with new Federal Investigative Standards (FIS).
  - Reevaluate the risk level of employees and contractors working at FAA critical NAS operations facilities. In FY 2016, we estimate that approximately 1,500 positions at 77 NAS tier-1 facilities will need to be raised from low-risk to moderate-risk, requiring a more in-depth background investigation in accordance with new FIS.

What is this Program and Why is it Necessary?

The mission of the Office of Security and Hazardous Materials Safety is to ensure aviation safety, support national security, and promote an efficient airspace system through the development and administration of policies and operation of programs. ASH develops and implements policy to protect FAA employees, contractors, information, facilities and assets; provides Agency crisis management coordination, manages continuity of operations / continuity of government facilities and communications, executes and supports FAA national security responsibilities and protects the flying public through the safe air transport of hazardous materials. Any failures or lapses in implementation of these programs directly impact the safety and security of the NAS and FAA's ability to execute its functions as one of the key components of our country's transportation infrastructure and emergency response. After the Chicago Air Route Traffic Control Center (ZAU) fire incident in September 2014, ASH conducted a comprehensive security review, which resulted in identification of 42 recommendations – 24 of them significant – to improve security. This request includes funding for activities recommended for immediate implementation in the areas of facility security, personnel security, and the insider threat program necessary to improve the security and support resiliency of FAA critical operations especially at NAS Service Tier 1 facilities.

The specific ASH programs that this request supports are:

Office of Hazardous Materials Safety (ADG)

The FAA's Hazardous Materials Safety Program (HMSP) is responsible for ensuring and promoting the safe transportation of hazardous materials in air commerce to, from, and within the U.S. This oversight responsibility spans all phases of transportation and includes air carriers, aircraft loaders, cargo shippers, freight forwarders, manufacturers, and passengers. The program is necessary to prevent loss of life and property damage. When not prepared or handled correctly, hazardous materials cause accidents, some catastrophic. The ValuJet disaster in 1996 is one such event attributed to incorrectly prepared hazmat cargo. Constant and continuously improving oversight, as well as outreach to the regulated community, is essential to ensure the increasing risks presented by hazmat on aircraft are mitigated to an acceptable level of safety. ADG has the following major program areas:

HMSP Oversight of Regulated Entities: Hazmat issues are closely related to cabin safety, passenger disability regulations, training, and the transport of air carrier equipment (COMAT) and, thus, require the attention of the entire certificate management team, including FAA's Hazmat specialists, to ensure an effective safety management system.

The HMSP is establishing an air carrier oversight process that will rely heavily on Safety Management System (SMS) and certificate management principles to increase safety and efficiency. These processes reflect the Office of Aviation Safety's (AVS) Flight Standards Service (AFS) air carrier oversight system and will utilize many of the same systems to ensure collaboration and efficiency. In FY 2016, this approach to oversight will continue to be standardized by the HMSP and applied to FAR 121 air carrier oversight.

As a result of the transition to the SMS approach to air carrier oversight, new components to air carrier safety inspections will be added to the HMSP's current oversight program. This will improve HMSP's understanding of the design of air carriers' systems, allow HMSP hazmat specialists to conduct surveillance based on non-regulatory risk precursors to non-compliance, as well as understand the relationship between an air carrier's hazardous materials safety program and other safety issues for which oversight responsibilities reside exclusively with AFS.

Outreach and International Leadership: Approximately 4.5 billion lithium ion cells are produced every year, and almost all of them will be transported on an air carrier at least once. In recent years, lithium batteries have caused dozens of fires in air cargo and baggage and have been implicated in three air disasters / hull losses: Asiana 991, Korea Strait (2011); UPS 006, Dubai (2010); and UPS 1307, Philadelphia (2006). Whereas traditional hazmat (e.g., corrosives, explosives, and radioactive materials) are offered by a small number of traditional industrial users, lithium batteries are both utilized and shipped by consumers via e-commerce. To mitigate this risk, FAA's Hazmat Safety Inspectors conduct both inspections and informational outreach where hazmat shipments are prepared, shipped, accepted, stored, loaded, and stowed on board. Hazmat inspections and / or outreach occur in a variety of industries throughout the country .

Outreach is especially critical to address the risk of undeclared hazmat – which does not allow air carriers to properly handle the shipments or inform pilots of their location. Currently, the Hazardous Materials Regulations (HMRs) allow a significant number of lithium battery shipments to be legally offered without declaration to the air carrier – almost completely negating the impact of air carrier ramp inspections. Outreach and international leadership, particularly at ICAO, are also important given that most lithium batteries are manufactured overseas and outside of the jurisdiction of FAA inspectors conducting shipper inspections.

Office of National Security Programs and Incident Response (AEO)

This office provides services in readiness, crisis management, and national security support to promote and ensure national airspace and aviation safety and security. AEO has the following major program areas:

Safety Whistleblower, Laser, and Prison Match Investigations:

- Safety Whistleblower Investigations: Section 334 of the FAA Reauthorization Act of 2012 established the Aviation Whistleblower Investigation Office, also known as the Office of Audit and Evaluation (AAE). Currently, AAE draws much of its investigative support from ASH resources, reducing resources available for other investigations that also have required timeframes for completion, such as Accountability Board, Department of Transportation Office of Inspector General Hotline complaints, and certificate actions taken against airmen involved in drug activities, etc.
- Laser Investigations: Section 311 of the FAA Reauthorization Act of 2012 established a prohibition against aiming a laser pointer at an aircraft and made it a criminal offense punishable under Chapter 2 of Title 18 USC. ASH conducts investigative responses to laser incidents in support of regulatory action by FAA Flight Standards.
- Prison Match Cases: Airmen who have been convicted for drug related offenses pose a substantial safety risk to the flying public. ASH is working to complete agreements to obtain Federal and State prison information to compare against the Airman Registry, identify matches, and recommend enforcement action that includes revocation of airmen certificates as appropriate. This activity supports both the FAA goal of denying NAS access to individuals convicted of certain drug-related crimes and the mission of Office of National Drug Control Policy (ONDCP).
- New and expanded investigative requirements in 2011 and 2012 continue to result in dramatic increases of ASH's investigative workload each year with a 67% increase in 2013 over 2012. The requirements identified above in support of AAE, AFS, and Prison Match investigations are in addition to the work accomplished by the 48 ASH Special Agents. During FY 2014, ASH Investigators and Law Enforcement Assistance Program Agents:
    - Opened 4,247 Internal and 653 Enforcement Investigations.
    - Responded to 5,755 Law Enforcement requests by providing information on 10,534 airman and aircraft.
    - Responded to 3,839 Laser incidents from which 91 subjects were identified.
    - Conducted 1,019 Ramp Inspections and inspected 14,673 aircraft.

Current Intelligence and Threat Evaluation Watch (CITE Watch): The CITE Watch is FAA's 24/7 intelligence lead on all aviation and homeland security threats. It supports the security and safety of the NAS, and the safety of U.S. civil air operations worldwide. This Watch provides intelligence indications and warning and threat assessment to FAA for addressing emerging threats to civil flight safety. The CITE Watch provides intelligence support to the Washington Operations Complex Center / Domestic Events Network (WOCC/DEN) through threat identification, warning and assessment, and liaison with Intelligence Community, Law Enforcement and Department of Defense agencies. It is FAA's focal point for the Transportation Security Administration's (TSA) Secure Flight Program and U.S. air operators in reporting threats to flight safety in international locations. The CITE Watch evaluates both classified intelligence and open source reporting, and provides tailored intelligence support to FAA and DOT leadership, WOCC/DEN, FAA LOBs/SOs, Regions and the Crisis Response Working Group / Crisis Response Steering Group (CRWG/CRSG) during aviation security / safety incidents and threats. It also supports National Special Security Events (NSSE), FAA's air traffic security programs, ASH security investigations and FAA personnel operating in high threat environments (e.g., Afghanistan). It serves as the U.S. operators' after-hours focal point for reporting security event information, as required in FAA Notices-to-Airmen (NOTAMs).

FAA Defensive Counterintelligence Program (DCIP): The FAA workforce is responsible for making significant certification, regulatory, and other major decisions that could directly affect the economic prospects of a foreign country's civil aviation industry. Therefore, FAA employees, information, and data networks are prime targets for exploitation by a potential foreign adversary seeking an economic advantage through the surreptitious acquisition of sensitive FAA information and data through espionage and cyber-attacks. Foreign governments worldwide are increasing their intelligence collection efforts against regulatory and critical infrastructure-related agencies like the FAA. The FAA currently has an experienced, but very small, cadre of personnel who are establishing a defensive counterintelligence capability. Full development of the DCIP is vital in order to protect the FAA workforce, information, and systems from foreign intelligence collection and cyber-espionage operations. This will include conducting counterintelligence awareness briefings for all FAA employees and targeted travel pre-briefings for executives and employees traveling to high-threat locations. Further, Executive Order (EO) 13636, *Improving Critical Infrastructure Cybersecurity*, signed February 12, 2013, establishes White House policy on the protection of critical infrastructure, such as the NAS, from cyber-attacks. The FAA DCIP provides a defense mechanism against these threats. Technical Surveillance Countermeasures (TSCM) component neutralizes specific clandestine penetration technologies used by hostile elements to get unauthorized access to classified and sensitive unclassified information. The TSCM responsibilities have been realigned to the DCIP.

FAA Insider Threat Detection and Mitigation Program (ITDMP): Executive Order (EO) 13587, *Structural Reforms To Improve the Security of Classified Networks and the Responsible Sharing and Safeguarding of Classified Information*, dated October 7, 2011; Presidential Memorandum, *National Insider Threat Policy and Minimum Standards for Executive Branch Insider Threat Programs,* dated November 21, 2012; and Department of Transportation Order 1642.1, *Defensive Counterintelligence and Insider Threat Program*, dated October 21, 2013, required all Executive Branch departments and agencies to establish a program to detect and mitigate insider threats by May 2013. FAA will not be able to meet the intent of these mandates without additional manning / funding. Once fully established, the ITDMP will cover the entire enterprise providing insider threat monitoring and security evaluation of the FAA workforce. The FAA's nascent ITDMP is designed to identify and protect the FAA from malicious activity including an active shooter situation, employee fraud, and the unauthorized release of classified or sensitive information by a trusted employee with access privileges for selfish motives. In addition to damaging national security and / or the U.S. economy, any of these events, should they occur and be disclosed to the general public, are very harmful to FAA relationships with key stakeholders and can jeopardize the faith and confidence of the flying public.

FAA Emergency Preparedness, Response and Continuity of Operations: ASH is responsible for developing policies, plans and procedures to ensure FAA's preparedness to respond during incidents ranging from aviation incidents to natural disasters to terrorist attacks and pandemic influenza. ASH coordinates FAA response activities and provides situation reporting to Agency and DOT leadership. ASH manages the FAA Continuity of Operations program and Agency participation in national-level exercise planning, conduct and evaluation, as well as administering FAA HQ Government Emergency Telecommunication Service (GETS) and Wireless Priority Service (WPS) programs.

This program is necessary to ensure the NAS, national critical infrastructure operated by the FAA, can continue to function during significant incidents, and enable support to local and national incident response and recovery, consistent with requirements in the National Response Framework and National Disaster Recovery Framework. Continuity of Operations, required by Homeland Security Presidential Directive 20 / National Security Presidential Directive 51, ensures the FAA's ability to maintain and operate the NAS under all circumstances, without interruption, even when FAA personnel and facilities are impacted by the incident. National level exercises, with interagency and other partners, prepare the Agency to effectively coordinate and operate across the range of potential incidents.

Command and Control Communications (C^3): This program provides the tools and infrastructure necessary to maintain command and control of the NAS during times of crisis through the use of classified and unclassified communications, special use facilities, and situational awareness tools. Unclassified recovery communication is maintained through the use of satellite radio, Very High Frequency / Frequency Modulated (VHF/FM) radio, and High Frequency (HF) radio. Classified voice communications are accomplished through Type 1 encryption for radio, secure cellular phones, and secure telephone equipment (STE). Classified data is transmitted through both secret and top secret data networks, such as Homeland Security Data Network (HSDN) and Joint Worldwide Intelligence Communications System (JWICS), while classified video is transmitted through the Secure Video Teleconference System (SVTS), GOLD Enterprise, and the Crisis Management System (CMS). Command and control of the NAS can be conducted at the Washington Operations Center Complex (WOCC) during normal operating environments, at the Emergency Operations Facility (EOF) if the WOCC is unavailable, the Primary Alternate Facility (PAF) if the Washington, D.C. area is compromised, and from the Emergency Response Vehicle (ERV) when a mobile command and communications platform is required. Situational awareness is accomplished through the operation of the Emergency Operations Network (EON).

This program was established to install and maintain the infrastructure and tools necessary to meet the Agency requirements set forth in the National Security Presidential Directive 51 (NSPD-51) / Homeland Security Presidential Directive 21 (HSPD-21), the National Communications System Directive 3-10 (NCSD 3-10), and the Federal Continuity Directive 1 (FCD-1), thus ensuring the continued exchange of information, both classified and unclassified, to promote national security and Agency mission functions during times of national events and crisis. The infrastructure consists of the WOCC, the EOF, and the PAF. Tools consist of the following networks: recovery communication networks; classified networks for voice, data and video; and networks providing situational awareness.

Office of Security (AIN)

This office supervises nationwide security program areas and provides program policy guidance, oversight and evaluations. Additionally, it provides operational Servicing Security Element (SSE) services to FAA Headquarters customers and represents ASH and the FAA in various intradepartmental and interagency policy forums. AIN has the following major program areas:

Facility Security Management Program (FSMP): The FSMP protects FAA critical infrastructure, personnel, assets, property, and facilities from physical threats, including active shooter threats. The FSMP will implement consistent active shooter threat response awareness at FAA facilities. Within the last five years, there have been at least 14 prominent, high-casualty domestic active shooter incidents. According to the Federal Bureau of Investigation (FBI), the rate at which these events occurred increased from approximately one every other month between 2000 and 2008 to more than one per month between 2009 and 2012. Since the purpose of FSMP is crime prevention at FAA facilities, the ASH facility security specialists must address this risk consistently nationwide by educating the FAA workforce on the skills and mind-set required to identify and handle critical situations at FAA facilities pertaining to violence in the workplace and active shooter incidents.

Information Security Program: This program protects classified national security information, national security systems, and sensitive unclassified information. The program provides oversight and ensures compliance with national, departmental, and Agency protection of Classified and Sensitive Unclassified Information (SUI). Oversight and compliance initiatives focus on both the physical and electronic environment. There has been a growing number of information security related incidents that have had an impact on every FAA regional location, Line of Business, facility, and in some cases, FAA-issued contracts. This increase has resulted in the need for dedicated personnel to provide direct oversight of classified and SUI operations and incidents as they arise. As awareness efforts, oversight initiatives, and the expanding use of electronic resources increase throughout the FAA, the discovery of additional vulnerabilities, as well as security incident reporting, are expected to continue to rise. The Communications Security (COMSEC) component protects communications and national security systems that transmit classified national security or other especially sensitive information during communications and use.

Personnel Security Program: This program provides both the determination that individuals may be granted access to classified national security information and the determination that individuals are suitable for employment by the FAA. The thorough examination of employees' suitability for employment and classified information access promotes the safety and security of personnel in the workplace, supports organizational effectiveness and is critical to the security of mission critical FAA operational activities and information. The Contractor and Industrial Security component of this program manages investigation, processing and adjudication of contract employees to determine their suitability to work on FAA contracts, and to carry out the National Industrial Security Program.

Identification Media Program: This program ensures the integrity and security of FAA Identification Media carried by all FAA employees and contractors and is the lead element in the HSPD-12 program under which FAA is participating in the government-wide upgrade and standardization of the processes and procedures used to vet all employees and contractors and the automation of ID media using smart card technology to improve government's efficient protection of Personally Identifiable Information (PII).

ASH Anticipated accomplishments include:

- Further integrating SMS and certificate management principles into the FAA Hazardous Materials Safety Program's oversight of FAR Part 121 air carriers, and coordinating with FAA's Office of Aviation Safety on surveillance of these air carriers' activities that are related to the air transportation of hazardous materials.
- Conducting national surveillance of air carriers, shippers, and aviation repair stations to assess and enforce hazmat safety regulations through coordination with other transportation modes and other agencies.
- Conducting global safety oversight activities in high risk and developing national airspace routes for the transportation of hazardous materials to include lithium batteries that are believed to have contributed to three catastrophic cargo aircraft accidents.
- Continuing to support global activities and initiatives related to the safe transportation of hazardous material by air through ICAO, IATA and other international bodies.
- Educating domestic and international passengers on the safety ramifications of transporting undeclared hazardous materials in baggage through the use of the internet and social media, in coordination with industry stakeholders and other agencies.
- Partnering with other agencies such as Customs & Border Protection, and with other Department modes, to capitalize on technology to gain data and information for quantitative and qualitative analysis of trends useful for targeting hazmat compliance, enforcement and outreach activities.
- Ensuring 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.
- Ensuring FAA executives have real-time access to and analysis of intelligence and threat information during crisis and security incidents.
- Identifying potential national security threats, safeguarding and protecting the FAA workforce, and protecting classified and sensitive security information related to the NAS. Information and networks will remain at considerable risk to cyber compromise and economic espionage perpetrated by malicious insiders.
- Developing standards and programmatic safeguards and controls for protecting classified national security and sensitive unclassified information from loss, compromise or unauthorized disclosure.
- Conducting counterintelligence awareness briefings for all FAA employees and targeted travel pre-briefings for executives and employees traveling to high-threat locations.
- Expeditiously analyzing and sharing intelligence information regarding cyber threats to FAA data and networks.
- Revoking or suspending certificates of airmen convicted of drug related offenses.
- Taking enforcement action against individuals who shine lasers at aircraft.
- Ensuring timely investigations are conducted in support of the AAE mission.
- Supporting the Facility Security Management Program and the Personnel Security Program implementation that protects critical FAA infrastructure and personnel in the NAS.
- Conducting FAA facility inspections and assessments and providing oversight to ensure FAA facilities are in compliance with facility and information security requirements that protect agency employees, visitors, and information at every level daily.
- Implementing consistent active shooter threat response awareness program at FAA facilities.
- Processing background investigations and fingerprint checks for FAA employees and contractors.
- Issuing PIV cards to new employees and contractors, and renewing expired ones.
- Enabling 100 percent of issued PIV cards for use within FAA facilities and information systems.

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

The requested funding is needed to maintain base level critical safety and security mission responsibilities that protect FAA personnel, systems, information and facilities, and to promote the safety of the flying public. Any reduction to our request will negatively impact on our ability to meet critical FAA safety and security mission requirements. There are three increase requests included in the FY 2016 budget:

Insider Threat Detection and Mitigation Program (ITDMP) & Defensive Counterintelligence Program (DCIP):

- The ITDMP funding request supports the program's continued development to deter, detect and mitigate potential employee threats to national security or aviation safety. The additional resources ($1,038,000 / 2 FTE) will provide FAA with a minimum capability to protect the FAA from malicious insider activity including an active shooter situation, employee fraud, and the unauthorized release of classified information by a trusted employee with access privileges for selfish motives. Equipment and software purchase will be one-time, but annual license fees are expected. The DCIP funding request will provide FAA with a minimum capability to protect the FAA from malicious activity by foreign intelligence and cyber-espionage threats directed at FAA personnel, IT support systems, and sensitive aviation and aerospace industry information. Such attacks and loss of information could damage aviation safety and national security and negatively impact the competitive advantage of U.S. aviation industry in the global market.

Security Review (ZAU)

- ASH is implementing 18 recommendations from the ZAU security review that will require work associated with changing existing policies, processes, and training; and is not requesting supplemental funds to implement these recommendations. Funds are being requested for 24 recommendations deemed significant that cannot be implemented without additional resources not currently included in ASH base. Without this base increase, ASH will not be able to increase inspection frequency and complexity, adjust screening of people and vehicles entering facilities, accelerate installation of PIV-compliant PACS , comply with new FIS standards, conduct investigations necessary for 1,500 people currently working in low-risk positions that are likely to be changed to moderate-risk (due to their ability to access controlled areas, sensitive information or critical systems), or procure the hardware/software needed to monitor FAA systems for potential insider threats.

Emergency Notification System (ENS):

- Numerous real-world events and emergency exercises have exposed the need to improve the FAA's tools for communicating with employees in emergencies. The ENS funding will provide for enterprise-wide licensing for FAA employees and contractors as well as management of a software program that will allow designated FAA personnel to expeditiously transmit emergency messages to targeted groups of FAA federal and contractor employees through a variety of electronic means (e.g., landline and cellular telephones, text, email, and computer pop-ups). Employees will be able to respond to these messages, as appropriate, to meet the AHR policy requirements for accounting for employees during emergencies via a two-way notification function.

At the requested level, we will also maintain mission capability for the following activities:

Office of Hazardous Materials Safety (ADG)

HMSP Oversight of Regulated Entities: With the requested funding, the HMSP would be able to conduct SMS oversight of all 81 Part 121 air carriers. A reduction to the requested level would limit the ability to expand the oversight of Part 121 air carriers under a risk-based SMS and would also limit safety oversight of the hazardous material transportation of air carriers, shippers and repair stations, and other regulated parties associated with the safe transportation of hazardous materials. This would limit the FAA's ability to determine compliance with safety regulations, training requirements, and FAA-approved programs specific to that air carrier, thus degrading safety of the NAS and U.S. civil flight operations globally.

The HMSP's goal in implementing an SMS approach to oversee air transportation of hazardous materials is to manage resources in a risk-based, data driven manner. Funding at less than the requested level will substantially slow the transition and drive the HMSP to continue to utilize a cruder approach to address Part 129 and Part 135 air carrier oversight. This results in an inefficient use of inspector resources as well as inconsistent use of SMS principles and risk-based decision-making.

Extending the SMS approach to all air carrier oversight is also critical because half of the 4.5 billion lithium ion cells produced every year are transported by aircraft. Almost all of these high risk and increasingly energy dense commodities are manufactured and shipped out of Asia, where the FAA does not have authority to conduct shipper inspections. Given the risk profile of lithium batteries, and in the absence of acceptable risk mitigation, the FAA Technical Center predicts approximately four freighter aircraft accidents in the next 10 years as a result of lithium batteries alone. The HMSP must have the FTEs and the skill set to assess the design and suitability of the operators' systems. In other words, the training and procedures used by U.S. air carriers in accepting and handling hazmat overseas is one area the HMSP can directly address this risk and enhance safety.

Office of National Security Programs and Incident Response (AEO)

Safety Whistleblower Investigations, Laser Investigations, and Prison Match Cases: A reduction in resources will require difficult choices, such as selectively choosing which investigations to conduct and when to conduct them, which creates increased safety risk to the NAS, as well as diminished or slowed investigative support to other Lines of Business (LOBs) or Staff Offices (SOs).

FAA Defensive Counterintelligence Program (DCIP): The FAA plays a critical role on a global scale in civil aviation, and recent activity directed against the FAA by a foreign entity shows that FAA is not immune from foreign intelligence collection operations, cyber network intrusion operations, and intense public and Congressional scrutiny. If employees are not educated on the counterintelligence threat to FAA data and networks, they could unwittingly provide access or information to foreign powers' intelligence services, which could harm national and economic security of the U.S. as well as cause our U.S partners, stakeholders and the flying public to lose confidence in FAA data integrity and / or protection. The TSCM Program is a subset of the DCIP and its focus is to neutralize specific clandestine penetration technologies used by hostile elements to get unauthorized access to classified and sensitive unclassified information. If funding for the FTEs and the DCIP / TSCM programs is not received, the nascent DCIP will not develop sufficient capabilities to protect the integrity of FAA information and NAS systems and protect the traveling public.

FAA Insider Threat Detection and Mitigation Program (ITDMP): The FAA plays a crucial role in Aviation Safety and National Security. Without funding, FAA will not be able to implement the program as required. A failure to meet requirements of Executive Order 13587 and the White House's National Insider Threat Program Policy requiring all Federal departments and agencies to establish and operate an Insider Threat Program to detect and mitigate malicious and harmful acts by trusted employees could do harm to national security and aviation safety if persons intentionally or improperly use or release information to foreign powers.

The Current Intelligence and Threat Evaluation Watch (CITE Watch): At the requested funding level, ASH can maintain the staffing to sustain 24/7 intelligence watch operations, thus supporting FAA's readiness to respond to emerging threats to NAS and U.S. operators and airmen worldwide. The CITE Watch can continue to provide intelligence support to the WOCC/DEN through threat identification, warning and assessment, and continue to act as a liaison with the Intelligence Community, Law Enforcement and Department of Defense agencies. It can continue to be a focal point within the FAA for interagency requests and notifications for the Secure Flight program, as well as provide support to CRWG/CRSG, and to U.S. operators and airmen who have been given the CITE Watch as the point contact for reporting security events. It can continue to provide aviation tailored intelligence support to the FAA, DOT, and U.S. Departments and Agencies.

FAA Emergency Preparedness, Response and Continuity of Operations: Funding at the requested level will maintain FAA's ability to prepare for and respond to, as well as recover from, the full range of incidents and hazards -- natural and man-made -- that can impact the NAS and the Agency's ability to maintain mission essential functions upon which the U.S. economy and national security depend.

Command and Control Communications (C^3): At the requested funding level, ASH will be able to fund the required license and maintenance agreements for the software and hardware necessary to continue operating the situational awareness network, fund airtime for satellite radios and maintenance for the HF radio network, maintain access to the HSDN and JWICS classified data network and the SVTS, GOLD and

CMS video networks, conduct required periodic maintenance and services for the facilities, and maintain and operate the ERV. These services are critical to command, control, and operation of the FAA and its critical facilities under all circumstances.

Office of Security (AIN)

Reductions to the current level directly impact the Agency's ability to safeguard FAA facilities, personnel, and information, reduce FAA's ability to achieve cost savings from facility operations, impede the ability to meet DOT targets for use of PIV cards for physical access, and put overall NAS and Agency operations at increased security risk. It also directly impacts the Agency's ability to meet hiring goals and timelines, and the safety and security of the NAS due to the degradation of the Agency's ability to ensure only suitable personnel are and remain employed, thus increasing the security risk to the Agency. Additionally, reductions to the requested level would 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. For Active Shooter Threat Response Awareness, a reduction in funding will affect the ability of AIN to educate the FAA workforce on active shooter threat response at FAA facilities, which will result in inconsistent nationwide implementation and leave the Agency and its workforce vulnerable.

What Benefits will be provided to the American Public through this request?

ASH programs directly contribute to the safety and security of the flying public. In addition, ASH has consistently met our projected targets for success each year as well as required cost efficiency and program effectiveness measures, demonstrating we are good stewards of public funds. We adhere to all regulations and laws pertaining to our work and ensure this through our internal auditing.

Office of Hazardous Materials Safety (ADG)

HMSP Oversight of Regulated Entities: The HMSP's robust oversight and enforcement program identifies noncompliance and mitigates potential risks to aviation safety. The American public will continue to be protected by the low commercial aviation fatality rate. Continued surveillance and administrative enforcement actions remain powerful tools to identify risks and realize meaningful corrective actions.

Outreach and International Leadership: The continued rise in hazardous materials shipments and the expansion of hazmat entry points into the aviation system (e.g., e-commerce) mean that almost anyone can introduce a safety risk into the NAS. Shippers and passengers outside the U.S. are not subject to FAA oversight; therefore, effective outreach is essential to inform all entities about safe hazmat transportation. Even domestically, the hazmat inspector workforce cannot interact with every shipper – outreach is the force multiplier and can prevent noncompliance before it occurs.

Office of National Security Programs and Incident Response (AEO)

Safety Whistleblower Investigations/Laser/Prison Match: This program benefits the American Public by addressing the actions and behaviors of those who present a safety risk to the NAS. ASH conducts administrative and regulatory investigations involving FAA employees, contractors, non-employees, and certificated airmen suspected of violating various FAA orders and Federal regulations; administers the Driving Under the Influence Program/Driving While Intoxicated Program that targets airmen who present a threat to safety of the NAS; and provides support via the Law Enforcement Assistance Program (LEAP) to assist federal, state, and local agencies investigating possible criminal activity involving airmen or the use of aircraft.

FAA Defensive Counterintelligence Program (DCIP): The DCIP will benefit the American Public and demonstrate its effectiveness by making FAA employees worldwide aware of foreign intelligence threats to U.S. civil aviation and aerospace sectors, thereby taking appropriate protective and defensive measures that protect the NAS, FAA systems and information, as well as the U.S. military and aerospace industry.

FAA Insider Threat Detection and Mitigation Program (ITDMP): This program will benefit the American Public by safeguarding against active insider threats that could impact the safety and security of the NAS and the flying public. The ITDMP will utilize active monitoring, investigative and other protective activities to identify and mitigate potential insider threats, while protecting employee privacy and information in accordance with Presidential directives, policy and law. A loss of confidence in the integrity of FAA safety employees and/or data would negatively impact the safety and security of the NAS and the flying public.

Current Intelligence and Threat Evaluation Watch (CITE Watch): The CITE Watch will benefit the American public through timely indications and warnings of threats and security event information that impacts the NAS, U.S. flying public, air operators and crews, and FAA personnel, worldwide. It coordinates several thousand notifications from the TSA and Terrorist Screening Center in support of the Secure Flight Program in order to protect the NAS and passengers on aircraft that may have a threat onboard. CITE Watch has participated in nearly 1,000 secure video conferences with IC/LE agencies, and has worked with USG interagency partners in developing Notice-to-Airmen (NOTAM) and International Flight information Manual (IFIM) warnings for U.S. operators and airmen operating in foreign hostile environments. It also supports FAA regulatory actions for Special Federal Aviation Regulations (SFARs) flight prohibitions by identifying unsafe areas for U.S. civil flight operations due to military conflicts / threats, and coordinating these threat issues with the USG counterparts to support FAA leadership decisions. Warning of potentially unsafe conditions or prohibiting operator use of unsafe airspace directly protects U.S. citizens flying on U.S. aircraft overseas.

FAA Emergency Preparedness, Response and Continuity of Operations: This program benefits the American Public by ensuring the FAA and NAS are prepared and resilient; ready to keep the NAS running under all circumstances to support response to and recovery from crises. The timeliness and quality of FAA preparedness, response, coordination, and reporting, through the entire incident cycle ensure the continued availability, safety, and security of NAS for the American public and contributes FAA capabilities to other aspects of national incident response and recovery, such as search and rescue, aeromedical evacuation, and movement of critical response assets and supplies.

Command and Control Communications (C^3): This program benefits the American Public by providing assets for C^3, such as radio communications, secure voice, data and video systems, operational and other manned facilities, and the Emergency Response Vehicle (ERV). This equipment and services are monitored, maintained and tested on a regular basis, ensuring availability and redundancy during times of crisis.

Office of Security (AIN)

Facility Security Management Program (FSMP): This program benefits the American public by ensuring safety of critical infrastructure, personnel, assets, and property at manned and unmanned FAA facilities. This program provides oversight to ensure FAA facilities are in compliance with facility security requirements and remain safe and secure to support provision of aviation safety and air traffic services. ASH provides the structure for security protocols from the interior of critical infrastructure to the expanded perimeter; defines protective measures used to secure FAA personnel, facilities, and assets; and ensures that FAA has a safe and secure Workforce of the Future.

Information Security Program: This program benefits the American public by protecting classified national security information, national security systems, and sensitive unclassified information from compromise or loss that could jeopardize national security. The program provides oversight and ensures compliance with protection of both the physical and electronic environment. The program aims to prevent information security related incidents at any FAA facility, within FAA offices, or FAA-issued contracts.

Personnel, Contractor, and Industrial Security Programs: This program benefits the American public by ensuring FAA employees and contractors are suitable to conduct the Agency's aviation safety and air traffic services missions and determining their ability to protect and access classified national security information. These suitability determinations protect national security and ensure that FAA has a safe and secure Workforce of the Future.

Identification Media Program: This program benefits the American public by ensuring the integrity and security of FAA Identification Media carried by all FAA employees and contractors. This program ensures FAA compliance with HSPD-12 and government-wide standards for processes and procedures used to verify and validate the identities of employees and contractors who are issued PIV cards. Use of ID media using smart card technology improves protection of Personally Identifiable Information (PII) and ensures only valid FAA employees and contractors can access FAA facilities and information systems.

Explanation of Funding Changes

	Dollars ($000)	FTE
Security and Hazardous Materials Safety	**$12,208**	**21**
Overview: For FY 2016, the Office of Security and Hazardous Materials Safety requests $100,880,000 and 451 FTE to meet its mission. The FY 2016 request level reflects adjustments to base, other changes and discretionary adjustments.		
Adjustments to Base	**$1,267**	**-**
Annualized FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	155	
FY 2016 Pay Raise: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	603	
Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	269	
FERS Contribution: OMB Circular A-11 has increased the agency's contribution rates to the Federal Employees Retirement System (FERS). This increase in cost to the FAA represents the increased rates for both Air Traffic Controllers and other agency employees.	240	
Other Changes	**-$395**	**-**
Working Capital Fund: This cost adjustment is requested to support the Department of Transportation's (DOT) Working Capital Fund (WCF) profile. These adjustments are being made to best align each office's resources within their expected WCF costs.	-395	
Discretionary Adjustments	**$11,336**	**21**
Insider Threat Detection and Mitigation Program (ITDMP) & Defensive Counterintelligence Program (DCIP): The ITDMP funding request supports the program's continued development to deter, detect and mitigate potential employee threats to national security or aviation safety. The funding will provide FAA with a minimum capability to protect the FAA from malicious insider activity including an active shooter situation, employee fraud, and the unauthorized release of classified information by a trusted employee with access privileges for selfish motives. Equipment and software purchase will be one-time, but annual license fees are expected. The DCIP funding request will provide FAA with a minimum capability to protect the FAA from malicious activity by foreign intelligence and cyber-espionage threats directed at FAA personnel, IT support systems, and sensitive aviation and aerospace industry information. Such attacks and loss of information could damage aviation safety and national security and negatively impact the competitive advantage of U.S. aviation industry stakeholders.	$1,038	2
Security Review (ZAU): This funding supports changes needed to adjust and enhance facility and personnel security measures. As a result of the comprehensive security review conducted after the Chicago Air Route Traffic Control Center (ZAU) fire incident on September 26, 2014, 42 recommendations – 24 of them significant – were identified to improve security. This request will provide funding for activities recommended for immediate implementation in the areas of facility security, personnel security necessary to improve security and support the resiliency of critical FAA operations especially at NAS Service Tier 1 facilities.	8,820	18

	Dollars ($000)	FTE
Emergency Notification System (ENS): This funding provides for the installation and management of an emergency notification system that will be used to transmit emergency messages to federal and contract employees nationwide through desktop and mobile platforms. It will also provide a two way notification function to account for employees' well-being and safety.	1,478	1

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STAFF OFFICES

Staff Offices
($000)

	Dollars	FTP	OTFTP	FTE
***FY 2015 Enacted**	**$204,175**	**1,091**	**56**	**1,076**
Adjustments to Base	**$2,804**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$345			
FY 2016 Pay Raise (1.3%) (.75)	$1,359			
Additional Compensable Day	$593			
FERS Contribution	$507			
Other Changes	**$120**			
Working Capital Fund	$120			
Base Transfers	**-$348**	**1**		**1**
Aviation Education	$164	1		1
FAA Leadership and Learning Institute	-$512			
FY 2016 Request	**$206,751**	**1,092**	**56**	**1,077**

*In previous budget submissions, the Office of Security and Hazardous Materials Safety (ASH) was displayed within the Staff Office (SO); in FY 2016 ASH is displayed as a Line of Business (LOB). The FY 2015 Enacted amount reflects a realignment of funding from Staff Offices to ASH as an LOB in the amount of $88,672 for the FY 2016 President's Budget request.

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Executive Summary: **Staff Offices**

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

The request of $206,751,000 and 1,077 FTEs allows FAA Staff Offices to provide executive leadership, policy and planning, legal counsel, security services, and other administrative services in support of FAA's mission. The request includes base funding, adjustments to base, Working Capital Fund and two base transfers. The two base transfers reflect 1 FTE for Aviation Education (AFN to AHR), and a financial adjustment for the FAA Leadership & Learning Institute (AHR to AFN) formerly titled Center for Management and Executive Leadership (CMEL).

In previous budget submissions, the Office of Security and Hazardous Materials Safety (ASH) was displayed within the Staff Office (SO); in FY 2016 ASH is displayed as a Line of Business (LOB). The FY 2015 Enacted amount reflects a realignment of funding from Staff Offices to ASH as an LOB in the amount of $88,672 for the FY 2016 President's Budget request.

What Is The Program?

The Staff Offices of FAA include the Office of the Administrator, Chief Counsel and six assistant administrators who provide mission support services to the four lines of business, including legal counsel, economic trend analysis, diversity leadership, government and industry liaisons, communications, public relations and human resources management. A brief description of staff offices are outlined as follows:

- The Office of Audit and Evaluation performs audit and investigative review functions primarily for internal safety disclosures and concerns, including the FAA Whistleblower Protection Program.
- The Office of Civil Rights advises, represents, and assists the FAA Administrator on civil rights and equal opportunity matters.
- The Office of Government and Industry Affairs serves as the Administrator's principal adviser and representative on matters concerning relationships with the Congress, aviation industry groups, and other governmental organizations, developing and reviewing plans and strategies involving these groups to enhance aviation safety.
- The Office of Communications is responsible for the policy, direction, and management of the agency's communications programs for the news media and FAA's employees nationwide.
- The Human Resources Management organization provides human resource services to all operating lines of business and staff offices (LOB/SOs) at the headquarters and to all the FAA regions including the two centers and overseas.
- The Office of Policy, International Affairs, and Environment serves as the principle advisor to the Administrator on international matters.

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 performing mission-critical services to receiving guidance and counsel on regulatory or legal issues, or managing annual appropriations, Staff Offices make a significant contribution to the mission of FAA.

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. By executing their mission responsibilities and providing management, leadership, and oversight, the FAA's Staff Offices have contributed to the overall success of the FAA.

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

Reductions below the requested level would hinder our ability to provide key support services. Our request is the funding needed to continue supporting Agency lines of business.

Office of the Administrator (AOA)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$4,017**	**20**	**4**	**24**
Adjustments to Base	**$62**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$7			
FY 2016 Pay Raise (1.3%) (.75)	$30			
Additional Compensable Day	$13			
FERS Contribution	$12			
FY 2016 Request	**$4,079**	**20**	**4**	**24**

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Detailed Justification for – Office of the Administrator (AOA)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016– Office of the Administrator
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015-FY 2016
Office of the Administrator	$4,017	$4,017	$4,079	+$62

In FY 2016, the Administrator requests $4,079,000 and 24 FTE to meet its mission. This increase consists of basic pay raises and the Federal Employees Retirement System (FERS) contributions. AOA directs and controls the operations of the Federal Aviation Administration (FAA) and acts as principal adviser to the Office of the Secretary (OST) on civil aviation matters and air transportation. AOA will continue to lead FAA toward achieving the agency's performance goals and targets.

What is this Program and Why is it Necessary?

The Office of the Administrator leads the FAA in its mission to provide the safest, most efficient aerospace system in the world. This office is responsible for the overall planning, direction, coordination and control of FAA programs, and represents the FAA in its work with the Department of Transportation and other agencies, the White House, Congress, the aviation community and the general public.

The agency's Administrator leads the maintenance and operations of 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.

AOA established the Office of Strategic Initiatives Group (SIG) approximately three years ago. The SIG's Director leads a staff of senior level experts and analysts who assist with continuing development, implementation and documentation of the FAA's strategic initiatives as well as coordination with line of business office heads and other key stakeholders to achieve the metrics, targets and milestones associated with the initiatives.

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

The FAA has a strong track record of achieving the vast majority of the agency's performance goals and targets and the SIG will lead this effort.

What Benefits will be provided to the American Public through this request?

The requested increase consists of basic pay raises and the Federal Employees Retirement System (FERS) contributions. It will be used to support the ongoing mission of the FAA. Some of the benefits derived from this funding will allow the FAA to focus on its top strategic initiatives:

- **Risk-Based Decision Making:** Build on safety management principles to proactively address emerging safety risk by using consistent, data-informed approaches to make smarter, system-level, risk-based decisions.
- **NAS Initiative:** Lay the foundation for the NAS of the future by achieving prioritized NextGen benefits, integrating new user entrants, and delivering more efficient, streamlined services.
- **Global Leadership:** Improve safety, air traffic efficiency, and environmental sustainability across the globe through an integrated, data-driven approach that shapes global standards, enhances collaboration and harmonization, and better targets FAA resources and efforts.

- **Workforce of the Future:** Prepare FAA's human capital for the future, by identifying, recruiting, and training a workforce with the leadership, technical, and functional skills to ensure the U.S. has the world's safest and most productive aviation sector.

Office of Audit and Evaluation (AAE)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$3,200**	**20**		**20**
Adjustments to Base	**$54**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$7			
FY 2016 Pay Raise (1.3%) (.75)	$27			
Additional Compensable Day	$11			
FERS Contribution	$9			
FY 2016 Request	**$3,254**	**20**		**20**

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Detailed Justification for – Office of Audit and Evaluation (AAE)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Audit and Evaluation (AAE)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015-FY 2016
Office of Audit and Evaluation	$3,200	$3,200	$3,254	+$54

In FY 2016, the Office of Audit and Evaluation requests $3,254,000 and 20 FTE to meet its mission. This increase consists of basic pay raises and the Federal Employees Retirement System (FERS) contribution.

The mission of the office directly supports the Departmental goal of increased safety, and also supports the goal of building and enhancing our high performance work place. The FY 2016 funding will support the operation and management of consolidated safety hotlines and provide a centralized focus for internally and externally generated safety-related complaints, critical audits and investigations, and intervention. Additionally, the Office provides an impartial agency venue for investigation and early resolution of safety disclosure.

What is this Program and Why is it Necessary?

The Office of Audit and Evaluation has two primary functions; safety audit and investigation review and analysis; and hotline operations and reporting. The audit and analysis staff perform audit and investigative review functions primarily for internal safety disclosures and concerns, including the FAA Whistleblower Protection Program. It is also coordinates and evaluates for completeness FAA responses to DOT- OIG, GAO and OSC generated audits, investigations and evaluations. The second function is a reporting and data function that provides for analysis of hotline submissions, coordination of AAE investigations, and reviews for completeness investigations conducted by appropriate FAA organizations. The Office also operates and manages several administrative and safety hotlines. While AAE coordinates and provides independent quality control evaluations of certain investigations conducted by the lines of business, the Office does not determine the technical merits of safety-related issues or make recommendations for resolution of particular safety-related cases. Such determinations remain the ultimate responsibility of the appropriate safety office.

Some of AAE's critical supporting activities include:

- Operating and managing the agency's hotline system, including the Safety Hotline, the Administrator's Hotline, and other programs that offer employees and others avenues to report safety-related and other concerns and make safety contributions.
- Coordinating and providing independent quality control evaluations of certain investigations conducted by the lines of business and analyzes data from a broad range of sources.
- Serving as primary interface and maintain a continuous liaison with GAO, OSC, and the DOT OIG investigations/audit staffs concerning safety-related investigations.
- Recording, tracking, reviewing, and confirming implementation of FAA responses to DOT OIG, OSC, and GAO audits and investigations that are under the purview of AAE.
- Managing the Whistleblower Protection Program established under 49 U.S.C. § 42121.
- Analyze data from the Safety Hotline, the Administrator's Hotline, and Whistleblower contributions to identify trends.
- Serving as an alternative point of contact for receipt of safety-related contributions or allegations of retaliation against whistleblowers in general.
- Conducting initial reviews of contributions and investigations received, including an immediate assessment (in consultation with appropriate parties), and review responses for accuracy, thoroughness and internal consistency of handling.

- Assessing and reviewing investigations and resolutions of matters that come under its purview for fairness, impartiality and conformance with established processes; providing guidance to lines of business and staff office on how to conduct investigations thoroughly and impartially.
- Serving as a new venue to receive disclosures from FAA employees or former employees, certificate holders, related to possible violation of the an FAA regulation or order, acts or omissions that pose a high level of risk to aviation safety, or gross misconduct of agency employees involving a matter of aviation safety.

Anticipated FY 2016 accomplishments include:

- Complete an analysis of FY 2016 hotline data and whistleblower contributions by the end of the first quarter and prepare a report on significant items for the Administrator by the end of the second quarter.
- Monitor milestones so that 75 percent of corrective actions developed by agency offices in response to internal or external audits and investigations are met.
- Improve timeliness for FAA responses to GAO, OIG and OSC audits and investigations such that 90 percent are delivered in accordance with established schedules.
- Improve access portals for hotline submissions to provide more usable information and efficient processes for contributions and ensure that 90 percent of call-ins receive a "call-back" within 10 business days.
- Increase agency awareness of AAE's services and successfully provide a fair and impartial venue for investigation and early resolution of safety disclosures so that OSC investigations of FAA employee whistleblower disclosures are reduced by 20 percent over FY 2016.

AAE has established itself as a viable forum for addressing internal safety concerns, it has developed standards to measure its successes. Currently, the success of the program can be gauged by its ability to timely process hotline matters, complete investigations, validate the completeness of agency responses to identified safety concerns, and ensure agency compliance with corrective actions.

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

AAE has become a vital and effective organization productively addressing and resolving safety-related whistleblower disclosures and employee workplace conflicts. Significantly, the visibility and accomplishments of the AAE Office have generated a critical awareness and recognition that employees can bring their safety sensitive disclosures to an internal organization and have them objectively reviewed by an unbiased entity.

AAE clearly demonstrates FAA's commitment to creating a strong internal safety culture firmly anchored in a robust, responsive, and formalized process for addressing safety issues raised by employees, conducting internal reviews, ensuring corrective action and protecting employees who report safety concerns. Although other organizations could be tasked to address such safety matters, an independent organization evokes the highest level of integrity and objectivity. Both are critical to the effectiveness of AAE.

AAE enhances agency accountability for internally identified safety concerns by providing an independent, vital and effective mechanism for addressing and resolving safety-related employee disclosures, whistleblower contributions and employee workplace conflicts. Reductions to the requested funding level would significantly reduce its effectiveness and disrupt the progress the Office has made in generating awareness and recognition that employees can bring their safety sensitive disclosures to an internal entity and have them reviewed in an objective and non-threatening forum. The safety benefits of an effective internal reporting program are well-accepted. A disruption or reduction in funding would limit AAE's progress in developing this critical safety tool.

What Benefits will be provided to the American Public through this request?

The direct beneficiaries of AAE's services are the agency and the flying public. AAE embodies FAA's commitment to a vibrant and evolving internal safety culture based on continuous review, evaluation, objective analysis and measured change. AAE provides agency employees and external stakeholders with an independent and highly visible forum to openly, safely and constructively address and resolve safety complaints, concerns or whistleblower contributions.

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Office of Civil Rights (ACR)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$11,799**	**80**	**4**	**80**
Adjustments to Base	**$169**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$21			
FY 2016 Pay Raise (1.3%) (.75)	$80			
Additional Compensable Day	$37			
FERS Contribution	$31			
FY 2016 Request	**$11,968**	**80**	**4**	**80**

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Detailed Justification for – Office of Civil Rights (ACR)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Office of Civil Rights
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015-FY 2016
Office of Civil Rights	$11,868	$11,799	$11,968	+$169

The request of $11,968,000 and 80 FTE supports the FAA's Office of Civil Rights (ACR). The request provides $21,000 for the annualized FY 2015 pay raise, $80,000 for the FY 2016 pay raise, $37,000 for one more compensable day in FY 2016, and $31,000 for the FERS contribution increase. Our mission is to prevent and address discrimination by providing civil rights training, guidance, compliance and oversight in our FAA workplace and at airports throughout the country. ACR takes actions that challenge, assist, and support our customers to create an environment where all are able to contribute meaningfully to the mission. Additionally, ACR advises, represents, and assists the FAA Administrator on civil rights, diversity, and equal opportunity matters.

Funding in the FY 2016 request will allow us to meet these milestones:

- Assist agency efforts to become more effective with a stronger, more knowledgeable, more accountable leadership and a better prepared, better trained, diverse workforce in the area of Equal Employment Opportunity (EEO).
- Assist in the prevention of discrimination through the implementation of agency-wide EEO policies, practices, and procedures.
- Continue our efforts on the EEO Action Committee, which meets on a bi-monthly basis with executives members from the LOBs/SOs to identify innovative recommendations regarding EEO and diversity within the FAA workplace.
- Implement a Model EEO Program that stresses the prevention of discrimination before it occurs.
- Take proactive measures to provide EEO training to agency managers and employees.
- Increase the effectiveness of the EEO Outreach Program to minority groups with lower than expected employment rates in the agency.
- Assist agency efforts to address discrimination by addressing EEO complaints through the National Intake Unit, EEO counseling, and EEO consultation services.
- Provide oversight regarding civil rights laws and regulations by administering the agency's Internal Civil Rights and the External Civil Rights (Airports) Programs.

What is this Program and Why is it Necessary?

The FAA Office of Civil Rights (ACR) provides leadership and direction with regard to civil rights, diversity, and equal opportunity matters. Internally, the ACR mission is to aid in the prevention of unlawful discrimination on the basis of race, color, national origin, sex, age, religion, sexual orientation, and individuals with disabilities employed by the FAA. There are four major internal programs; EEO complaint services and Alternative Dispute Resolution services; Model EEO Program; EEO Outreach; and EEO Training.

Externally, the ACR mission is to provide airport oversight with regard to civil rights laws and regulations. ACR works to ensure that all beneficiaries of federally assisted transportation programs are offered equal opportunity for participation and are free from discrimination. There are three major external programs; Disability Airport Compliance; Airport Non-discrimination Compliance; and Disadvantaged Business Enterprise (DBE) Compliance. It includes airport compliance with the Americans with Disabilities Act, Title VI, Limited English Proficiency, Environmental Justice and other civil rights regulations.

ACR provides services that develop a diverse and collaborative workforce. We advise, represent, and assist the FAA Administrator on civil rights and equal opportunity matters that ensure the elimination of unlawful discrimination on the basis of race, color, national origin, sex, age, religion, creed, sexual orientation, and individuals with disabilities in federally operated and federally assisted transportation programs. Further, we work to ensure a positive working environment in the FAA by valuing, using, and managing the differences that individuals bring to the workplace.

The Office of Civil Rights works in conjunction with FAA managers to ensure EEO awareness and adherence to EEO policies and guidelines. FAA employees are trained in respectful and equitable treatment of one another. Every FAA organization, in turn, plays a role in the implementation of an effective EEO program where individuals are treated with equity and respect regardless of differences.

The Civil Rights Program's key activities include:

- Conducting Disadvantaged Business Enterprise (DBE) compliance reviews and 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 Pre-Complaint Process and ensure that the 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:

- Provide consultations and training to 200 airport sponsors on the DBE program, Title VI of the Civil Rights Act of 1964, LEP, EJ, ADA, Section 504 of the Rehabilitation Act of 1973, and on other civil rights policies and regulations affecting airports. Maintain an online FAA DBE-connect system to allow DBEs to find relevant airport opportunities, and allow airports to find certified DBEs in areas of work needed to support their DBE goals. In order to increase the diversity in DBE participation, ACR will enhance the system with job opportunity and training functions.
- Ensure compliance with ADA/Section 504, Title VI, and Environmental Justice regulations by conducting a minimum of 20 reviews and consultations at various airports throughout the nation.
- Establish a partnership with at least two external organizations to enrich and market EEO efforts in various minority communities.
- Conduct a mission critical occupation barrier analyses and collaborate with the LOB/SO to provide recommendations and actions for improvement with regard to the barriers identified. ACR will also work toward eliminating a minimum of two agency deficiencies identified in the agency self-assessment to ensure compliance with Management Directive 715.
- Visit 20 FAA facilities to offer EEO consultations, conduct training, and address workplace issues from managers and employees, the goal being to further establish FAA as a workplace of choice.
- Develop the annual EEO Plan in conjunction with FAA lines of business and staff offices (LOB/SO) to identify and eliminate EEO barriers and agency deficiencies.
- Conduct evaluations to ensure that organizations are complying with EEO mandates.
- Increase the hiring of persons with targeted disabilities in support of the Department of Transportation hiring goal.

- Deliver high quality EEO training sessions to 60 percent of managers and 10 percent of employees utilizing available technology.
- Augment agency recruitment efforts by reaching out to groups with lower than expected rates by attending career fairs and events tailored to targeted groups.
- Identify the best practices for the four focus areas of Leadership Commitment, Human Capital, Agency Communication, and Supplier/Diversity by consulting with federal agencies and private industry entities that have been recognized as top leaders in diversity.
- Ensure the highest level of EEO pre-complaint processing services by maintaining ISO Quality System certification.
- Establish training programs to improve the travel experience for all people but especially those underserved, underrepresented, and historically underutilized.
- Execute a National External Training Conference for approximately 150 persons to address civil rights obligations and requirements.
- Manage an EEO Discrimination Pre-Complaint Program that can process 100 percent of the allegations and inquiries regarding EEO complaints through counseling, mediation, and consulting services

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

ACR 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 Office of Civil Rights has oversight of internal and external EEO policy, which if not properly funded or staffed, could cause serious dissatisfaction in the workplace. If FAA personnel are not properly trained on EEO matters and complaints are not addressed in a timely and effective way, there is a further risk of losing quality employees to other agencies that place an emphasis on EEO and diversity.

Without the requested level of funding, ACR will be ill-equipped to successfully execute our mission and support DOT's Workplace of Choice initiative. ACR needs adequate resources to further promote diversity and EEO within the agency and to improve employee morale for years to come.

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.

ACR received a base transfer from the ATO Diversity Office in FY 2014 as a result of the consolidation of shared services within the agency. This funding allowed ACR to hire additional staff and provide programmatic funding to cover the agency's internal and external EEO needs.
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.

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 2016, 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.

As mentioned above, ACR has shifted our focus from just processing EEO complaints to becoming involved in true conflict resolution and training. Without adequate funding, ACR will not be able to train and provide skilled mediators to resolve workplace issues. The result will be additional monetary costs to the agency if disputes are not settled before becoming formal complaints. Additionally, morale could suffer if FAA employees are not adequately trained on EEO issues.

In order to effectively perform barrier analysis to eliminate barriers to employment for minorities, women and people with disabilities and conduct successful outreach, ACR must have sufficient staff to perform these functions. ACR must conduct barrier analysis with regard to merit promotion, awards, and training to determine if there are barriers in these areas. In addition, FAA must identify where applicants are failing in the hiring process e.g. testing, medical, security, interview, etc. If adequate funding is not provided, we will have to decrease our barrier analysis efforts, possibly resulting in little or no change to the FAA demographics.

Other potential results of not funding the program at the requested level include:

- Congress and EEOC will view our EEO efforts as ineffective.
- EEO Complaints will significantly increase.
- ADR will not be viewed as an effective tool for resolving complaints.
- Barriers to EEO will not be identified and corrected and adverse impacts will continue.
- Reducing the amount of resources devoted to EEO Outreach activities potentially sending a negative message to women, minorities, and people with disabilities and causing a decrease in the diversity of the FAA applicant pool.

What Benefits Will Be Provided To The American Public Through This Request?

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

- Conducted the barrier analysis of the Phase 1 Air Traffic Controller (ATC) occupation to determine why the demographics of the newly hired ATC continue to indicate a lower than expected participation rate for minority groups.
- Provided EEO training to 6,107 personnel or 12.8 percent of the work force and launched the No Fear training to meet OPM requirements.
- Issued Directive 1400.8 after two years in the coordination process.
- Successfully conducted the 2nd Annual EEO Awareness Day, with the Acting Administrator signing an FAA Proclamation and recording a message for employees.
- Attended 105 Outreach Events and collected over 5,700 signatures from potential applicants. Additionally ACR participated in 8 high school and middle school outreach events and activities, reaching over 700 students.
- The EEOC Action Committee was restructured to operate as an entity that will produce tangible outcomes and products. This approach will integrate several EEO initiatives under the Committee, whose members will serve as the leads and be the primary liaisons for each line of business and staff offices.
- Consulted with 306 airport grant recipients on developing DBE goal methodologies under Part 26. ACR consulted with 65 airport sponsors on developing concession programs under Part 23. Additionally, ACR conducted seven (7) onsite reviews at primary airports.
- Developed a Best Practices Tool for airports to assist in overseeing their own DBE/ACDBE programs. The DOORs and e-dbe were enhanced.
- Sponsored a joint DBE, ADA and Title 7 Conference in Washington DC for customers and stakeholders.
- Completed a comprehensive Title VI Tool Kit for airport sponsors and implemented Title VI MOU and Checklist, in partnership between the Office of Civil Rights and the Airports Division ensure minority populations are not adversely impacted by the projects.
- Conducted quarterly briefings on how to hire people with targeted disabilities through the Workforce Recruitment Program. Provided training to managers and supervisors on how to recruit, hire,

accommodate, and interact with people with disabilities and achieved an efficiency rate of 90.81 percent of processing reasonable accommodation requests in under 25 business days or less.

- ACR continues to market and provide awareness to all FAA employees on the agency's EEO principles by: leading marketing campaigns to promote ACR programs and services; maintaining FAA managers and supervisor updated with the latest information through the Civil Rights Bulletin; and conducting the annual National EEO Awareness Day celebration.

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Government and Industry Affairs (AGI)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$1,530**	**10**		**10**
Adjustments to Base	**$26**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$3			
FY 2016 Pay Raise (1.3%) (.75)	$12			
Additional Compensable Day	$6			
FERS Contribution	$5			
FY 2016 Request	**$1,556**	**10**		**10**

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Detailed Justification for – Government and Industry Affairs (AGI)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Government and Industry Affairs
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Government and Industry Affairs	$1,530	$1,530	$1,556	+$26

The FY 2016 budget request of $1,556,000 and 10 FTEs will support the Office of Government and Industry Affairs program. The request provides $3,000 for the annualized FY 2015 pay raise, $12,000 for the FY 2016 pay raise, $6,000 for one more compensable day in FY 2016, and $5,000 for the FERS contribution increase. The following core activities represent the FY 2016 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.
- Work in coordination with AGC on congressional hearings.
- 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.

What is this Program and Why is it 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 program and staff offices to coordinate and present FAA's legislative message and 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.

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

FAA needs to have one office whose mission it is to provide high quality, timely communications to Congress.

What Benefits will be provided to the American Public through this request?

AGI 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:

- Serves as FAA's focal point to coordinate agency actions relating to Congressional oversight of FAA programs;
- Manages the Reports to Congress program within the FAA. Serves as the FAA Reports Control Officer and is responsible for providing the DOT Congressional Reports Officer all information to disseminate to Congress and interested parties;
- Coordinates with Departmental officials to ensure consistency in furthering policies relating to Congressional and intergovernmental relations issues;
- Keeps FAA Associate Administrators and the offices and services informed of Congressional and public concerns which may influence their operational responsibility;
- Coordinates all incoming Congressional Correspondence; and Congressional Hearings and Briefings;
- Ensures witnesses are well-prepared to answer questions at hearings

AGI solicits information from program offices within the Agency to better understand and communicate potential areas of interest or concern to the United States Congress. AGI strives for inter-agency coordination by providing Congress with timely and quality responses to all Congressional inquiries (i.e., briefings, calls, outreach events, etc.).

The work of this office enables the Administrator, Deputy Administrator, and Associate Administrators 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.

Office of Communications (AOC)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$6,203**	**34**	**1**	**34**
Adjustments to Base	**$108**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$13			
FY 2016 Pay Raise (1.3%) (.75)	$50			
Additional Compensable Day	$23			
FERS Contribution	$22			
FY 2016 Request	**$6,311**	**34**	**1**	**34**

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Detailed Justification for – Office of Communications (AOC)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Office of Communications – Budget Request
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Office of Communications	$6,003	$6,203	$6,311	+$108

The request is for $6,311,000 and 34 FTEs to support the Office of Communications' (AOC) critical outreach to FAA licensed individuals, the flying public, news media, and the FAA's 40,000+ workforce across the globe. AOC works with news media and stakeholders to provide the public with accurate, timely, useful and important information about the agency's goals, policies, activities and operations. AOC manages the internal and external web presence for the FAA, and serves as the voice of the agency, providing employees with daily, weekly and periodic communication vehicles and news programs.

AOC manages an agency-wide employee collaboration program that enables employees to share ideas, participate in conversations, and supports the FAA's safety mission through online communities that enable innovation and collaboration. AOC also oversees the FAA branding program, multimedia (broadcast and video) services and all web content for the agency at large.

Our funding in FY 2016 enable us to focus on the following key outputs and outcomes:

- Increase awareness and understanding of FAA safety, NextGen initiatives, and National Airspace System efficiency and capacity enhancements through press conferences, media briefings, roundtables, direct outreach to reporters, press releases, websites, social media, and other communication channels.
- Increase awareness of the FAA's role as a world leader on aviation issues.
- Use multiple communications channels to promote key FAA safety initiatives (e.g., child safety, laser awareness, runway safety, weather, etc).
- Respond to media calls about safety and other issues within 24 hours with accurate information and ensure the delivery of urgent, time sensitive information to key audiences.
- Continue improvements to FAA websites to increase online customer satisfaction.
- Ensure the efficient online delivery of aviation safety related regulatory documents including flight safety, airworthiness directives, and pilot and aircraft licensure.
- Support open government initiatives to make data available, improve online services, and increase collaboration with citizens, stakeholders, and other government agencies.
- Use external social media channels to engage with and educate the flying public, stakeholders, and aviation industry professionals about key FAA safety initiatives (e.g., FAA official Facebook, Twitter, YouTube, LinkedIn et al properties).
- Use new media technologies to extend the FAA's reach to deliver aviation safety information to targeted public audiences.
- Use a variety of internal communication vehicles to increase employee understanding of agency strategic goals, programs, and activities. Obtain feedback that helps the FAA meet those goals.
- Lead the DOT/FAA IdeaHub program to leverage employee ideas to help accomplish the FAA mission, make the organization a better place to work, and continue to improve morale through engagement.

What Is This Program And Why Is It Necessary?

The Office of Communications (AOC) supports the policy, direction, and management of the agency's communications programs for news media, stakeholders, and FAA employees nationwide. AOC serves as the spokesperson for the FAA externally, as well as internally to employees. The mission of the organization is to disseminate accurate and timely aviation and aviation-related information affecting FAA licensed individuals, employees, stakeholders, and the flying public. This program is necessary to ensure delivery of critical safety information to the right person at the right time in the right method.

Two core missions are accomplished within AOC:

Media Relations
AOC works closely with FAA's lines of business and staff offices to provide timely, accurate information on FAA programs and activities under the agency's strategic goals. AOC advises all agency officials on communications strategy, prepares them for media interviews and other public appearances, and develops and implements communications strategies for key agency initiatives. Office activities also support the Department of Transportation's goals of Organizational Excellence as well as Efficiency by facilitating clear, timely, consistent, and inclusive communications. AOC also coordinates the activities of the regional and central public affairs offices.

Corporate Communications
AOC coordinates with the agency's lines of business and staff offices to provide more than 40,000 FAA employees with pertinent, accurate, and timely information on agency programs and activities. In addition, through FAA employee websites, AOC provides information and resources employees need to do their jobs. Through agency-wide employee engagement programs, AOC enable employees to share ideas, participate in conversations, collaborate together and support the FAA's safety mission through online communities that increase innovation, efficiency, and productivity. AOC coordinates with lines of business and staff offices to provide employees with pertinent, accurate, and timely information on agency programs and activities using audio/video services, a web-based employee newsletter and other communication channels. AOC manages the FAA's internal and external websites as well as internal web-based publications, social media platforms, video, audio and information-sharing programs. The FAA's external web pages inform FAA-licensed individuals and the flying public on issues involving aviation and aviation-related programs. Together these websites receive more than four million visits per month.

Anticipated Accomplishments Include:

- Ensure that at least seven articles, news stories or editorials on separate issues appear in national publications or TV coverage that positively highlight agency safety initiatives.
- Ensure that at least seven articles, news stories or editorials on separate issues appear in national publications or television coverage that positively highlight agency technology or procedural advances that will enable NextGen.
- Ensure that at least four articles, news stories or editorials on separate topics appear in national publications or television coverage that positively highlight agency environmental sustainability across the globe and when appropriate, communicate the FAA's role in using an integrated, data-informed approach that shapes global standards and enhances collaboration and harmonization.
- Ensure rapid response to media requests and provide critical information to the public in the event of an aviation emergency.
- Provide monthly web traffic, satisfaction, and usage reports including social media for FAA.gov and My.FAA.gov visitor usage, email subscriptions, and downloads.
- Achieve an average American Customer Satisfaction Survey (ACSI) customer satisfaction score of 74 or better on the FAA public website for FY 2014 and FY 2015.
- Deliver more than 6 million FAA safety and regulatory documents online instead distributing in print.
- Publish daily broadcast email messages to employees that promote FAA programs and HR information as well as raise awareness of coverage of FAA in the press.
- Welcome more than 4 million visitors to FAA public and employee websites every month.

- Publish more than 250 employee news articles in Focus FAA that increase employee understanding of agency programs and activities.
- Receive more than 500 comments from employees on employee ideas to improve the FAA.
- Promote at least 10 FAA leadership messages to the workforce.
- Provide audio/visual support for more than fifteen FAA/DOT employee town hall events.
- Conduct outreach and education through a variety of channels on unmanned aircraft systems (UAS).

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

In the last year, there were more than 6 million regulatory documents downloads from FAA.gov related to pre-flight safety procedures and planning, airmen/aircraft certification, aircraft mechanical records, airport safety regulations, and accident/incident data. This AOC-led delivery of critical safety information to the right person at the right time in the right method is at the very core of FAA's mission to ensure safety in flight for citizens.

Requirements are growing. Over the last few years; FAA has seen a persistent increase in demand for secure access to critical aviation safety information via mobile devices. FAA employees, external stakeholders and the flying public expect unfettered access to information from the FAA and more interaction about that information. AOC must continue to accurately and in a timely fashion provide critical information about FAA operations, safety oversight, efficiency initiatives and other programs to the media, employees and the flying public.

AOC will use this funding to:

- Improve "findability" of regulatory documents, online services and content by using a multi-faceted approach to searching for, navigating through, and locating information.
- "Open FAA Data" – support standardization of data to increase internal and external access to high value, machine readable datasets and applications to deliver more value to consumers of FAA content.
- Implement new approaches to optimize the user experience via various FAA digital platforms.

As a result, airline pilots, mechanics, the flying public, citizens, and FAA employees will continue to benefit from access to critical aviation safety and operational information.

What Benefits Will Be Provided To The American Public Through This Request?

Benefits of these communication services - With more than 40,000+ employees working in offices and in the field, around the country and abroad – the FAA intranet, employee news, daily broadcast, and audio/video production services are a vital part of ensuring employees are connected with the vision, mission and values of the agency. These vital communications vehicles ensure that employees get information about everything from HR benefits to changes in compensation programs that may directly impact them. Strong internal communications generate a more engaged, productive, and loyal workforce. AOC measures the benefits of these programs through the direct feedback received from employees on a regular basis and measures effectiveness through the number of visits to the news sites and video products as well as the online engagement that these products is generate.

Readership and engagement have increased significantly through these communications channels. Employees have come to expect the information that AOC delivers via these services. Other offices have come to expect the communications services that AOC provides for them which help convey important information about the agency programs.

AOC has a variety of tools that help it ensure that FAA communications are effective. Consistent high survey feedback from users indicates that AOC is meeting its goal to provide information that is readily available, timely, accurate, and is understandable by the traveling public. AOC's web management program has increased its annual American Customer Satisfaction Survey (ASCI) score from a 66 to a 73 in the last four years. This puts the FAA on par with the Federal Government average and well above the regulatory agency average.

An internal communications e-newsletter called Focus FAA receives more than 100,000 page views per month, has high readership, and enables robust employee interaction. AOC also monitors the number of visits and time spent reading and viewing audio/visual content. AOC receives positive feedback and a high-level of response via online feedback channels for these publications. AOC also holds frequent media training sessions for FAA Leadership and takes advantage of new media technologies to deliver its message to a wide-range of audiences.

Office of Chief Counsel (AGC)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$44,243**	**234**	**9**	**236**
Adjustments to Base	**$696**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$84			
FY 2016 Pay Raise (1.3%) (.75)	$346			
Additional Compensable Day	$139			
FERS Contribution	$127			
Other Changes	**-$153**			
Working Capital Fund	-$153			
FY 2016 Request	**$44,786**	**234**	**9**	**236**

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Detailed Justification for – Office of Chief Counsel (AGC)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016– Office of the Chief Counsel (AGC)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015-FY 2016
Chief Counsel	$44,190	$44,243	$44,786	+$543

The Office of the Chief Counsel requests $44,786,000 and 236 FTEs to enable AGC to provide necessary legal services to the FAA. This request includes an increase of $543,000 for basic pay raises, the Federal Employees Retirement System (FERS) contribution and a -$153,000 reduction in AGC's payment to the Department's Working Capital Fund. This funding will go towards ensuring the FAA meets its mission obligations consistent with legal requirements and that agency action and employees are vigorously represented in administrative and judicial forums. The request will be deployed in a manner calculated to best provide timely and responsive legal services in support of FAA's most critical program responsibilities.

Funding at the FY 2016 requested level will provide necessary legal services, including representation, in support of significant FAA program responsibilities and functions. Among the more significant are:

- Rulemaking, including critical safety rules and regulatory aspects of NextGen.
- Enforcement of safety regulations.
- Acquisition of operational safety systems and equipment, including acquisition aspects of NextGen development, and compliance with commercial and fiscal requirements.
- Airports capacity enhancement and grants, environmental streamlining for airport projects, and environmental aspects of NextGen development.
- Personnel and labor matters.
- Key international agreements harmonization of safety requirements and safety assessments.
- International technical assistance agreements and safety assessments.
- Dispute resolution services and/or administrative adjudication of acquisition related disputes, and administration of the Civil Penalty Program; representation of agency interests and choice of actions before United States federal courts and various administrative forums, including the National Transportation Safety Board (NTSB), the Merit Systems Protection Board, and the EEO Commission.

In order to advance the DOT goals of achieving the next level of safety, maximizing access to the aviation system, advancing global collaboration and building and enhancing our high performance workforce, the Office of the Chief Counsel, based on critical agency priorities and requirements, will assess and prioritize the following key outputs and outcomes in FY 2016:

- 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 the 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 80 percent of the exemptions submitted.
- Prosecute enforcement actions timely by conducting 50% informal conferences within 90 days of receipt of a respondent's request and 75% within 180 days. Beginning in FY 2015, by taking the first legal action in at least 50% of the cases within 60 days of receipt by legal counsel and 75% within 180 days; and avoid case backlog by taking next legal counsel action within 90 days of an informal conference in at least 50% of the cases and within 180 days in 75% of cases.
- Provide representational legal services on all phases of tort litigation, investigations, claim processing and monitor and report on the agency's contingent liability.

What is this Program and Why is it Necessary?

The Office of the Chief Counsel provides mission critical legal support services across each of the Department of Transportation (DOT) goal areas. Within FAA, AGC is both a key partner to each line of business and staff office and an integral contributor to the success of every major agency program and function. Across every line of business and every agency program, AGC provides legal advice, reviews agency action for legal sufficiency and conformity, represents agency interests in various administrative and court forums, defends agency choice of action, and enhances risk management by proactively seeking to identify and mitigate risk. In addition, AGC is responsible for two distinct internal FAA adjudicative functions: the Office of Dispute Resolution for Acquisition serves as the Administrator's adjudicatory body in acquisition-related matters and provides alternative dispute resolution services; and, a discrete unit within the office supports the FAA's civil penalty adjudication function by serving as a confidential advisor to the FAA Administrator in his capacity as the Civil Penalty Program decision-maker.

AGC principle legal practice areas provide services in support of DOT goals in the following manner: 1) Enhancing Safety, through its activity in regulatory enforcement, rulemaking, acquisition and commercial law, aircraft and other tort litigation; 2) maximizing Economic Competitiveness through its rulemaking activity, environmental legal services, airport legal services which support airport expansion and capacity, and acquisition of technologies that support increased capacity and efficiency; advancing global collaboration through international activity and harmonization of safety rules, enhancing Livable Communities and ensuring Environmental Sustainability through its rulemaking activity and environmental legal services; and 3) building Organizational Excellence by enhancing our high performing workforce, supporting numerous agency-wide strategic initiatives, and providing legal services in support of agency administrative functions including employment and labor law, ethics counsel, FOIA and Privacy Act services and legislative services.

The direct beneficiaries of our services are the agency organizations that have operational and programmatic responsibility for carrying out FAA's mission, and by extension, the goals of the Department of Transportation. More significantly, 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 all of our various program areas. Our critical supporting activities include:

- Ensuring FAA's rules meet legal standards, assisting the agency in completing critical safety rules on schedule, and providing regulatory interpretations to internal staff, agency officials and member of the public.
- Prosecuting all manner of enforcement cases referred by the Flight Standards Service, Aircraft Certification Service, the Office of Aerospace Medicine, the Office of Security and Hazardous Materials, the Office of Airports and the Office of Commercial Space Transportation.
- Representing the FAA on safety matters before the NTSB, the FAA Decision-maker and the Federal courts.
- Advising agency employees and management during aircraft accident investigations and defending the agency in associated litigation; evaluating tort claims; assisting Department of Justice in defending wrongful death, personal injury and property damage lawsuits.
- Advising the FAA Administrator, in his capacity as decision-maker on cases appealed from decisions issued by Administrative Law Judges.
- Advising program offices on the legal and environmental implications of programs that enhance airport and airspace capacity and defending the agency's choice of action.
- Providing legal advice, litigation support, policy and regulatory guidance, and legal sufficiency reviews related to environmental review of airport capacity and capacity-related projects, administration of the airport improvement program, funding of runway expansion and safety projects, redesign of the airspace surrounding airports in major metropolitan areas and streamlined environmental review and compliance.
- Providing acquisition and commercial law expertise to assist clients in acquiring safety and capacity enhancing equipment and services.
- Ensuring legal sufficiency on all high value agency procurement activities; advising on grants, cooperative agreements, and other transaction agreements; and representing FAA in acquisition related litigation and disputes.

- Providing fiscal and commercial law services needed to support the agency's information security requirements, export control compliance, bankruptcy cases, antitrust issues, real estate activity and appropriations matters.
- Representing the agency before various administrative and federal courts on personnel, labor, civil rights and equal employment opportunity matters.
- Counseling how to minimize the legal risks relating to employment decisions and policy.
- Providing an administrative adjudicatory body in acquisition-related matters and ensuring acquisition conflicts are resolved through alternative dispute resolution processes or are promptly adjudicated.

Anticipated FY 2016 accomplishments include:

- Supporting timely and efficient agency rulemaking activities by submitting to DOT 85 percent of significant ("A") rules approved by the Rulemaking Council within 90 days of the scheduled date and issuing 85 percent of certain non-significant rules approved by the Rulemaking Council within 90 days of the scheduled date.
- Responding to 60 percent of public requests for interpretations of regulations within 120 days of receipt.
- Completing legal review of all procurement documents on average within 10 days and ensuring that key procurements remain within a prescribed tolerance in terms of funding and schedule.
- Providing legal services relating to drafting and negotiation of international agreements and on safety oversight, air traffic airworthiness, technical assistance, and other aviation related areas.

AGC provides critical legal support to each and every key function and critical program within FAA's mission. Legal services are necessary to ensure: agency actions are consistent with legal requirements and within legal authorities; that government interests are vigorously advocated, represented and defended; and that government personnel is fairly represented and able to carry on the agency's mission; and, that program and decisions risks are soundly evaluated, assessed and mitigated where appropriate. The legal office both defends agency choice of action, as well as agency employees, and vigorously prosecutes regulatory violations that imperil safety. AGC is the singular authorized source of legal advice and review for the entire agency.

AGC's principal legal practice areas are integrally linked to the success of FAA's mission. AGC directly supports the agency's safety mission by: timely and efficiently prosecuting violations of the federal aviation regulations, as well as, providing legal support of voluntary compliance programs; ensuring that critical safety rules are both legally sufficient and completed timely; providing timely and accurate agency responses to public requests for interpretations of the regulations; assisting in FAA accident investigation activities; and vigorously representing the agency and agency personnel in air crash and other tort litigation. In support of economic competitiveness and enhancing access to aviation, AGC plays a significant role by providing critical legal advice so that program milestones are maintained and, providing legal sufficiency reviews and advice to bolster and sustain program office actions regarding the environmental implications of runway expansions, terminal improvements, and redesign of the national airspace. Our environmental legal work also supports the related goals of ensuring livable communities and enhancing environmental sustainability. Further, AGC legal advice, risk management expertise, and sufficiency reviews in the acquisition and commercial law practice areas are essential to development, acquisition and deployment of the safety and capacity enhancing equipment and technology needed to support the national airspace system. AGC advice and risk management efforts assisted the agency in keeping major acquisitions within acquisition cost and schedule baselines in most cases. Moreover, AGC supports the agency efforts pertaining to global collaboration by developing the agency position on international law issues and supporting FAA international aviation efforts. Finally, in support of the overall goal of organizational excellence and enhancing our high performance workplace, AGC provides advice and guidance to key agency officials on personnel, labor law, and civil rights matters and the various general law disciplines applicable to all federal agencies.

AGC's most visible contributions can be found in our timely and efficient support of safety and access:

- Complete 85 percent of critical safety rules within 90 days of DOT scheduled due date.
- Over 60 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, on average within 10% of their cost and schedule baseline over 90 percent time and contract documents are cleared through the legal office within 10 days.

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

AGC's funding is primarily for personnel costs and our staffing level drives the level of service we can provide to the agency. Reductions to the requested funding level would 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. A decline in the ability to provide timely legal services would ultimately slow down FAA response time to regulatory issues, enforcement cases, acquisitions, and litigation and personnel cases and have an overall impact of the safety of the aviation community.

A reduction in funding could also impair the agency ability to vigorously defend tort and personnel cases, thereby significantly increasing the government's exposure to loss. AGC litigation losses consistently have been small compared to its potential tort liability. Similarly, pending class action employment cases carry an exceeding large potential liability, but AGC attorneys have successfully defended the cases to date.

A reduction or disruption in AGC's ability to deliver timely legal services likely would impair efforts to accelerate development and implementation of the NextGen Air Traffic Control System and related safety enhancements, and would interfere with initiatives related to maintaining scheduled progress of environmental reviews for airport development projects and airspace redesign efforts. If these programs are delayed due to a bottleneck in AGC, the safety and efficiency improvements these programs hold for the traveling public will be similarly delayed.

What Benefits Will Be Provided To The American Public Through This Request?

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. AGC is not a program in the traditional sense and our contribution cannot be assessed through a single measure. Rather AGC contributes on many fronts to many programs to ensure overall that FAA actions are consistent with legal requirements, risks are defined and managed to the extent practicable, and the interests of the government and the flying public are strongly represented.

AGC 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.

While there is no single or overall measure to assess the legal program, it merits saying that over the years AGC has consistently met the specific performance measures for its key practice areas. Moreover, AGC has been a proactive and efficient partner significantly contributing to FAA's consistent success in meeting its programmatic and safety goals.

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

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$33,183**	**136**	**7**	**139**
Adjustments to Base	**$408**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$50			
FY 2016 Pay Raise (1.3%) (.75)	$194			
Additional Compensable Day	$90			
FERS Contribution	$74			
FY 2016 Request	**$33,591**	**136**	**7**	**139**

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Detailed Justification for – Office of Policy, International Affairs, and Environment (APL)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Office of Policy, International Affairs, and Environment (APL)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2016 – FY 2015
Policy, International Affairs, and Environment	$33,396	$33,183	$33,591	+$408

The FY 2016 budget request of $33,591,000 and 139 FTEs allows FAA to identify, develop and implement the domestic and international policy and environmental goals of the agency. This funding provides $50,000 for the annualized FY 2015 pay raise, $194,000 for the FY 2016 pay raise, $90,000 for one more compensable day in FY 2016, and $74,000 for the FERS contribution increase. The request also provides for activities including program travel, training, communications, support services requirements, contract support, and supplies and equipment to support continuing operations.

The organization consists of the following offices:

Aviation Policy and Plans improves the FAA's effectiveness with corporate planning and performance management; makes coordinated and well-informed policy decisions for crosscutting and novel civil aerospace issues using independent economic, quantitative and qualitative analysis, information and tools; and positions the FAA for the future by identifying, researching, and projecting emerging issues and trends.
International Affairs is responsible for coordinating all of FAA's international efforts and advancing the nation's longstanding leadership on the international front including engaging in dialogue with counterparts across the world.
Environment and Energy is responsible for developing, recommending, coordinating, and implementing national and international standards, policy and guidance, research and technology goals, and analytical capabilities on aviation environmental and energy matters.

What is this Program and Why is it Necessary?

APL supports the Department of Transportation's (DOT) goals of Economic Competitiveness and Environmental Sustainability through multiple programs and projects designed to reduce aircraft noise and aviation emissions, minimize their impacts as well as increase fuel efficiency and to foster the continued development of competent civil aviation authorities worldwide to meet international standards. APL provides U.S. leadership on reducing global aviation's carbon footprint and working with the International Civil Aviation Organization's (ICAO) Committee on Aviation Environmental Protection (CAEP) and international partners exploring options for a new carbon dioxide emissions standard for aircraft. As more Americans travel worldwide, the development of competent civil aviation authorities has become a cornerstone for providing technical assistance, increasing global aviation safety, building efficiency and transferring technologies for public benefit.

APL supports FAA and DOT Safety goals through economic and regulatory analysis of proposed and current U.S. safety policies and regulations, and by fostering the development of competent aviation authorities world-wide.

All APL offices support FAA and DOT Organizational Excellence strategic goals, ensuring continuously-improving, secure, efficient, and transparent exchanges of critical information, organizational performance management including performance reporting, and maximizing output/outcome oriented efficient planning and business processes.

APL serves multiple international functions: principal advisor to the Administrator on international matters; management of agency international strategic outreach, cooperation, and technical/operational exchanges with a view to enhance safety, efficiency, environmental sustainability; development and coordination of international civil aviation policies, positions and standards based on U.S. systems, procedures and practices; provision of support to the U.S. Mission at the International Civil Aviation Organization; technical assistance (over 1,500 cooperative agreements with 150 countries); and management of the Administration's Global Leadership Initiative to guide FAA's international engagement using a data-informed approach to drive global standards, enhance collaboration and harmonization, and better focus finite agency resources for maximum U.S. aviation benefit.

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.

The FAA is also very active in working with ICAO, International Air Transport Association (IATA) and international partners and organizations to develop global and domestic standards (e.g., global aircraft noise and engine emissions standards) and recommended practices as well as guidance materials that support implementation of harmonized aviation policies and programs such as NextGen and associated technologies by ICAO members worldwide, and economic policies for airport and air navigation service providers.

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 corporate planning and performance management efforts. In addition, APL coordinates the agency's reauthorization before Congress, and is responsible for national aviation policies and strategies in the environment and energy arenas, including aviation activity forecasts, economic analyses, aircraft noise and emissions analyses and mitigation, environmental policy, and aviation insurance.

In the area of environment, APL is responsible for improving environmental protection and addressing the energy and sustainability needs. APL is responsible for developing broad based approaches and coordinating agency responses to limit and reduce future aviation environmental impacts to levels that protect public health and welfare, ensure energy availability, and enhance sustainability of FAA operations. This work requires addressing environment, energy, and sustainability issues that will influence the future capacity and flexibility of the national airspace system (NAS), aircraft noise, air quality, global climate effects, energy availability and efficiency, water quality and sustainability of FAA operations.

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 and international partners in supporting the implementation of global and domestic standards and recommended practices as well as guidance materials that support implementation of harmonized aviation policies and programs, as outlined above.

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. Historically the U.S., based on its size, technological advancement, expertise, and regulatory development has shaped the global aviation sector. However, the global transportation network is changing and even the growth of the U.S. industry is shifting abroad. Therefore, for the FAA to continue as the leading model for safety, efficiency, and environmental sustainability, APL will lead the FAA's initiative to adapt our international approach toward maintaining and enhancing the U.S.' global leadership position.

The base budget request covers the following:

- Advancing harmonization of aviation standards and practices through representation in key international bodies and provision of training and technical assistance around the world.
- Improving safety, air traffic efficiency, and environmental sustainability across the globe through an integrated, data-informed approach that shapes global standards and enhances collaboration and harmonization.
- Leading or facilitating agency reauthorization efforts to include development of reauthorization proposals and implementation of enacted reauthorization initiatives.
- Leading FAA's corporate planning and performance management efforts to help the agency make meaningful improvements in performing our safety and efficiency mission and advancing our strategic priorities.
- Aviation environment and energy policy, programs, and operational activities to:
  - Reduce aircraft noise.
  - Reduce aviation emissions and climate impacts.
  - Improve National Airspace System energy efficiency and develop sustainable alternative aviation fuels.
  - Integrate environmental considerations into NextGen through Environmental Management System Approach and National Environmental Policy Act compliance.
- Supporting FAA's strategic sustainability through cross cutting coordination and performance tracking activities.

Anticipated accomplishments in FY 2016 for Policy, International Affairs, and Environment include:

<u>Policy and Plans</u>

- Identify and initiate resolution of NextGen policy issues as well as analyze capacity and congestion policy implications of NextGen near and mid-term improvements.
- Improve FAA's effectiveness and support implementation of the FAA's strategic initiatives by leading a streamlined and responsive corporate planning and performance management process for the agency.
- Provide timely economic analysis to enable the agency to send critical safety rules to the Office of the Secretary of Transportation.
- Implement congestion management solutions for congested areas including the New York area and conduct 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 analyze forecasts of the Aviation Trust Fund.
- Support the Administrator by staffing the Management Advisory Council and other similar advisory bodies as directed by Congress.
- Develop the FAA Aerospace Forecasts at the national level and the Terminal Area Forecasts at the airport level for the FAA and the aviation industry for use in NAS planning, staffing, rule-making, development, and investment analysis.
- Update and evaluate the costs and benefits of the Federal Contract Tower airports, FAA towered airports and future airport applicants to the program.

<u>International Affairs</u>

- Prepare, negotiate, manage, and conclude international agreements in support of the FAA's international activities.
- Advance FAA policies and programs through the fostering and maintenance of aviation relationships within the U.S. Government and with national, regional and multilateral aviation organizations.
- Promote U.S. and FAA aviation leadership development.
- Promote safety oversight activities in all regions and through the International Civil Aviation Organization (ICAO) to enhance the capabilities of Civil Aviation Authorities (CAAs), regional organizations, industry, and other stakeholders around the world.
- Promote global interoperability by working on research, validation and implementation of new concepts, systems, and procedures through maximizing resources to assist key countries and regional organizations to implement interoperable air traffic management (ATM) technologies and procedures.
- Coordinate FAA-wide efforts to support U.S. aims regarding ICAO global safety, efficiency, and environmental initiatives and programs.
- Serve as the Secretariat of the Interagency Group on International Aviation.

- Support the FAA's international decision making process for determining agency priority international technical assistance, training and other initiatives through available data and global drivers.

Environment and Energy

- Provide implementation guidance on the use of the Aviation Environmental Design Tool (AEDT) for demonstrating environmental compliance.
- Conduct analysis of research outcomes and explore options for potential revisions in community noise threshold levels.
- Coordinate U.S. positions to ICAO on a new aircraft CO_2 emissions standard and an emissions threshold associated with a new particulate matter emissions standard.
- Policies, methods and guidance materials for implementing the aircraft noise and aircraft/engine certification regulations and compliance oversight, including expanded delegation authority.
- Support international activities to address aviation emissions influence on climate, through ICAO and other venues.
- Develop and provide training and guidance to LOBs/SOs on FAA Order 1050.1F to improve our efficiency for meeting NEPA requirements and support NextGen implementation.
- Lead FAA's Greening Initiative, an agency-wide sustainability program focused on minimizing FAA's environmental footprint through greenhouse gas emissions reductions, sustainable buildings, energy and water efficiency, renewable energy use, vehicle fleet management, sustainable acquisition, waste management, and electronics stewardship.
- Coordinate the development of FAA's annual Strategic Sustainability Performance Plan and Greenhouse Gas and Sustainability Reports.
- Track, assess, and report FAA's sustainability performance.
- Assess NAS-wide environmental performance for exposure to significant noise and improved fuel efficiency.
- Explore operational procedures that can reduce noise, fuel, and emissions and quantify their environmental benefits.

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

To achieve the performance goals outlined in the FY 2016 budget request as well as the long-term goals outlined in the FAA Administrator's Strategic Initiatives, in particular Enhancing Global Leadership, we will depend on the maximization of resources through the leveraging of partnerships, technology, and expertise. We will continue to strive to meet the demands and requirements placed by the Administration and the Department in connection with various domestic and international initiatives

Funding in FY 2016 will support the following organizational plans and goals:

Policy and Plans

- As required by law, complete economic analyses of agency rulemaking and regulatory projects provide criteria and analysis of FAA investments in aviation infrastructure, update guidance materials for economic evaluation and investment, and evaluate airport benefit-cost analyses and competition plans.
- Implement congestion management solutions 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.
- Work with the Administration, Congress, and stakeholders to develop and implement FAA reauthorization legislation and to analyze forecasts of Aviation Trust Fund revenues and expenditures at least twice a year.
- Improve FAA's effectiveness and support implementation of FAA's strategic initiatives by leading the agency's continuous, end-to-end corporate planning and performance process for the agency to include transparent reporting of performance outcomes via web-based initiatives.

International Affairs

- Implement and further refine an integrated, data-informed approach to prioritize and make decisions about international activities and key relationships.
- Continue to transform our internal structure to use an integrated team approach to ensure open dialog and decision making for consistent, validated international activities.
- Place international resources strategically to improve safety, air traffic efficiency, and environmental sustainability across the globe.
- Ensure the safety of (A) U.S. passengers traveling abroad and (B) international flights arriving and departing the U.S.
- Ensure global interoperability of NextGen technologies and procedures by shaping international standards for efficiency.
- Ensure environmental sustainability as international aviation grows by reducing noise, threats to local air quality, and greenhouse gas emissions.

Environment and Energy

- Support activities to reduce aviation's environmental impacts, including reducing the number of people exposed to significant aircraft noise, health impacts associated with aviation emissions, and aviation's carbon dioxide (CO_2) emissions
- Support activities to improve aviation fuel efficiency and augment the use of sustainable aviation fuels
- Continue activities to support NextGen infrastructure and to lead FAA's Greening Initiative, which is key to FAA improving its sustainability performance in accordance with Executive Order 13514, as well as other environmental and energy related Federal laws, regulations, executive orders, and presidential memorandums.
- Implement policy for application of environmental analysis tools for screening and compliance needs
- Explore implications for potential revision of the threshold for community noise levels
- Implement FAA's revised National Environmental Policy Act (NEPA) implementation order 1050.F to ensure more efficient and effective implementation of NEPA. Includes training and guidance to representatives across LOBs/SOs to facilitate FAA-wide implementation.
- Develop and coordinate policies, methods and guidance materials necessary for implementing the aircraft noise and aircraft/engine certification regulations and compliance oversight, including expanded delegation authority.
- Coordinate tracking and reporting of FAA's environmental sustainability performance to assess compliance with Federal requirements.
- Review, refine and implement NextGen environmental policy.
- Support activities to achieve U.S. environmental and energy objectives at ICAO.
- Air traffic management modernization research drives reductions in environmental and energy impacts in the near- and medium-term.

The measures of program effectiveness for the agency are laid out in the FAA and DOT Strategic Plans, as well as in individual business plans for each organization. This office directly influences how agency goals, targets, and initiatives are set in each, and directly influences the agency's success in meeting them through our direct support in the specific program areas.

This office has been instrumental in the agency's success in five DOT goal areas – Safety, State of Good Repair, Livable Communities, Environmental Sustainability, and Organizational Excellence and is instrumental in many aspects of NextGen implementation. These include its work in policy, forecasting, metrics, environmental, and international collaboration. 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.

APL Targets – APL maintains three specific planning targets. These include:

- Noise Exposure: Reduce the number of people exposed to significant noise in terms of Day-Night Average Sound Level (DNL) of 65dB or greater around U.S. airports to less than 300,000 people in FY 2018.

- Aviation Fuel Efficiency: Improve National Airspace System (NAS) energy efficiency in terms of fuel burned per revenue ton miles flown by at least 1% annually.
- Sustainable Jet Fuels: One billion gallons of sustainable jet fuel is used by aviation, by 2018.

Additional indicators of our success include:

- Implementation of FAA's Sustainability Policy and Strategic Sustainability Performance Plan in collaboration with LOBs/SOs via the FAA Greening Initiative.
- Reported FAA's energy management performance to DOT.
- Working to update our Environmental Management Systems and NEPA policy and guidance to facilitate more efficient environmental analysis of NextGen actions.
- Completing and presenting the Annual Aviation Commercial and General Aviation Forecast.
- Contributing to a successful Commercial Aviation Alternative Fuels Initiative (CAAFI) international conference.
- Supporting the approval of additional jet fuels, working through the Commercial Aviation Alternative Fuels Initiative.
- Working with other federal agencies to develop and implement a National Alternative Jet Fuels R&D Strategy and Plan.
- Working within the ICAO CAEP to finalize development of a certification standard for aircraft CO_2 emissions.
- Working within ICAO and CAEP to develop a global market based measure for international aviation.
- Supporting expansion of particulate matter (PM) emissions measurement databases to inform an emissions threshold appropriate for standard-setting purposes.
- Working with other LOB/SO's to assess potential changes in policies regarding noise impacts from aircraft.
- Promulgation of aircraft noise regulations consistent with standards adopted by ICAO and the balanced approach to aircraft noise mitigation.
- Delivering cost-benefit analyses on FAA safety and operational rulemakings enabling the agency to meet its scheduled delivery dates to OST while supporting Congressional rulemaking mandates.
- Evolving FAA policies in coordination with the international community on financial and operational incentives for NextGen avionics equipage.
- Improving FAA's effectiveness and supporting implementation of the FAA's strategic initiatives by leading a streamlined and responsive corporate planning and performance management process for the agency.
- Implementing congestion management solutions for congested areas including the New York area.
- Leading agency efforts on reauthorization development and/or implementation.
- Providing policy outreach by representing the FAA within USG agencies on international aviation matters; coordinating aviation policies and priorities with international stakeholders to advance U.S. goals; and supporting USG participation at significant aviation events and activities.
- Developing international aviation leaders by working with USG agencies to identify and nominate international aviation candidates from national, regional and multilateral organizations for potential foreign aviation leadership programs, such as the International Visitor Program (IVLP) and Voluntary Visitor Program (VVP).
- Serving as the point of contact within the FAA for all ICAO related activities and the coordination point for all USG government related ICAO activities.
- Working in collaboration with the Global Leadership Initiative to support the data requirements necessary for the development and maintenance of an agency-wide international strategy.
- Promoting conformity with and acceptance of international aviation safety standards, and US regulatory policy as necessary, by participating in or coordinating safety oversight enhancing activities or projects.
- Promoting the adoption of NextGen/ICAO Aviation System Block Upgrade concepts, interoperable technologies, and procedures in collaboration with significant countries and/or organizations by participating in best practices activities.
- Promoting global sustainability outreach by participating in or coordinating appropriate environmental activities and forums.
- Providing aviation safety and efficiency assistance to the civil aviation authorities in Iraq and Afghanistan, through the Department of Transportation (DOT) Office of the Transportation Attaché (OTA).

- Encouraging ICAO Contracting States to develop and submit action plans to ICAO in support of the aspirational goal of 2 percent global fuel efficiency improvement per year.
- Working with other LOBs/SOs to implement environmentally efficient Air Traffic Management and operational procedures.

What Benefits will be provided to the American Public through this request?

The American Public benefits from FAA's global leadership with increases in global aviation safety, efficiency, environmental sustainability, exports, and leverage to achieve broader international objectives. U.S. citizens travelling abroad, and flights between the U.S. and other countries, benefit from increased safety due to FAA expertise and leadership in developing global regulations and standards. FAA programs promote seamless connectivity across borders for air navigation and product exchanges. Worldwide acceptance of U.S. policies and regulatory approaches removes barriers for the U.S. aerospace industry, a vital component of the U.S. economy. Nothing supports these benefits more than the fact that the global aviation system moves more than 7.7 million people and more than 130 thousand tons of cargo to their destinations every day. To achieve these benefits and ensure the safety, efficiency and sustainability of global aviation, APL collaborates across the FAA as well as our domestic and international partners to ensure the U.S. will continue to be the gold standard for aviation.

The aviation industry benefits because lower impacts reduce environmental constraints on aviation operation and growth. Improvements in fuel burn and energy efficiency improve emissions, including greenhouse gas emissions, reduce the economic burden imposed by high fuel costs, and contribute to U.S. energy conservation. Advancing sustainable alternative aviation fuels contributes to energy independence, which also benefits the public at large.

Work on critical safety rules directly contributes to aviation safety, which benefits the general public and the aviation industry. Economic analyses of investments helps ensure the best return to the taxpayers and flying public. The public and industry also benefit from APL's work to identify and resolve crosscutting policy issues affecting NextGen implementation. Helping the FAA make meaningful improvements in performing its safety and efficiency mission through a disciplined planning and performance management process benefits the flying public, the aerospace industry, and the economy at large.

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Human Resources Management (AHR)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2015 Enacted	**$100,000**	**557**	**31**	**533**
Adjustments to Base	**$1,281**			
Annualized FY 2015 Pay Raise 1.0% (.25)	$160			
FY 2016 Pay Raise (1.3%) (.75)	$620			
Additional Compensable Day	$274			
FERS Contribution	$227			
Other Changes	**$273**			
Working Capital Fund	$273			
Base Transfers	**-$348**	**1**		**1**
Aviation Education	$164	1		1
FAA Leadership and Learning Institute	-$512			
FY 2016 Request	**$101,206**	**$558**	**$31**	**$534**

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Detailed Justification for - Human Resource Management (AHR)

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Human Resource Management (AHR)
($000)

Program Activity	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015 – FY 2016
Human Resource Management	$103,490	$100,000	$101,206	+$1,206

The FY 2016 budget request of $101,206,000 and 534 FTEs will support the Office of Human Resource Management (AHR) program. This request provides for salaries, benefits, and estimated non-pay AHR activities including implementing and maintaining comprehensive policies, procedures, and systems necessary for managing the FAA's most important asset: its people.

The request includes an increase of $1,206,000 for FY 2016; an increase in the AHR Working Capital Fund by $273,000; a base transfer of 1 FTE for $164,000 to support the agency's Aviation and Space Education Outreach Program (AVSED); pay inflation adjustments of $1,281,000. Additionally included is a base transfer that addresses a financial adjustment of $512,000 to AFN/ARC for the FAA Leadership & Learning Institute (FLLI), formerly titled Center for Management and Executive Leadership (CMEL) from an FY 2014 appropriations base transfer.

The FAA workforce is the backbone of the agency's success in providing the safest, most productive aviation sector, and efficient aerospace system in the world. The AHR request covers daily work in providing human resource services to the nearly 44,000 FAA employees. We support five high priority objectives: hiring reform, human capital management, leadership development, employee engagement and labor management relations. AHR plans to continue the implementation of the current Administration's flagship personnel policy reform initiative. We continue to fund the strategic management of human capital, which helps FAA, ensure it has the skilled workforce needed to transform to NextGen. In FY 2016, 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 2016 will result in the following outcomes:

- Ensuring the agency continues to show incremental increases towards being ranked in the top 25 percent of places to work in the federal government sub-components by FY 2018. FAA ranked in the top 40 percent of sub-components in FY 2013, and saw a decrease in FY 2014 moving to the top 50 percent of agency sub-components.
- Streamlining hiring practices to achieve the performance target set by DOT in meeting OPM's 80-day hiring standard.
- Supporting safety organizations in hiring practices and processes. Continuing implementation and refinement of newly revised Air Traffic Controller hiring process from second quarter FY 2015.
- Implementation of President Obama's hiring reform agenda. Social networking tools will be used to identify, connect and recruit top talent. Our streamlined end-to-end hiring process will allow us to select high-quality candidates efficiently and quickly, and comply with OPM's 80-day hiring model.
- Continued support in FAA's transition to NextGen. Effecting this transition will involve a systematic approach to getting the right number of people with the right skills, experience and competencies in the right jobs at the right time. AHR evaluates and identifies changes to the qualification requirements for air traffic controllers in the emerging NextGen system.
- Increased leadership capability within FAA. The development of our executive leaders is grounded in creating a culture focused on developing talent, enhancing collaboration and innovation, and valuing

diversity and inclusion while stressing accountability. The Senior Leadership Development Program enhances the pipeline of highly qualified FAA senior leaders who can fill projected executive vacancies.
- Becoming an employer of choice. DOT and FAA consider improving the linkage of employee performance to strategic goals a critical step in improving employee satisfaction, reducing turnover and attracting a high performance workforce.
- Improved FAA's corporate labor-management relationships. AHR will provide advice and guidance to all FAA managers and labor relations practitioners about collaboration efforts and techniques as well as offer training that includes approaches to building trust, effective communications and interest-based problem-solving techniques.

What is this Program and Why is it Necessary?

The Office of Human Resources Management supports the DOT Strategic Plan goal of Organizational Excellence, specifically contributing toward initiatives that result in a diverse and collaborative DOT workforce outcome. The AHR budget request funds salaries and benefits, contractor support, and administrative activities to support staff located in FAA headquarters and 11 regional offices and centers throughout the United States. Further, the AHR budget provides partial funding for worker's compensation and fully funds the agency's unemployment compensation costs. We manage a complex network of policies, programs, and systems designed to address all issues related to people such as compensation, hiring, performance management, wellness, benefits, and professional development. Compensation alone requires skill in navigating the intricacies of 28 collective bargaining agreements.

Anticipated FY 2016 accomplishments include:

- Providing corporate agency guidance and consultation as necessary to monitor and assess agency Employee Engagement Action Plan implementation.
- Providing oversight for ongoing workforce planning and annual plan updates by providing workforce data, updated guidance/requirements, tools and consultation to Lines of Business and Staff Offices.
- Managing the operation and maintenance within FAA of personnel and payroll automated processing by the Federal Personnel and Payroll System, and expanding and enhancing the Selections within Faster Times automated suite to all mission-critical positions and those positions that cross organizational lines, i.e., finance, budget, human resources, and information technology.
- Providing day to day operational support and services to FAA managers on compensation, staffing, labor and employee relations, workers' compensation programs, employee assistance program, benefits, awards, training and human resources automation.
- Managing oversight and compliance of all bargaining with FAA unions. AHR will monitor and ensure compliance of all bargaining with FAA unions in accordance with FAA Order 3710.18, Internal Coordination Requirements for Negotiating Term and Mid-Term Agreements with FAA Unions, and the Federal Service Labor-Management Statute.
- Transition and manage the AVSED program which places greater emphasis on increasing the general public's knowledge of the dynamics of aviation and on the key role air transportation plays in improving the economic and social life of all Americans and to acquaint people with the full potential of finding careers in air transportation systems and general aviation.

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.
- Providing oversight and managing the outreach efforts of the new performance management program, Valuing Performance.
- Managing the relationships between FAA and its unions, representing the agency in all national and headquarters negotiations, unfair labor practices proceedings and arbitrations. Defining requirements, setting quality standards and monitoring the effectiveness of corporate talent development programs

and services, and addressing the professional and development needs of the full range of FAA employees.

- Fostering a workplace free of harassment and inappropriate behavior by investigating and adjudicating allegations of employee misconduct.
- Overseeing and managing automation systems regarding time collection, labor reporting, personnel and payroll for every agency employee while meeting all information systems security requirements.

Congress challenged FAA to meet the demanding productivity, service and efficiency expectations of the public and the aviation industry by designing and implementing independent human resources and acquisition systems. They later amended that authority to require FAA to follow the Federal Service Labor-Relations Statute with exception to impasse proceedings. FAA's Personnel Management System replaces 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. 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. Workforce planning for mission critical and key occupations will benefit FAA managers as they make staffing decisions to achieve program goals based on a rigorous analysis of their organization's work, workforce and expected technological advances. AHR will supply workforce demographics and employment data, facilitating the identification of issues such as growing retirement eligibility and anticipated turnover. AHR will provide tools for identifying competencies needed in the future and solution analyses on recruiting, reassigning, retaining and retraining employees. State-of-the-art recruitment and marketing programs will be implemented to attract high performing and highly qualified candidates. As a part of the vision to empower and innovate with the FAA's people, the FAA Administrator established the Workforce of the Future Strategic Initiative. While this is an agency-wide effort, this initiative's champion is the Assistant Administrator for Human Resource Management. Cross-agency sub-initiative teams have been established to lead the transformational change management needed to attract and retain talented employees, develop leaders, analyze gaps in the skills required to meet changing operational requirements and ensure training tools are in place to close any skills gaps in order to meet the industry demands of the future.

Significant progress has been made in FY 2015 for this initiative. In the area of leadership development, a core management curriculum for the FAA Leadership and Learning Institute has been developed and leadership courses have been redesigned. A collaborative team is working to develop criteria for FAA to use to ensure we have the employees with the right skills prepared to succeed in international assignments. Competencies for mission critical positions are being assessed to ensure we train and recruit employees with the right skills to do these jobs in the future The FAA is also implementing an engaging corporate approach to onboarding new hires to improve retention of talented employees in the future workforce.

Another challenge is building leadership capabilities 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 leaders is grounded in creating a culture of accountability and making FAA more effective. Development activities feature the new Forum for Executive Excellence and on-boarding activities, as well as participation in agency and government-wide executive seminars on topical issues and current events. The Senior Leadership Development Program (SLDP) is a powerful and prestigious developmental program that provides the FAA a systematic approach to executive level succession planning and development that balances agency-wide priorities with succession needs of participating Lines of Business (LOBs) and Staff Office (SOs). The program is specifically designed to enhance the quality of FAA senior leaders who, together with external candidates, could meet the projected executive level requirements identified through succession planning and establish a pipeline of highly qualified FAA senior leaders who can fill projected executive vacancies. Participants complete a structured development program consisting of mandatory core components and other developmental activities. These activities are responsive to individual career goals and objectives identified in the individual's development plan. Mandatory core components include: Structured assessment activities and multi-rater feedback, professional coaching, mentoring with an FAA executive advisor, developing a personal Individual Development Plan (IDP), attending program workshops designed to build proficiency in key competency areas, completing an external executive education course, completing 90 – 120 days of developmental assignments, and participating in three program workshops which are designed to build proficiency in key competency areas. Our Program for Emerging Leaders (PEL), offers high potential non-supervisory employees opportunities over an 18-month period for assessment, mentoring, formal online and classroom training, and developmental assignments. Building stronger leadership within the agency helps FAA achieve strategic goals and manage people and resources effectively while driving continuous improvement.

Becoming an employer of choice is a high priority objective for DOT and FAA. The Employee Engagement Steering Committee, spearheaded by AHR, is charged with implementing strategies to get employees excited about working for FAA and strengthening their commitment to the mission and shared values of the agency. AHR will update managerial and executive development and training to reflect emerging challenges and deliver activities designed to make the leadership team more visible to the workforce. Using the on-boarding process for new hires will build employees' affiliation, strengthen engagement and commitment to FAA, and accelerate the time-to-productivity for new hires. AHR will market the value of using work plans to supplement generic performance standards. This will provide additional opportunities to establish clear performance expectations, and give and receive feedback and offer developmental 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. AHR will provide advice and guidance to all FAA managers and labor relations practitioners about collaboration efforts and techniques as well as offer training that include approaches to building trust, effective communications and interest-based problem-solving techniques.

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

Funding at the requested level is critical to continue providing basic personnel services to all FAA employees. The non-pay costs within AHR's budget are include systems like CASTLE for time and attendance, AVIATOR for on-line job application and processing, learning management system, services like employee assistance and FAA's Accountability Board, and Agency worker's and unemployment compensation and are necessary for FAA's lines of business to be successful. Deeper reductions will affect the Agency's ability to hire personnel; most of the FAA's hiring efforts are within the ATO and AVS organizations. AHR will not be able to support as many recruiting events (e.g. virtual career fairs). This not only directly affects the FAA's ability to reach qualified candidates, but also to support DOT and FAA's goals of maintaining a diverse workforce including veterans and persons with targeted disabilities. As more federal employees become eligible to retire in FY 2016 and beyond, the competition for talent will increase. AHR must receive the requested funds to minimize the time-to-hire and maximize the ability to support our safety organization's workforce needs, on-boarding, labor relations, employee relations and the continual need for "normal" day-to-day personnel actions, employee engagement, labor relations and the FAA employee assistance program among many other key activities.

What Benefits Will Be Provided To The American Public Through This Request?

Every two years OPM reviews FAA's Interchange Agreement for compliance with a legally defensible and merit-based personnel system that maintains competitive status for all FAA employees. FAA was successful in FY 2014 in meeting this requirement, as tracked through the Human Resource Accountability System. Building on the success of the executive and senior leadership programs, AHR continues to expand FAA efforts to tap into the potential of our full performance, non-supervisory employees who seek managerial positions. Since its FY 2009 inception, the Program for Emerging Leaders (PEL) has seen 1,569 applicants and of those, 481 participants have received placement into nine PEL cohorts and 71 participants have received promotions to frontline managers. Additionally, over the past two years we have conducted a needs analysis and redesigned key managerial development courses, through the creation of the FLLI curriculum which focused specifically on the front/first line managers in the FAA. Results and trends of the employee Viewpoint survey indicate a steady and significant positive increase in the ratings of immediate supervisors which, in 2012 exceed the results when compared to the rest of the government.

Anticipating a retirement bubble and addressing competition for attracting a workforce with the leadership, technical, and functional skills, the FAA adopted the challenge of the Administration's end-to-end hiring initiative. Measuring hiring time remains a critical step in improving the efficiency in our hiring process. AHR has met the Department of Transportation's FY 2011 performance target of filling external hires within 120 days.

AHR is a significant contributor to the FAA's cost control efforts. Success of FAA's centralized approach to claims management resulted in Department-wide adoption of FAA services. During FY 2011, AHR migrated and began performing the case and program management responsibilities for all DOT operating administrations. In FY 2014, AHR achieved $7,945,962 ($7,033,745 on FAA claims and $912,217 for all other operating administrations) in estimated one-year cost avoidance for the DOT. Another significant indicator of AHR's contributions to departmental control efforts can be seen by comparing the DOT's percentage increases or decreases in workers' compensation costs to the government-wide average over a three-year period. From FY 2011 – FY 2014, the government-wide average in workers' compensation costs increased by 0.7 percent, while the DOT's decreased by 8.3 percent.

Aviation is a global industry and millions of Americans travel overseas every year. The FAA must continue America's heritage as world leaders in aviation and set the standard for others to measure against. The FAA needs to be at the table to shape international standards to improve aviation safety and efficiency around the world. Meeting this strategic challenge requires that the FAA harness the collective strength of the agency's employees. The FAA's people are the ultimate drivers of success, FAA must build an infrastructure that can efficiently and effectively identify workforce skills needs, recruit talent, and provide employees with the training to develop these skills. The workforce is changing and is in the midst of a retirement wave, which presents both challenges and opportunities. There is significant work to do to set the foundation to Empower and Innovate with FAA's people.

Explanation of Funding Changes

	Dollars ($000)	FTE
Staff Offices	**$2,576**	**1**
Overview: For FY 2016, the Staff Offices Assistant Administrators request $206,751,000 and 1,077 FTE to meet their respective missions. The FY 2016 request level reflects adjustments to base, other changes and base transfers.		
Adjustments to Base	**$2,804**	**-**
Annualized FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	345	
FY 2016 Raise: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	1,359	
Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	593	
FERS Contribution: OMB Circular A-11 has increased the agency's contribution rates to the Federal Employees Retirement System (FERS). This increase in cost to the FAA represents the increased rates for both Air Traffic Controllers and other agency employees.	507	
Other Changes	**$120**	**-**
Working Capital Fund: This cost adjustment is requested to support the Department of Transportation's (DOT) Working Capital Fund (WCF) profile. These adjustments are being made to best align each office's resources within their expected WCF costs.	120	
Base Transfers	**-$348**	**1**
Aviation Education (AFN to AHR): This request transfers funding and 1 FTP/FTE from the Office of Finance and Management to the Office of Human Resources (AHR) in support of the Aviation and Space Education Outreach Program (AVSED). The AVSED program was identified as one that that would be strengthened by the transfer to AHR under its Office of Talent Development (AHD).	164	1
FAA Leadership & Learning Institute (AHR to AFN): Formerly titled Center for Management and Executive Leadership (CMEL), this adjustment transfers funding from the Office of Human Resources (AHR) to the Office of Finance and Management. This funding adjustment is associated with the FY2014 base transfer, which transferred responsibility of the Center for Management and Executive Leadership (CMEL) from AFN to AHR, approved by Congress in the FY 2014 appropriations process.	-512	

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3B. FACILITIES & EQUIPMENT

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, $2,855,000,000, of which $636,049,000 shall remain available until September 30, 2016, and $2,218,951,000 shall remain available until September 30, 2018: 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 2017 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 2017 through 2021, with total funding for each year of the plan constrained to the funding targets for those years as estimated and approved by the Office of Management and Budget.

Program and Financing
(in millions of dollars)

Identification code: 69-8107-0-7-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Obligations by program activity:			
	Direct program:			
0001	Engineering, development, test and evaluation	313	362	206
0002	Procurement and modernization of (ATC) facilities and equipment	1,311	1,428	1,664
0003	Procurement and modernization of non-ATC facilities and equipment	159	159	175
0004	Mission support	213	198	226
0005	Personnel and related expenses	449	460	470
0006	Hurricane Sandy	9	6	. . . . .
0007	Sustain ADS-B Services and WAAS GEOs	. . . . .	. . . . .	166
0100	Subtotal, direct program	2,454	2,613	2,907
0799	Total Direct obligations	2,454	2,613	2,907
0801	Reimbursable program	73	72	71
0900	Total new obligations	2,527	2,685	2,978
	Budgetary resources available for obligation:			
1000	Unobligated balance brought forward, Oct 1	1,090	1,254	1,221
1021	Recoveries of prior year unpaid obligations	35	. . . . .	. . . . .
1050	Unobligated balance	1,125	1,254	1,221
	New budget authority (gross), detail:			
	Discretionary:			
1101	Appropriation (special or trust fund)	2,600	2,600	2,855
1160	Appropriation, discretionary (total)	2,600	2,600	2,855
	Spending authority from offsetting collections:			
1700	Collected	82	52	52
1701	Change in uncollected payment, Federal sources	-20	. . . . .	. . . . .
1750	Spending auth from offsetting collections, disc (total)	62	52	52
1900	Budget authority (total)	2,662	2,652	2,907
1930	Total budgetary resources available	3,787	3,906	4,128
	Memorandum (non –add) entries:			
1940	Unobligated balance expiring	-6	. . . . .	. . . . .
1941	Unexpired Unobligated balance, end of year	1,254	1,221	1,150
1950	Other balances withdrawn and returned to unappropriated receipts	29	. . . . .	. . . . .
1951	Unobligated balance expiring	6	. . . . .	. . . . .
1952	Expired Unobligated balance, start of year	78	67	78
1953	Expired Unobligated balance, end of year	61	78	78
1954	Unobligated balance canceling	29	. . . . .	. . . . .
	Change in obligated balances:			
3000	Unpaid obligations, brought forward, Oct 1	1,862	1,534	1,506
3010	Obligations incurred, unexpired accounts	2,527	2,685	2,978
3011	Obligations incurred, expired accounts	8	. . . . .	. . . . .
3020	Outlays (gross)	-2,807	-2,713	-2,879
3040	Recoveries of prior year unpaid obligations, unexpired	-35	. . . . .	. . . . .
3041	Recoveries of prior year unpaid obligations, expired	-21	. . . . .	. . . . .
3050	Unpaid obligations, end of year	1,534	1,506	1,605
3060	Uncollected pymts, Fed sources, brought forward, Oct 1	-87	-59	-59
3070	Change in uncollected pymts, Fed sources, unexpired	20	. . . . .	. . . . .
3071	Change in uncollected pymts, Fed sources, expired	8	. . . . .	. . . . .
3090	Uncollected pymts, Fed sources, end of year	-59	-59	-59
3100	Obligated balance, start of year	1,775	1,475	1,447
3200	Obligated balance, end of year	1,475	1,447	1,546
	Budget Authority and outlays, net:			

Identification code: 69-8107-0-7-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
4000	Budget authority, gross	2,662	2,652	2,907
4010	Outlays from new discretionary authority	999	1,141	1,322
4011	Outlays from discretionary balances	1,808	1,572	1,557
4020	Outlays, gross (total)	2,807	2,713	2,879
	Offsets:			
	Against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-40	-16	-16
4033	Non-Federal sources	-49	-36	-36
4040	Offsets against gross budget authority and outlays (total)	-89	-52	-52
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pymts, Fed sources, unexpired	20	.....	.....
4052	Offsetting collections credited to expired accounts	7	.....	.....
4060	Additional offsets against budget authority only (total)	27	.....	.....
4070	Budget authority, net (discretionary)	2,600	2,600	2,855
4080	Outlay, net (discretionary)	2,718	2,661	2,827
4180	Budget authority, net (total)	2,600	2,600	2,855
4190	Outlay, net (total)	2,718	2,661	2,827

Memorandum (non-add) entries:

5090	Unavailable balance, SOY: Offsetting collections	3	3	3
5092	Unavailable balance, EOY: Offsetting collections	3	3	3

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 the Department of Transportation, the National Aeronautics and Space Administration, and the Departments of Defense, Homeland Security, and Commerce to improve the safety, capacity, security, and environmental performance of the NAS. The funding request supports the Federal Aviation Administration'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 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Direct obligations:			
	Personnel compensation:			
11.1	Full-time permanent	296	307	311
11.3	Other than full-time permanent	1	1	1
11.5	Other personnel compensation	10	8	8
11.9	Total personnel compensation	307	316	320
12.1	Civilian personnel benefits	86	93	96
13.0	Benefits for former personnel	1	.....	.....
21.0	Travel and transportation of persons	39	37	39
22.0	Transportation of things	2	2	2
23.2	Rental payments to others	39	44	32
23.3	Communications, utilities, and miscellaneous charges	41	41	42
25.1	Advisory and assistance services	1,352	1,367	1,722
25.2	Other services from non-federal sources	112	110	113
25.3	Other goods and services from federal sources	26	53	54
25.4	Operation and maintenance of facilities	84	97	77
25.5	Research and development contracts	3	13	3

Identification code: 69-8107-0-7-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
25.6	Medical care	. . . . .	1	. . . . .
25.7	Operation and maintenance of equipments	66	74	64
26.0	Supplies and materials	28	28	20
31.0	Equipment	158	207	204
32.0	Land and structures	100	123	112
41.0	Grants, subsidies, and contributions	7	7	7
43.0	Interest and dividends	3	. . . . .	. . . . .
99.0	Direct obligations	2,454	2,613	2,907
99.0	Reimbursable obligations	73	72	71
99.9	Total new obligations	2,527	2,685	2,978

Employment Summary

Identification code: 69-8107-0-7-402	FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
1001 Direct civilian full-time equivalent employment	2,598	2,733	2,733
2001 Reimbursable civilian full-time equivalent employment	68	62	62

EXHIBIT III-1

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

	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request	Change FY 2015-2016
Engineering, Development, Test and Evaluation	347,195	177,937	151,050	-26,887
Air Traffic Control Facilities and Equipment	1,437,390	1,577,983	1,671,201	93,218
Non-Air Traffic Control Facilities and Equipment	146,800	158,280	171,000	12,720
Facilities and Equipment Mission Support	218,365	225,800	225,700	-100
Personnel and Related Expenses	450,250	460,000	470,049	10,049
Sustain ADS-B Services and WAAS GEOs			166,000	166,000
Total	2,600,000	2,600,000	2,855,000	255,000
FTEs				
Direct	2,598	2,733	2,733	0
Reimbursable	68	62	62	0

Program and Performance Statement

This account provides funds for programs that improve operational efficiency, constrain costs, modernize automation and communication technology and systems, and deal with aging facilities. Particular emphasis is placed on en route and terminal air traffic control, satellite navigation and landing systems, and communications.

Funding is organized within the following activity areas of FAA:

Activity 1: Engineering, Development, Test and Evaluation;

Activity 2: Procurement and Modernization of Air Traffic Control Facilities and Equipment;

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

Activity 4: Facilities and Equipment Mission Support; and

Activity 5: Personnel and Related Expenses.

Activity 6: ADS-B Services and WAAS GEOs

EXHIBIT III-1a

FACILITIES and EQUIPMENT
SUMMARY ANALYSIS OF CHANGE FROM FY 2015 TO FY 2016
Appropriations, Obligations Limitations, and Exempt Obligations
($000)

Item	Change from FY 2015 to FY 2016 ($000)	Change from FY 2015 to FY 2016 (FTE)
FY 2015 Base	**$2,600,000**	**2,733**
Administrative Adjustments to Base:		
Annualization of FY 2015 FTE		
Annualization of FY 2015 Pay Raise	875	
FY 2016 Pay Raise	3,688	
One Additional Compensable Day	1,595	
FERS Increase	1,357	
Working Capital Fund	13	
Non-Pay Inflation	21,917	
Subtotal, Adjustments to Base	**$29,445**	**0**
Program Reductions:		
Engineering, Development, Test and Evaluation	-28,666	
Air Traffic Control Facilities and Equipment		
Non-Air Traffic Control Facilities and Equipment		
Facilities and Equipment Mission Support	-2,358	
Personnel and Related Expenses		
Subtotal Program Reductions	**-$31,024**	**0**
New and Expanded Programs:		
Engineering, Development, Test and Evaluation		
Air Traffic Control Facilities and Equipment	77,438	
Non-Air Traffic Control Facilities and Equipment	11,137	
Facilities and Equipment Mission Support		
Personnel and Related Expenses	2,004	
ADS-B Services and WAAS GEOs	166,000	
Subtotal New or Expanded Programs	**$256,579**	**0**
FY 2016 Request	**$2,855,000**	**2,733**

Executive Summary – Facilities and Equipment (F&E), Activity 1

What is the Request and What Funds are Currently Spent on the Program?

As NextGen has progressed over the last several years, more programs have transitioned into the implementation phase. NextGen's concept development and pre-implementation work builds off of the programs in the implementation phase and the pre-implementation activities align very closely with the intended end products. FAA is focusing these FY 2016 portfolio resources in a manner consistent with NextGen Advisory Committee (NAC) recommendations for prioritizing NextGen activities.

The Facilities and Equipment (F&E) Activity 1 program requests $151,050,000 for FY 2016, a decrease of $26,887,000 (15.1 percent) below our enacted FY 2015 level. Of the $151,050,000 requested for FY 2016, $97,500,000 is requested to continue multiple basic and applied research efforts in support of future Next Generation Air Transportation System (NextGen) technologies and concepts. Included as a component of the NextGen applied research efforts are funds for the NextGen Integration and Evaluation Capability Laboratory and the Florida Testbed which are physically located at the William J. Hughes Technical Center (WJHTC) at Atlantic City, New Jersey and at the airport in Dayton, FL respectively. The remaining $53,550,000 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 WJHTC.

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

- Funding will continue development and implementation of Precision Based Navigation (PBN) procedures, while ensuring safety
- The FY 2016 request will support Optimization of Airspace and Procedures in the Metroplex (OAPM) design work and completion of the pre-implementation evaluation activity at the South/Central Florida Metroplex location
- FAA will complete an investment analysis for Tower Flight Data Manager (TFDM), which is a key ground infrastructure program for NextGen operations in the areas of flight planning; push back, taxi and departure; descent and approach; and landing, taxi and arrival
- Identification and maturation of Unmanned Airspace System (UAS) needs as they relate to Air Traffic systems and services; FAA will address operational requirements and establish procedures and policies to support the integration of UAS in the National Airspace System (NAS)
- Development of new agency level metrics to enhance management awareness of, and response to, system performance.
- Major Airspace Redesign will continue to serve as one of the FAA's primary efforts to modernize the Nation's airspace.

What Is This Program And Why Is It Necessary?

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 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.

Activity 1 programs are undertaken 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. This means defining operational requirements are defined and completing system engineering. Activity 1 also includes maintenance and upgrades of the laboratories and other infrastructure at the FAA Technical Center. Investment in these programs is made with the ultimate goal of modernizing and sustaining the NAS.

Some of the basic and applied research performed under Activity 1 includes:

- Technology research to prevent future runway incursions
- Airspace analysis for complementing F&E programs
- Various development projects needed to transition to the next level of F&E development
- Pre-implementation studies, requirements documentation, and initial investment analysis

These efforts contribute to the following DOT Strategic Goals:

- Safety: Reduction in transportation related injuries and fatalities
- Economic Competitiveness: Maximum economic returns on transportation policies and investments
- Organizational Excellence: Diverse and collaborative DOT workforce

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

Activity 1 is comprised mainly of NextGen pre-implementation activites to support the investments that will ultimately result in the implementation of NextGen deliverables and services in the NAS. The remaining Activity 1 programs provide the supporting structure for researching, testing, and evaluating all systems that will be deployed or that require modifications in the NAS.

What Benefits Will Be Provided To The American Public Through This Request?

The objective of performing these activities is to support capital investment decision–making. Based on private sector and federal procurement best practices, FAA has learned that performing these activities helps to 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).

Efforts under Activity 1 show positive outcomes as individual projects reach maturity and are transferred to Activities 2 through 4 in the F&E Budget. Systems are fielded as a result of efforts at the Tech Center, and programs are slated for cancellation as a result of analysis during the pre-acquisition and research work.

Detailed Justification for - 1A01 Advanced Technology Development and Prototyping

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Advanced Technology Development and Prototyping
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Advanced Technology Development and Prototyping	$32,000	$29,900	$21,300	-$8,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Runway Incursion Reduction Program (RIRP)	---	$1,000.0
B. System Capacity, Planning and Improvements	---	3,000.0
C. Operations Concept Validation and Infrastructure Evolution	---	4,000.0
D. Major Airspace Redesign	---	2,500.0
E. Strategy and Evaluation	---	1,000.0
F. Dynamic Capital Planning	---	2,500.0
G. Unified Contracting System (UCS)	---	4,600.0
H. Operational Analysis and Reporting System (OARS)	---	1,000.0
I. Operations Network (OPSNET) Replacement	---	1,000.0
J. In Service Engineering	---	700.0
Total	Various	$21,300.0

For FY 2016, a total of $21,300,000 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 requirements associated with the evolving air traffic system architecture and improvements in airport safety and capacity.

What Is This Program And Why Is It Necessary?

A. Runway Incursion Reduction Program (RIRP)

The RIRP conducts research, development, and operational evaluation of technologies to increase runway safety. Consistent with standing National Transportation Safety Board (NTSB) recommendations and initiatives, research emphasis will remain on technologies that provide for direct safety indications and alerts to pilots and air-crews at large airports as well as those that can be applied cost effectively at small to medium-sized airports.

The program will test alternative airport surface detection technology and the application of these technologies for pilot, controller, and vehicle operator situational awareness tools. Current initiatives include removal of the existing Low Cost Ground Surveillance (LCGS) Pilot sites, Runway Safety Assessment (RSA) studies and evaluation of the Small Airport Surveillance Sensor (SASS). When appropriate, investment analyses will be performed to support acquisition and implementation of selected solutions.

Runway Incursions (RI) are a leading safety concern of the FAA and this program helps to identify solutions that can aid in preventing them. The RIRP will pursue a strategy of "right site, right size" to identify candidate technologies that are best suited to a variety of airports in order to address the specific types of RI causal factors encountered at that site, e.g. converging runways, ground vehicle operations, taxiway/runway hotspots, wildlife, etc.

Currently, the equipment removal and site restoration of the Low Cost Ground Surveillance (LCGS) prototype sites are funded under RIRP at the following LCGS sites: Spokane, Washington; Reno, Nevada; Long Beach, California; Manchester, New Hampshire; and San Jose, California. Additionally, the Small Airport Surveillance Sensor (SASS) prototype is being evaluated at Hanscom Field, Massachusetts.

The RIRP is focused on the prototyping and operational evaluation of emerging technologies designed to reduce the risk of runway incursions, thereby allowing the FAA to reduce risks associated with the acquisition of these new technologies into the NAS and allowing the FAA to continue to meet the goal of maintaining the rate of runway incursions at or below 20 per 1,000 events through FY 2018.

B. System Capacity, Planning, and Improvements

The System Capacity, Planning, and Improvements program provides data and analyses on NAS operations to FAA executives and managers to help them identify deficiencies and develop proposals to improve NAS performance. This program also sponsors NAS performance 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. It has the added capability of using its performance measurement systems and operations research to quantify the efficiency of the NAS and form the basis of proposals for overall system improvements. This work includes:

- Airport modeling and analysis using Performance Data Analysis and Reporting System (PDARS) which compiles actual data collected from Air Traffic Control (ATC) systems in the field to determine the value of potential improvements in airspace or airfield modifications. PDARS is a fully integrated performance measurement tool designed to help the FAA improve the NAS by tracking the daily operations of the ATC system and their environmental impacts. System capability upgrades will include enhanced consolidated gate-to-gate measurement and analysis capability. PDARS also provides operational data to baseline the measurement and analysis of NextGen capability improvements.
- Development of new agency level metrics to enhance management awareness of, and response to, system performance.
- The benchmarking of ATO performance with other Air Navigation Service Provider (ANSP) to support joint projects done as part of ICAO, Civil Air Navigation Services Organization (CANSO) or Aerospace Transportation Advisory Group (ATAG) work plans. These efforts are performed to respond to inquiries on global flight efficiency performance targets for Air Traffic Management (ATM) or more general inquiries on the overall flight inefficiency that may be attributed to ATM.
- This program enables collaboration with international organizations to produce ICAO and CANSO documents on recommended practices for measuring operational performance; delivery of annual operational performance benchmark reports with EUROCONTROL under Annex 2, and delivery of joint operational performance analysis with EUROCONTROL under Annex 2.
- Analyze capacity and performance improvements over the North Atlantic as the FAA chair of the ICAO North Atlantic Economic and Financial Group.

The FAA extensively uses the data it acquires from this Program to satisfy external reporting requirements and to develop new metrics to enhance management awareness of, and response to, system performance. This program is also used to provide quick response data and analysis to support Safety Event Responses including Aircraft accidents, incidents, and hotline action items. This program provides critical data and analysis capabilities that support the determination of causal factors and mitigation actions. Additionally this program provides data and analysis to support the decision making process for implementing new rules, requirements, and procedures. The data is further used to support Safety Risk Management Documentation.

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. This program supports the Optimization of Airspace and Procedures in the Metroplex as the PDARS system is critical to baselining, development, and post implementation analysis. In addition, the data provided by PDARS is used extensively in the associated Environmental Assessments.

This program is necessary to provide the data and analytical capabilities required to complete cost benefit analysis and determine NextGen Operational Improvements made in the NAS. The legacy PDARS system is nearing the end of the life cycle, and there is a requirement to update the system under a new contract because the current system is not sustainable.

C. Operations Concept Validation and Infrastructure Evolution

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:

- Concept/Scenario Development
- Concept Validation
- Simulation and Analysis
- System Design
- Methods and Metric Development
- Technical Analysis
- Requirements Development

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. Also, this project tests the assumptions behind common situational awareness and distributed information processing.

Operations Concept Validation and Infrastructure Evolution also contribute to the FAA's support for the RTCA, a non-profit association that develops standards based on manufactures, government, and aviation operator inputs. RTCA also recommends operational improvements to increase the efficiency of air transportation.

D. Major Airspace Redesign

This program supports increased efficiency by funding the physical changes in facilities necessary to accommodate airspace redesign. Redesign projects will take on increased emphasis at both the national and regional levels to ensure that FAA is able to effectively manage the projected growth in demand at FAA facilities and airports.

Implementation of airspace redesign efforts frequently results in changes in the number and shape of operational positions or sectors, including changes to sector, area or facility boundaries. Transition to a new configuration after airspace redesign is implemented requires changes in the supporting infrastructure. These infrastructure changes can include communication modifications such as changes in frequencies, connectivity of radio site to the control facility, controller-to-controller connectivity; surveillance infrastructure modifications to ensure proper radar coverage; automation modifications to the ERAM data processing or flight data processing; inter-facility transmission modifications; additional consoles and communications backup needs; and modifications to the facility power and cabling.

Airspace Redesign is the FAA initiative that ensures all airspace related efficiency benefits facilitated by the Major Airspace Program, facility changes and automation improvements are achieved. Major Airspace Redesign serves as one of the FAA's primary efforts to modernize the Nation's airspace. The purpose of this national initiative is to review, redesign and restructure airspace. Modernization of airspace through the Major Airspace Redesign Program 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 associated with the New York Metropolitan area. F&E funding is planned for New York area redesign national integration efforts of the program office. Sector or route changes cannot be implemented without this program and without those sector or route changes, the airspace will remain inefficient. The Major Airspace Redesign Program will continue to provide engineering, analytical and technical support to this major airspace redesign effort.

E. Strategy and Evaluation

The Strategy and Evaluation Program develops fast-time simulation models of the National Airspace System (NAS). Several of the existing models are obsolete and cannot support the analysis of advanced Air Traffic Management (ATM) concepts.

The Strategy and Evaluation Program will continue the development and maintenance of the two fast-time simulation models, System Wide Analytical Capability (SWAC) and Airfield Delay Simulation Model (ADSIM+) which support FAA cost-benefit analyses and trade-off studies. These models are used by the Offices of Systems Analysis and Modeling, Investment Planning and Analysis, Performance Analysis and Strategy, Advanced Concepts and Technology Development, and FAA contractors to analyze the impacts of investments, operational changes, and changing demand on the performance of the National Airspace System (NAS). Customers of these analyses include, but are not limited to, the Offices of NAS Lifecycle Integration; NextGen Performance and Outreach; Office of Airports; Systems Engineering; Office of Aviation Policy, International Affairs, and Environment; Air Traffic Organization-Program Management Office (PMO); and the Office of the Administrator.

At the enterprise-level (representing the entire air transportation system), a system-wide model is being developed to replace the existing 1980s-era model. This 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. An initial version of this model, known as SWAC, has been delivered to the FAA and its capabilities and functionalities continue to be enhanced to aid investment decision making. The SWAC tool continues to be used to support various benefit projection and analyses for the entire NextGen modernization, and specific programs in the NextGen Organization, the FAA's Program Management Office (PMO), Office of Performance Analysis, Office of Investment Planning and Analysis, and Office of Environmental and Energy.

To effectively perform analyses at specific airport locations, a new airport capacity model, known as ADSIM+, is being developed for use in analyzing new airport capacity-related projects. This model will facilitate rapid analysis of airport improvements, demand changes, and ATM technology insertions. In addition to being used by the Office of Systems Analysis and Modeling, the model will be used by the Office of Performance Analysis for runway capacity studies, the Office of Investment Planning and Analysis for investment analyses, and the FAA's Office of Airports. The model will also be used by aviation consultants and the academic community, and provide a de facto standard for airport capacity analyses.

High-level improvements to the NAS have been proposed, with some initiatives already progressing through testing and evaluation, as reflected in the NextGen Concept of Operations and NextGen Segment Implementation Plan (NSIP). These are complex and expensive improvements to the NAS (for both the Federal Government and airspace operators). However, the FAA currently lacks capable tools to effectively evaluate these proposed ATM and airport infrastructure enhancements at the NAS-wide (i.e., enterprise) level as well as at specific airport locations.

At the NAS-wide level, FAA lacks tools to evaluate the system-wide impacts of improved traffic flow management, surface management, Trajectory-Based Flow Management (TBFM), and the overall effectiveness of NextGen modernization initiatives.

In addition, various airport improvement initiatives have been progressing in the NAS, in conjunction with implementation of various NextGen capabilities. Thus, a change in a location in the NAS is likely to result in an impact to other NAS locations. However, none of the current models has the ability to analyze the complex interactions, interdependencies, and impacts of multiple proximate airports. The new airport capacity model being developed under this program will address this shortfall.

Together, these tools will support FAA senior leadership in making timely, effective, and informed decisions regarding investments, resource allocation, and rulemaking, and help to justify these decisions to internal and external stakeholders.

F. Dynamic Capital Planning

The Dynamic Capital Planning tools and support will allow FAA to make optimal decisions based on best business practices. These tools and support will provide verification that disciplined management of capital programs continues to be carried out.

The project will allow the initial procurement of financial analysis tools and support to allow a better evaluation of programs through all phases of the acquisition life cycle. Focus areas that will be supported include: 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; support for capital portfolio management and other oversight functions such as EVM, and post implementation analysis for corporate lessons learned results.

G. Unified Contracting System (UCS)

The Unified Contracting System (UCS) will provide full contract lifecycle capabilities by automating contract formulation and execution (pre-award planning, solicitation, negotiation, award, administration and closeouts). UCS will provide validated and timely procurement data, electronic storage and retrieval of contractual documents, and management information reports. Fully operational UCS will automate all FAA procurements in accordance with the Acquisition Management System (AMS) and guidance in the FAA Acquisition Support Tool (FAST) and provide an end-to-end electronic contracting system to produce, route, manage, store, and retrieve the roughly 50,000 contractual documents that are produced yearly by the FAA.

UCS will provide an integrated and automated procurement process in place of the largely manual processes. The UCS application will greatly improve the sharing of procurement and contract information through its integration with the document management, email system, other FAA legacy and external systems. UCS will facilitate alignment with agency business goals and enforce enterprise standards and processes to minimize costs.

UCS will also enable users and management access to reporting on status, allocation of effort, task durations, and other user and management measurements. UCS will be built upon a foundation consisting of AMS, the ATO's Business Process Management Suite (BPMS) standard, the FAA's enterprise document management tool (Documentum) or other FAA-approved document management system.

The UCS program is being implemented in several modules. In FY 2013, the FAA's first official electronic document storage system (eDocS) for contracts was deployed. In FY 2014 the UCS Program is planning the deployment of the Purchase Card Processing System 2nd Generation and will initiate the development of two other modules (Contract Writing and the Automation of Procurement Processes (APP) version 1.

By replacing manual, paper-based methods and document storage, UCS will improve FAA's ability to effectively support the volume and complexity of upcoming FAA procurements, particularly for NextGen and continuing NAS sustainment. The primary quantitative benefit is the replacement of the FAA's current contracting system, PRISM, which has high operations and maintenance costs. It is estimated the UCS will be able to replace PRISM by the beginning of FY 2016. Operating costs for UCS are estimated to be over $2 million per year less than the operating costs for PRISM, while adding additional functionality and process efficiencies. In addition, automating the FAA's contracting system will ensure proper transaction approval, complete and viable records retention and effective reconciliation of financial information, thus allowing FAA to increase purchase card usage which has historically been a goal the FAA shied away from due to the lack of oversight within the current system.

H. Operational Analysis and Reporting System (OARS)

The OARS is an enterprise portal that provides one-stop access to data and applications for safety analysis to support ATO's Proactive Safety Management and the SMS. OARS improves collection and analysis in order to provide immediate safety information (Hazards, Mitigations, Performance monitoring, etc.), based on current data, for a wide range of users, which will increase the safety of NAS operations. ATO collects and analyzes safety data to make data-driven decisions in order to assess safety risk, identify mitigations and provide performance monitoring. OARS is accessed through an integrated enterprise portal for safety data distribution, fusion from multiple locations, and warehousing.

The OARS program will automate/integrate safety risk analysis processes in order to increase capacity, efficiency and effectiveness, provide an integrated platform to facilitate technology transfer of existing analytics and prototypes and improve consistency and accessibility of data and tools used for safety analyses. OARS will provide improved quality control and life-cycle maintenance through consolidation and reengineering of existing toolsets, a proactive and continuous (24/7) approach to risk: analysis, assessment, treatment and assurance, a deeper understanding of existing hazards and controls, as well as their interdependencies. This is critical as we continue to implement changes to NAS processes and systems (e.g. NextGen) in order to maintain the safety of the NAS.

The FAA's efforts to implement the transformational shift towards a risk-based safety management system produced a significant increase in the FAA's capability to capture safety events that may prove hazardous to the NAS. However, the FAA's capabilities to analyze and provide mitigating recommendations to the captured safety events have not been developed and enhanced at the same pace.

Due to the vast amount of unintegrated operational data and the limited capacity of available analytical tools, safety practitioners spend excessive time collecting data, manually extracting data from multiple systems, and manually redistributing data to multiple systems. In addition, the current suite of automated tools is not life-cycle sustainable and is difficult to enhance. Since daily safety information (reports, dashboards, analytics, etc.) based on current data is not available to safety practitioners and operational personnel, the time required to identify/address safety risks and operational trends, refine mitigation strategies, and provide meaningful safety assurance is increased. As a result of these factors all safety events cannot be analyzed efficiently and effectively.

I. Operations Network (OPSNET) Replacement

This program was formerly known as Traffic Activity and Delay System (TADS). Reliability of current performance reports to the DOT and public has been questioned by the DOT Inspector General for a number of reasons. The legacy system is constrained by dependency on obsolete data definitions, inaccurate and inconsistent data entries compiled manually by Air Traffic Controllers (ATCs), higher operational demands on ATCs relative to administering performance reports, and difficulties of compiling and cross-correlating data from multiple sources in preparing and submitting reports. Improvements are needed to determine how traffic counts and delays should be defined and collected at the point of origin. OPSNET will re-define "delay" so that it will reflect greater detail and will shift from manual data entry and compilation methods used today to automated receipt of operational data from FAA automation systems.

These improvements and the increased accuracy in reporting will enable the FAA and airlines to improve air traffic operation services and procedures. In parallel with improving the data definitions for use in measuring NAS performance, coordination will occur with the international community to standardize the definition and granularity of metrics needed in reporting. Provisioning of more accurate metrics for reporting will enable improved benchmarking, which in turn will allow more accurate comparisons of NAS performance relative to the incremental improvements introduced in the future by NextGen and NAS performance relative to international performance.

Redefinition of airline operations flight delay and count data together with the automated collection and reporting of that data will not only leverage NextGen automation enhancements being implemented every day but will achieve the dual objectives of improving FAA reporting to DOT and the public and will improve consistency with reporting to the international community.

OPSNET efforts are underway to complete the production of a required shortfall analysis document by summer 2014. The shortfalls document will partially fulfill the requirements for the initial service analysis phase of the acquisition process. Funding for FY 2016 will enable OPSNET to begin developing the Concept of Operations (ConOps) and Requirements document. These are key documents that will enable subsequent development after 2016.

J. In Service Engineering

In-service engineering allows for immediate response to emerging technology solutions. Funding is requested for ongoing engineering support of all prototyping efforts.

DOT Strategic Goals – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$21,300,000 is required to continue all activities within the ATDP budget line item. The requested funding will assist in maintaining important program milestones that have been established and will help in the progression of precursor programs and efforts that study technical outcomes in the various prototype areas.

What Benefits Will Be Provided To The American Public Through This Request?

A. Runway Incursion Reduction Program (RIRP)

The RIRP supports achievement of the next level of safety; through reduction of Aviation risk, through all phases of flight (gate-to-gate), reduction in the general aviation fatal accident rate, and ensuring that there are no fatal accidents on certificated airports.

The demonstration, evaluation and transition of mature runway safety technologies such as Runway Status Lights have been proven to reduce the incidence of high-hazard (Category A/B) runway incursions and ultimately reduce the risk of a runway collision at deployed airports. Early development, testing and maturation of such viable technologies by the RIRP results in the expedient delivery of runway safety benefits, which contributes to safer aviation from gate-to-gate.

The RIRP will continue its mission to develop these safety technologies that can then be applied at not just large airports, but also small-to-medium sized airports with commercial service throughout the NAS that have seen a recent uptick in the rate of runway incursions. This critical role played by the RIRP contributes to making aviation safer for the American public by reducing the risk of runway incursions at this next tier of airports in addition to the larger, primary airports within the NAS.

With the anticipated reduction in funding for FY 2016, the RIRP will not be able to support further development and field evaluation of the Small Airport Surveillance Sensor (SASS) that is currently funded by RIRP, nor initiate field testing of other new runway safety and surveillance technologies currently being assessed by the RIRP for evaluation in FY 2016. This reduction in funding could also jeopardize the successful removal and restoration of the five existing Low Cost Ground Surveillance (LCGS) pilot sites that has been mandated by the FAA JRC for completion by FY 2016.

B. System Capacity, Planning, and Improvements

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, are critical for analyzing surface operations and baselining NAS performance. PDARS is a well-accepted tool used at all major ATC facilities.

As a result of the data and analysis resulting from this program the FAA has satisfied and improved external reporting. New metrics developed and reliant on this program have facilitated management awareness and response to system performance. The end result is improved efficiency and capacity, leading to a better experience for the flying public.

C. Operations Concept Validation and Infrastructure Evolution

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 and worthy of additional funding.

D. Major Airspace Redesign

The airspace redesign projects are projected to deliver benefits realized through the reduction of restrictions, shorter flight distances, more fuel efficient routes, and reduced delays. The most significant benefits will be in the key metropolitan areas. Airspace redesign in the New York and Philadelphia metropolitan areas has been projected to reduce delays by 20 percent in the next 10 years. In Chicago, airspace redesign will ensure return on the runway investments. With airspace changes and the new runway, delays can be reduced by as much as 60 percent. Airspace redesign will also provide internal FAA benefits. Without airspace redesign, sector splitting and growth in the number of sectors will be the only methods to manage complexity and congestion, increasing operations costs every year.

Major Airspace Redesign delivered the Chicago Airspace Project Stage 3 in alignment with the O'Hare Modernization Program. On October 17, 2013, Chicago O'Hare International Airport commissioned new Runway 10C/28C and the airspace design changes essential to achieve the capacity and efficiency gains of the new runway were ready. This was a multi-year effort involving numerous facilities and lines of business. Major Airspace Redesign was additionally able to accelerate the implementation schedule by two months in support of a request from the Chicago Department of Aviation.

The Major Airspace Redesign program delivered Stage 2 of the New York/New Jersey/Philadelphia (NY/NJ/PHL) Airspace Redesign (ARD). Stage 2 was implemented in two parts. In May 2011, Stage 2a was implemented and the activity consisted of the New York Terminal Radar Approach Control (N90) integrating airspace to achieve efficiency gains through better internal coordination for aircraft closest to the airports. This was accomplished by re-aligning key positions in the control room. Also, the New York Air Route Traffic Control Center (ZNY) acquired radar data from eight radar sites to expand areas eligible for reduced separation from five nautical miles to three nautical miles. The final Stage 2a implementation element, completed in October 2011, was the addition of a new departure route for the John F. Kennedy International Airport (JFK) enabling departures to reach optimal altitude more quickly and reduce airspace complexity; the addition of a new departure fix for all New York metropolitan area airports; and a new arrival route to the Dulles International Airport (IAD).

In May 2012, Stage 2b was implemented that included the activation of new dispersal headings on the west and east departure flow at the Philadelphia International Airport (PHL). The headings, as per the Environmental Impact Statement/Record of Decision, are designed to increase departure efficiency and mitigate significant noise impact. Airspace design activities continue with focus on improving existing operations in the New York Metropolitan area.

E. Strategy and Evaluation

This program will provide analytical and simulation tools capable of estimating the operational benefits of NextGen improvements, at the individual airport and system wide. Their widespread use will improve decision-making at FAA and throughout the aviation community. Initial versions of the functioning software have been delivered to the FAA; the capabilities and functionality continued to be enhanced; and the tools are being used to support various on-going analyses at the NAS-wide level as well as at target airports.

The capabilities of the new SWAC have been used to generate all publicly-released estimates of future NextGen benefits, including those in the 2009, 2010, 2011, 2012, and 2013 NextGen Implementation Plans. The model will continue to be used in support of the NextGen Implementation Plan, with the addition that realized benefits will be modeled, as well as future benefits of past investments, to help quantify the entire value of NextGen. SWAC has been and is being used to support benefits analyses of various NextGen Programs. For example, the model has been used in support of the business case analysis for the Data Communication program for the En-Route domain. It is also currently being used to support the Satellite and Broadcast Services (SBS) Program Office, and to perform various financial and operational incentive studies.

F. Dynamic Capital Planning

The improved data will lead to better decisions on program implementation and improvements in ATO's performance. It will provide reliable data with an automated tracking and reporting system for F&E projects that will enable decision-makers enhanced use of agency resources. This program will help keep major acquisition programs on schedule and within cost by maximizing limited resources linked to budget information and processes. Managers and engineers will have up-to-date reliable data on F&E projects through the resource tracking program (RTP). Productivity is improved when we support a standardized project management process and have the application emulating current operating procedures.

G. Unified Contracting System (UCS)

The UCS Program Office has conducted two BPMS pilots (PCPS and eFAST Planning) a small-scale BPMS solution to assess user acceptance, operational efficacy, and overall business value of the BPMS platform before adopting the tool for a full-scale implementation of UCS. The UCS Pilots have enabled FAA to reduce overall risk in the full implementation of UCS using the BPMS. FAA has:

- Verified, in an FAA operational environment, that the BPMS platform meets FAA ATO IT requirements as outlined in the Enterprise BPMS Requirements Document
- Conducted a proof of concept that a BPMS can automate a typical procurement process (eFAST, PCPS)
- Provided a learning experience regarding approaches and methods for completing and managing the development
- Built standard, reusable components that form the foundation for ongoing development of UCS
- Established and tested interfaces between the BPMS with standard FAA systems

H. Operational Analysis and Reporting System (OARS)

The American Public will benefit from OARS through the improvement in the safety of the NAS by providing predictive analytic capabilities which will reduce the risk associated with undesirable events related to Air Traffic Control service provision.

I. Operations Network (OPSNET) Replacement

Existence of the legacy system underscores the need as well as the feasibility to collect and report metrics data to the airlines and public. Benefits that are expected to be accrued by FAA and the public by implementing OPSNET include; improved reliability in operations data being reported, reduced ATC workload through use of data input from automation systems, improved performance metrics through use of data in tracking actual versus targeted NextGen enhancement goals.

J. In Service Engineering

In-service engineering allows tactical distribution of resources in support of all prototyping efforts.

Detailed Justification for - 1A02 NAS Improvement of System Support Laboratory

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – NAS Improvement of System Support Laboratory
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
NAS Improvement of System Support Laboratory	$1,000	$1,000	$1,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Lifecycle Replacement of Infrastructure Items	--1	1,000.0

For FY 2016, $1,000,000 is requested for continued improvements to the laboratory systems and laboratory infrastructure in order to support National Airspace System (NAS) and NextGen programs. The FAA's centralized set of laboratories located at the William J Hughes Technical Center (WJHTC) provide virtually all FAA acquisition programs the infrastructure for research, development, testing, evaluation, and field support to over 50 F&E NAS and NextGen program interdependencies supported by this program (i.e. FAA's Capital Investment Plan (CIP) programs). It is necessary to upgrade and improve the supporting laboratory infrastructure and equipment to maintain a laboratory platform capable of supporting these programs.

A Laboratory Master Plan, developed in 2010, identified over 150 improvement areas that should be performed over a 20-year period. The Laboratory Services Division reevaluates the priority list of projects annually to validate needs and review emerging and/or urgent projects which may take priority over planned improvements. Additionally, some improvement projects may be implemented sooner than originally planned because an opportunity existed that would generate short- and long-term savings. For example, a new lab installation is an opportunity to repair raised flooring.

The Lifecycle Replacement of Infrastructure Items covers some of the on-going improvements identified in the Laboratory Master Plan, such as, raised floor replacements, electrical panel-board replacements, computer air conditioning (CAC) unit replacements, and lighting upgrades.

What Is This Program And Why Is It Necessary?

This program provides for the upgrade and enhancement of Technical Center's Air Traffic Control (ATC) laboratory facilities. The program improves FAA's centralized state-of-the-art laboratory environment supporting the implementation, testing, and integration of new NAS and NextGen systems prior to their delivery to the various FAA field sites.

It is necessary to modify, upgrade, and reorganize the WJHTC's laboratory infrastructure as F&E programs and their supporting systems are delivered, installed, and eventually removed. The laboratory infrastructure encompasses a total of 210,461 square feet in the main buildings, numerous outlying buildings, and remote sites.

A single, centralized support laboratory eliminates the cost of establishing and maintaining multiple laboratories for each project, program, Service Unit, and Line of Business. Everything needed to test systems in the NAS is in one location which enables integration and reduces the overall cost to the FAA and provides for efficiency and productivity gains.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$1,000,000 is required to continue improvements to the laboratory infrastructure that supports National Airspace System (NAS) programs. As discussed above, this requested funding level was informed by the Laboratory Master Plan and an annual re-evaluation by the Laboratory Services Division to determine the priority list that will ensure completition of activity targets.

What Benefits Will Be Provided To The American Public Through This Request?

The American public benefits by having their National Airspace System researched, developed, tested, and evaluated at the world class laboratories at the WJHTC. The goal of this program is to modernize the equipment and infrastructure necessary for FAA's centralized NAS laboratory facilities so that F&E programs can deliver products that result in a safe, reliable, and efficient NAS. The capabilities developed in these laboratories will reduce overall cost of NAS and NextGen development that will increase traveler safety and decrease travel times by reducing airspace congestions.

Detailed Justification for - 1A03 William J. Hughes Technical Center Facilities

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – William J. Hughes Technical Center Facilities
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
William J. Hughes Technical Center Facilities	$11,000	$12,049	$19,050	+$7,001

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Laboratory Support Services	---	$12,485.0
b. Land Leases, Fuel, Telephone, etc.	---	1,600.0
c. Laboratory Equipment Refresh	---	2,200.0
d. HW/SW Licenses and Maintenance Agreements	---	1,375.0
e. Supplies, Repair Parts, Equipment, Calibration, etc.	---	290.0
f. Laboratory Systems Consolidation	---	1,100.0
Total	1	$19,050.0

For FY 2016, $19,050,000 is requested for continued sustainment of FAA's National Airspace System (NAS) laboratory test beds located at the William J. Hughes Technical Center in Atlantic City, NJ. This program provides the support services required to operate the laboratories; laboratory equipment including the hardware, software, and licensing costs; and all associated costs for operating and maintaining the Air Traffic Control (ATC) laboratories, remote facilities, three active radar sites and their facilities, and the flying laboratories that include six aircraft.

The Laboratory Support Services include engineering and programming support, configuration management, laboratory networking, laboratory scheduling, aircraft support, data center management, and infrastructure engineering services. This allows the William J. Hughes Technical Center Facilities to maintain the laboratory infrastructure and provide expertise to the F&E programs utilizing the facilities for research, development, test, and evaluation.

This program also provides for the land leases for the three radar sites, aircraft fuel in support of F&E flight testing, over 103 hardware and software licenses and maintenance agreements, equipment calibrations, communication equipment and services, and general supplies. Laboratory equipment refresh items include server upgrades and replacements, network equipment upgrades, laboratory cabling and connections, and procurement of laboratory equipment supporting F&E programs.

The goal of the Laboratory Systems Consolidation project is collocating Priority 1 Laboratory Systems. These systems share a common need for special infrastructure support (generator power, uninterrupted power supply, etc.) that can be more economically addressed in a common location. This project also addresses the laboratory space changes needed for new CIP program installations and connectivity requirements. The project will take at least four years to accomplish and the FY 2016 funding supports Phase 1, design of this project.

What Is This Program And Why Is It Necessary?

This program maintains and sustains the FAA's centralized set of laboratories located at the William J. Hughes Technical Center which provides the infrastructure for research, development, testing, evaluation, and field support to FAA's Capital Investment Plan (CIP) programs. 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. The Technical Center laboratories are the only location where it is possible to realistically simulate the NAS. These laboratories are essential to the FAA's efforts to transition the NAS to the Next Generation Air Transportation System (NextGen). Laboratory integration, test and evaluation activities result in procedures and systems that ensure a safe, secure, efficient, and seamless transition to NextGen. These activities require numerous test beds that can be configured to replicate desired field configuration and traffic scenario, thus providing stakeholders with an understanding of how upgraded systems will perform prior to operational deployment.

These test beds serve a second and equally important role by providing direct field support for Operational NAS systems. Problems identified at various field locations are quickly transmitted to the appropriate laboratory where solutions can be developed and tested by second level engineering personnel. This keeps systems operational avoiding service degradation and costly interruptions.

The Agency's test beds located at the Technical Center are used by virtually all acquisition programs for development, test, evaluation, integration, transition testing, and 1st and 2nd level support to the field, including over 50 F&E NAS and NextGen program interdependencies. Partnerships with other agencies include Department of Defense (DOD), Department of Homeland Security (DHS), and National Aeronautics and Space Administration (NASA). The Technical Center laboratories provide support through the AMS lifecycle from Concepts and Requirement Definition to In-service Decision.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$19,050,000 is required to sustain FAA's laboratory test beds. 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.

What Benefits Will Be Provided To The American Public through This Request?

The American public benefits by having their National Airspace System researched, developed, tested, and evaluated at the world class laboratories at the WJHTC. The goal of this program is to sustain the FAA's centralized NAS laboratory facilities so that F&E programs can deliver products that result in a safe, reliable, and efficient NAS.

The capabilities developed in these laboratories will reduce overall cost of NAS and NextGen development that will increase traveler safety and decrease travel times by reducing airspace congestions.

Detailed Justification for - 1A04 William J. Hughes Technical Center Infrastructure Sustainment

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – William J. Hughes Technical Center Infrastructure Sustainment ($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
William J. Hughes Technical Center Infrastructure Sustainment	$5,000	$12,200	$12,200	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Building 316 Electrical Substation Replacement (Construction (Phase1/2)	---	$8,000.0
b. Building 211 and 303 Roof Replacements (Construction)	---	800.0
c. Building 300 Mechanical Equipment Replacements (Design)	---	200.0
d. Life Safety Improvements to Five Facilities (Design)	---	200.0
e. Main Electrical Substation Upgrades (Switchgear Enclosure) (Construction)	---	3,000.0
Total	1	$12,200.0

For FY 2016, $12,200,000 of funding is requested to accomplish the following projects in support of the continued sustainment of the FAA's infrastructure at the William J. Hughes Technical Center (WJHTC):

a. Building 316 Electrical Substation Replacements (Construction Phase 1 of 2)

$8,000,000 is requested to replace two of the five substations in Building 316.

The American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) consider average substation transformer (and associated equipment) life to be 20 to 25 years. The Building 316 existing substation transformers and equipment are circa 1990 vintage. This project will replace the existing dry type transformers with Cast coil (epoxy encapsulated electrical) cores which have a projected useful life of between 30 and 50 years. The project will also include:

- The reconfiguration of the building's primary electrical distribution system from a serial configuration (one after another) to a radial scheme, thereby improving electrical reliability and facilitating partial planned building electrical shutdowns and preventive maintenance activities
- The provision of an electrical switch house
- The inclusion of the new equipment into the WJHTC's existing electrical Power Monitoring and Control System

Installation of these new substations will improve the reliability of electrical power to not only the laboratory portion of Building 316 but to the WJHTC campus as well. The new substations will also have greater capacities, thus allowing for electrical system/equipment expansion, and will include self-healing networks, thereby enabling automatic electrical power restoration after power outages. The FY 2015 enacted funding will support costs associated with the design for this project. The FY 2016 requested funding will support costs associated with the installation of two of the building's five substations (Substation Numbers 8 and 11) as well as the installation of the new switch house. A future request will support costs associated with the installation of the building's remaining three substations (Substation Numbers 7, 9 and 10).

b. Buildings 211 and 303 Roof Replacements (Construction)

$800,000 is requested to replace approximately 25,000 square feet of roofing on two facilities as follows:

Building 303 (Central Utilities Plant): This project involves the replacement of approximately 20,000 square feet of roofing at grade level. The current roof system is a two-ply modified bitumen system which is out of warranty and is in poor condition. Numerous service calls for roof repair work (leaks) have been made within the last year, with several areas currently leaking on critical central heating, cooling and control equipment which service our largest on site laboratory facilities (i.e., Buildings 300 and 316). Repeated maintenance repairs have been unsuccessful in maintaining a weather tight building.

Building 211 (Engine Test Facility): This project involves the replacement of approximately 5,000 square feet of roofing. The current roof system dates back to 1984, when a new four ply built up roof was installed to replace the building's original (circa 1963) four ply built up roof. In an attempt to provide a weather tight roof, some portions of the roof were replaced in 2006, but a comprehensive replacement was never done. The current roof system is out of warranty and well beyond its useful life. A survey performed by an independent consultant in 2007 indicated the roofing system was in fair to poor condition and that the entire roofing system should be replaced.

These projects will remove the entire existing roofing systems and replace them with new roofing and insulation systems carrying 20 year total system warranties. Removed materials will be recycled wherever possible. The new roof systems will be designed to be environmentally friendly, reduce energy costs through improved insulation, and reduce maintenance expenses. In addition, upgrades and/or replacement of rooftop mounted lightning protection system components to comply with the latest FAA and industry standards will be completed in conjunction with the roof replacement. The FY 2015 enacted funding supports costs associated with the design for this project.

c. Building 300 Mechanical Equipment Replacements (Design)

$200,000 is requested for the design effort to replace Heating, Ventilation and Air Conditioning (HVAC) equipment in Building 300.

This project will replace HVAC equipment in Mechanical Equipment Room #3 (MER-3) of Building 300, specifically three air handling (AC) units, AC-6, AC-7 and AC-8. This equipment services various portions of a building encompassing approximately 500,000 square feet. The equipment is original to the building (circa 1980). These pieces of equipment have all exceeded their respective useful lives of 25 years (as estimated by the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)). Due to the age of the equipment, maintenance has been difficult since, in some cases, parts are no longer available. The project also entails the removal and replacement of associated ductwork, piping, valves, controls and other sub-components associated with the installation of the upgraded equipment.

The new AC units will be designed to be environmentally friendly, reduce utility costs through the use of modern, energy efficient equipment, and reduce maintenance expenses. The FY 2016 requested funding will support costs for the design of the project. A future request will support costs associated with installation of the equipment and will include costs associated with providing temporary HVAC equipment during construction to keep the facility fully occupied and operational.

d. Life Safety Improvements to Five Facilities (Design)

$200,000 is requested for the design effort for fire alarm system upgrades to Buildings 27 (Integration/Interoperability Laboratory), 28 (Human Factors Laboratory), 33 (Water Treatment Plant), 56 (Hazardous Material Storage), and 270 (Office and Training Building).

The fire alarm systems in these facilities are Gamewell FCI 7200 fire alarm systems which were installed over 20 years ago. This product line has been discontinued and each is a legacy system that is no longer being manufactured or sold by Gamewell-FCI. This includes all system control panels, detectors and initiating devices, notification appliances, accessories, and power supplies. This means if any component of the system fails, there are no readily available replacement parts. (Our estimate is that we have enough spare parts to maintain these systems until FY 2017, utilizing salvaged working components from the FY

2015 - FY 2016 construction for the replacement of the Building 300 fire alarm system.) An inoperable fire alarm system necessitates evacuation of the affected building (potentially over 200 employees among these buildings) or instituting a 24 hour fire watch at increased operating expense.

The new fire alarm systems for these facilities will be designed to be compatible with new fire alarm systems scheduled for installation in Buildings 301 and 300 as part of the FY 2014 and FY 2015 requests, thereby assuring interchangeability of components. Installation of new fire alarm systems in these facilities will reduce maintenance expenses currently associated with the need to replace aged, failing components. The FY 2016 requested funding will support costs for the design of the project. A future request will support costs associated with the installation of fire alarm systems in these buildings.

e. Main Electrical Substation Upgrades (Switchgear Enclosure) (Construction)

$3,000,000 is requested to provide an enclosure for the switchgear at the Main Electrical Substation.

A project to enhance the life cycle of the WJHTC's Main Electrical Substation by constructing an enclosure for the switchgear is required. The substation's existing switchgear structure is more than 40 years and is showing signs of deterioration (rusting) due to direct exposure to rain, snow and the salt-air environment typical at the WJHTC. This deterioration will continue to spread, significantly increasing the risk that direct water intrusion will lead to catastrophic failure of the medium voltage switchgear with a resulting Center-wide power outage and/or a fire.

In addition, the direct exposure of the switchgear structure has resulted in the need to perform unscheduled repair and maintenance at increased costs. Examples of such expenses are:

- $400,000 was spent to replace seventeen 1,200 amp, 15kV (medium voltage) circuit breakers after 15 years of service due to accelerated deterioration from environmental exposure. These types of breakers typically have a useful life of 25 years.
- $40,000 was invested in an effort to mitigate any further damage to the top ("roof") of the switchgear structure by applying a waterproof coating.
- $25,000 is being expended every two years to perform bus duct remediation due to the migration and acceleration of corrosion. Such bus duct remediation would typically only be required every 10 years.

This project will significantly reduce the risk of experiencing a Center-wide power outage as well as reduce continually accelerated maintenance repairs and expenses, which have typically only resulted in "band-aid" type solutions to the overall problem. Unscheduled power outages can pose a significant safety risk and can have a substantial monetary impact on WJHTC operations, particularly on mission crucial systems hosted at the Technical Center which require 24x7x365 power (e.g., Traffic Flow Management Production Center (TPC), FAA Telecommunications Infrastructure (FTI), and the Enterprise Data Centers).

The new enclosure would provide an environmentally controlled space which will protect and extend the life of the existing switchgear and greatly reduce the risk of experiencing an unplanned power outage. In addition, the new enclosure will decrease maintenance expenses currently associated with the need for premature replacement of switchgear components.

The budget estimate for this project is $3,000,000 for construction. Design will be by in-house personnel or construction and will be procured through a design/build type contract. This amount may be considered a wise investment, as a new substation would cost between $20,000,000 and $25,000,000, not including the costs of any emergency equipment/activities in the event of a failure.

What Is This Program And Why Is It Necessary?

The WJHTC owns and operates approximately 1.6 million square feet of test and evaluation, research and development, and administrative facilities, plus numerous project test sites. The current value of the buildings and infrastructure is in excess of $400 million. The WJHTC must keep the Central Utilities Plant (CUP), utility distribution systems, and the infrastructure supporting these facilities 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. Accordingly, these facilities require an annual program of capital improvements and modernization.

Example projects include:

- Replacing old heating, ventilation, and air-conditioning systems
- Upgrading the electrical distribution systems
- Upgrading fire-suppression systems to current fire safety codes

Infrastructure providing and sustaining a suitable, reliable environment (i.e. power, cooling, etc.) for the WJHTC's 24x7x365 operations is necessary to support mission crucial systems hosted at the WJHTC, such as Traffic Flow Management Production Center (TPC), FAA Telecommunications Infrastructure (FTI), and the Enterprise Data Centers that support FAA Information Technology (IT) operations, and enables such systems to operate with increased capacity and enhanced reliability. In addition to these operational systems, the WJHTC must provide 24x7 support for monitoring of systems and functions such as Reduced Vertical Separation Minimum (RVSM), Wide Area Augmentation System (WAAS), Automatic Dependent Surveillance Broadcast (ADS-B) and System Wide Information Management (SWIM). The infrastructure also supports second level engineering support to resolve critical issues for operational National Air Space (NAS) systems (e.g., En Route Automation Modernization (ERAM), Standard Terminal Automation Replacement System (STARS), and Advanced Technologies and Oceanic Procedures (ATOP) so that they will perform in a proper environment and hence provide enhanced safety and reliability to the greater NAS/FAA system. Other facilities at the WJHTC support numerous Capital Investment Plan (CIP) projects affecting security, automation, communication, navigation and landing, and surveillance programs. The improvements made to the WJHTC facilities in actuality support these aforementioned CIP projects, thereby establishing interdependency with them. These improvements also provide indirect support toward achieving the FAA's mission and its performance targets.

Additionally this program provides direct support, via sustaining the WJHTC's infrastructure, to the WJHTC Facilities System Support Laboratory Sustained Support program. This program will provide direct support to other NAS programs as well, such as NextGen, including Data Com, NextGen Network Enabled Weather (NNEW) and NAS Voice System (NVS). This program also provides indirect support to numerous other CIP programs. Examples of these programs are: TPC, FTI, Next Generation Radar (NEXRAD), Operation and Supportability Implementation System (OASIS), Corridor Integrated Weather System (CWIS), Weather and Radar Processor (WARP), Airport Surface Detection Equipment – Model X (ASDE-X), Airport Movement Area and Display (AMASS), Safety Management System (SMS), Voice Switching Communication System (VSCS), Next Generation Air/Ground Communications (NEXCOM), Surface Movement Advisor (SMA), En Route Programs, Terminal Programs and Oceanic Legacy Systems.

This program also provides indirect support to certain ATO-P Research and Development (R&D) programs by sustaining the R&D facilities. Examples of these programs are the Fire Research and Safety Program, the Aircraft R&D Program, the Propulsion/Fuel Systems Program and the Flight Safety Program.

Finally, this program provides exterior infrastructure support to other governmental agencies residing at the WJHTC. These agencies include the Coast Guard, Federal Air Marshal Service, Transportation Security Laboratory, South Jersey Transportation Authority and the New Jersey Air National Guard.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$12,200,000 is required to replace electrical substations at Building 316, replace roofs at Buildings 211 and 303, design the replacement of mechanical equipment in Building 300, design life safety improvements (replacement of fire alarm systems) in five facilities, and provide an enclosure for the switchgear at the Main Electrical Substation.

This program decreases maintenance costs associated with the need to upkeep aging infrastructure components, decreases operating costs associated with the need to utilize existing energy inefficient systems and construction, and significantly decreases the risk of infrastructure failures occurring, supporting operations of the mission crucial systems, programs and government agencies noted above.

This CIP program is the only available funding stream to support the execution of these projects. Each of these projects is a discrete activity with a finite duration. Therefore, funding this program at the requested level is imperative for increasing the Facility Condition Index (FCI) of the affected building(s) or structure(s).

What Benefits Will Be Provided To The American Public Through This Request?

Infrastructure sustainment at the WJHTC improves operational efficiency and effectiveness by updating facilities, facility support systems, and utility distribution systems with state of the art systems and components that are engineered to provide increased reliability, capability and projected useful lives versus their existing counterparts. This reduces expenses associated with ongoing operation and maintenance activities as well as the frequency of expenses associated with system replacement. Furthermore, such system updates reduce energy consumption, and cost, on a per-square-foot basis, thus supporting Executive Orders 13423 and 13514 concerning Federal Energy Management. This budget line item also controls costs by replacing aged and inefficient facility systems and equipment before serious problems or failures occur which would otherwise necessitate increased expenses for repair or restoration of the equipment or system or for repair of incidental damages caused by such failures.

This program incorporates best business practices and adopts industry standards promulgated by such organizations as the International Code Council (ICC), American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), National Fire Protection Association (NFPA), National Electrical Manufacturers' Association (NEMA), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Institute of Electrical and Electronic Engineers (IEEE) and Underwriters' Laboratories, Inc. (UL). In so doing, the taxpayer is assured that infrastructure improvements designed and constructed under this program are implemented in an efficient, consistent manner comparable to that used for commercial construction.

Recent examples of program projects completed or underway and their benefits include:

- Replacement of six Substations in Building 300 (Technical and Administrative Building) (Completed): The new substations provide increased power reliability, increased system longevity (useful life), and increased power monitoring and control capability versus the buildings' originally installed substations.
- Replacement of the Roof and Skylights on Building 300 (Technical and Administrative Building) (Completed): This project replaced a roof that had passed its expiration date on a 15 year warrantywith a new 20 year warranted roof with increased insulation and reflective properties to reduce energy consumption and decrease heat absorption. In addition, the new skylights replaced the building's original discolored and leaking skylights with 10 year warranted weather tight construction. Neither the new roof nor the new skylights have leaked, and the new skylights have provided an increase of at least 100 percent in natural light levels within the atrium of the building.
- Replacement of Mechanical Equipment in Building 301 (Aircraft Maintenance Hangar) (in construction): This project will replace 50 year old HVAC equipment (air handlers, heating and ventilating unit, chilled water and hot water pumps, controls, air compressors, exhaust fans, and ductwork) servicing the four story administrative wing of the building with new equipment providing energy savings, reduced maintenance expenses, and improved comfort.

Detailed Justification for - 1A05 NextGen - Separation Management Portfolio

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Separation Management Portfolio
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Separation Management Portfolio	$20,328*	$20,500*	$26,500	+$6,000

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ADS-B In Applications – Flight Interval Management	---	$5,000.0
B. Modern Procedures	---	5,000.0
C. Alternate Positioning, Navigation and Timing	---	1,000.0
D. Wake Turbulence Re-Categorization	---	1,500.0
E. Oceanic Tactical Trajectory Management	---	5,000.0
F. Unmanned Aircraft System (UAS) Concept Validation/Requirement Dev	---	7,000.0
G. Reduced Oceanic Separation*	---	2,000.0
Total	Various	$26,500.0

A. ADS-B In Applications – Flight Interval Management

For FY 2016, $5,000,000 is requested to provide ADS -B In Applications – Flight Interval Management program will develop Minimum Operational Performance Standards (MOPS) and operational requirements for Interval Management – Spacing Arrivals and Approach, and Cruise. This activity will include requirements development, prototype avionics, standards development, human-in-the-loop simulations and flight demonstrations. These capabilities will be implemented as a future segment of the ADS-B budget line item.

The anticipated FY 2016 accomplishments for ADS -B In Applications – Flight Interval Management are as follows:

- Complete a Delta System Specification Document (SSD)
- Equip aircraft with MOPS v1 functionality (in preparation for FY 2017 Joint FAA-NASA Flight Test)
- Continue development of MOPS v2 document
- Complete all documents and checklist items necessary for Final Investment Decision (DP 884) including: Requirements document, Business Case, Implementation Strategy and Planning Document, Acquisition Program Baseline
- Complete Advanced Interval Management ConOps for future IM applications
- Develop Advanced Interval Management Requirements Document for future IM applications

B. Modern Procedures

For FY 2016, Modern Procedures is requesting $5,000,000 to continue to develop En Route NextGen Mid-Term Baseline capabilities, which assist controllers in maintaining safe aircraft separation while optimizing use of airspace system capacity. The first three research areas listed below are important for Optimized

Profile Descent (OPD). These areas are complex technical challenges that require study and prototyping for accuracy of aircraft trajectory modeling using advanced Kinetic Vertical Modeling techniques involving aircraft characteristics, aircraft performance data when aircraft turns or descends, and a closed-loop trajectory based on runway assignment. FY 2016 areas of capability research and analysis include:

- Complete Kinetic Vertical Modeling (KVM) Phase-3 prototyping "Hybrid Model Complete"
- Complete follow-up study for complex Turn Modeling
- Complete study sources of runway assignment data and availability into ERAM
- Complete analysis of Unmanned Aircraft Systems (UAS) impact on ERAM
- Develop integration prototype for National Special Activity Airspace Project (NSAAP) services
- Conduct an initial operational evaluation for Automation-Assisted Controller-to-Controller Coordination (i.e. Conditional Handoff, Point-outs, and Approval Requests)
- Complete examination of overtake/in-trail algorithm
- Complete operational acceptability determination of problem detection based on the aircraft's Communication Navigation Surveillance (CNS) capability

C. Alternative Positioning Navigation and Timing (APNT)

The Alternative Positioning, Navigation, and Timing (APNT) program ensures that backup PNT services will be available to support flight operations to maintain safety, security, and minimize economic impacts from GPS outages within the National Airspace System (NAS). The FY 2016 funding supports the engineering analysis alternatives to support the down select to the recommended candidate.

D. Wake Turbulence Re-Categorization

For FY 2016, the Wake Turbulence Re-Categorization (Wake Re-Cat) project requests $1,500,000 to develop the system adaptation, procedures, training and documentation for implementing the airport specific wake mitigation Wake Turbulence Re-Categorization Phase II Pair-Wise Static separation standards. The Wake Re-Cat Phase II product will provide for each airport the most runway throughput efficient wake separation standards and procedures for the mix of aircraft operating at that airport. This will result in increased airport runway arrival and departure runway throughput capacity, especially when the airport is experiencing weather or other conditions requiring it to operate with instrument landing procedures. The Phase II standards, when implemented, will refine the current generalized Six Category Phase I aircraft-to-aircraft wake separation standards into wake separation standards optimized to provide the maximum runway throughput for that airport. The FY 2016 funding will include the following:

- Develop the FAA Safety Risk Management Document needed for approval to use the Phase II wake separation standards and procedures
- Develop the procedures and associated training for use of the Phase II wake separation standards
- Develop the adaptation of the FAA automation platforms information outputs to display the airport specific Phase II wake separations

E. Oceanic Tactical Trajectory Management

For FY 2016, Oceanic Tactical Trajectory Management (OTTM) is requesting $5,000,000 to perform the following:

- Traffic Congestion Depiction and Flight Specific Likelihood Feedback - Enables interactive flight plan collaboration between airspace users and the FAA in which the airspace user informs the FAA of their intended 4D oceanic trajectory and receives feedback, including the Re-Profile Alerts capability which informs airlines of constraints due to weather, traffic, and/or profile, prior to the flights entry into oceanic airspace (whether pre-departure or in-flight) about the likelihood of achieving that trajectory based on other oceanic flights intended trajectories
- Pre-Oceanic Coordination Planner - Provides a flexible, web-based interface between the FAA automation and the flight planner, where flight specific likelihood does not provide sufficient predictability. The Planner provides a schedule which considers the full oceanic trajectory, rather than just the oceanic entry, to improve planning, collaboration, and further promote information sharing between airspace users and FAA

F. UAS Concept Validation and Requirements Development

For FY 2016, $7,000,000 is requested to identify and mature UAS needs as they relate to Air Traffic systems and services, addressing operational requirements, procedures and policies to support the integration of UAS in the National Airspace System (NAS).

The FY 2016 work will focus on identified UAS operational shortfalls, refining the concepts through engagements with users and subject matter experts, human-in-the-loop simulations, engineering studies and fast-time modeling. These efforts will analyze UAS impacts on NAS systems, procedures, training and rulemaking with specific focus on airspace classes, flight planning, communications, mixed equipage environments, interaction with Detect and Avoid systems, contingency procedures (including lost link), complex trajectory management and equity of airspace access considerations. Operational requirements will be determined and/or refined and NAS program impacts will be assessed. Once the operational requirements and NAS program impacts are known, a business case can be generated and investment analysis activities initiated.

In addition to the concept engineering and requirements development work, an initial safety analysis will be initiated in FY 2016 focusing on the potential impacts of introducing increasing numbers of UAS into the NAS in various airspace classes. Once the operational requirements and NAS program impacts are known, a business case can be generated and investment analysis activities initiated.

Throughout the year, opportunities for stakeholder engagement will arise, allowing for greater alignment between the UAS user community, the non-UAS NAS users and the air traffic community on operational expectations.

G. Reduced Oceanic Separation

The report language supporting the Consolidated and Further Continuing Appropriations Act of 2015 (P.L. 113-235) described that the $7.5 million above the ADS-B requested amount was to advance space-based ADS-B capabilities. The FAA is investigating an opportunity to address gaps in performance for oceanic airspace as well as remote airspace. The FAA has been evaluating various approaches for improving separation services by providing surveillance coverage in Oceanic Flight Information Regions (FIRs) and remote domestic airspace via a satellite-based solution, including, but not limited to, Space-based Automatic Dependent Surveillance – Broadcast (ADS-B).

On October 15, 2014, the FAA's Joint Resources Council (JRC) approved the Reduced Oceanic Separation (ROS) strategy decision to stay engaged with three approaches for improving separation services in oceanic airspace. These alternatives include: Existing separation minima (using Future Air Navigation System (FANS)-1/A); Space-based ADS-B Out (Aireon initiative); and ADS-B In (Pairwise Trajectory Management application).

As a part of this decision, the ROS Program Office is scheduled to return for an interim JRC decision by early 2015 to approve additional funding to conduct studies on the feasibility of alternatives and to engage in testing and requirements development for the Aireon Space-based ADS-B system.

The FY 2016 funding will provide initial support to the safety efforts at ICAO; participate in ICAO panels in support of the ROS safety case; engage in testing; conduct FAA Safety Management System (SMS) efforts for changes to the NAS; develop the final requirements; and implement ATOP automation requirements for space-based ADS-B 15/15nm

What Is This Program And Why Is It Necessary?

A. ADS-B In Applications – Flight Interval Management

The program will develop ADS-B In Applications for Interval Management. This application is applicable to oceanic, en route, and terminal airspace and will require investments in both Air Traffic Management and Decision Support automation systems, as well as flight deck avionics.

Information is sent to aircraft using ADS-B In, which shows all aircraft in the area, including those not equipped with ADS-B technology, via a cockpit display. This improves flight safety by enhancing pilot situational awareness and providing advisories so pilots can determine airborne and airport surface hazards.

This program will develop Minimum Operational Performance Standards (MOPS) and operational requirements for Interval Management – Spacing Arrivals and Approach, and Cruise. This activity will include requirements development, prototype avionics, standards development, human-in-the-loop simulations and flight demonstrations. These capabilities will be implemented as a future segment of the ADS-B budget line item.

The program is planning an Investment Analysis Readiness Decision (IARD) for the first set of ADS-B In applications in the second quarter of FY 2015, and a Final Investment Decision (FID) in the third quarter of FY 2016.

B. Modern Procedures

Separation Management automation enhancements include concepts and technologies, performance enhancements to existing automation functions identified through development, deployment, and operational use of ERAM and predecessor systems (e.g., Host, User Request Evaluation Tool (URET), Display System Replacement (DSR)), etc.. Pre-implementation activities include operational and technical risk reduction, and acquisition artifact development. Separation Management – Modern Procedures includes all Air Traffic Control (ATC) automation capabilities that assist controllers in maintaining safe aircraft separation while optimizing use of airspace capacity. This project will apply pre-implementation processes to define, prioritize, sequence, and transition to implementation of the Radar-Side (R-Side) and Data-Side (D-Side) controller capabilities and technology enhancements.

This program provides the following concept maturity and technology development activities:

- Operational risk reduction
- Concept validation and documentation
- Prototype demonstration for technical risk reduction
- Technology transfer from research organizations
- Pre-Production prototyping of key technical components

Categories of Modern Procedures automation enhancements to be in addressed include:

- Radar Controller Position (R-side) Automation Capabilities
- Data Controller Position (D-side) Automation Capabilities
- Flight Data Display and Data Entry Capabilities
- Strategic Conflict Detection Improvements
- Automated Conflict Resolution
- Technical Performance and Accuracy Enhancements

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 fixed and conservative, which restricts capacity to the overall system. Modern Procedures includes a series of automation upgrades and improvements in the strategic En Route conflict probe (CP), the tactical conflict alert (CA), and display enhancements. Developing new automation CP and CA 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.

C. Alternative Positioning Navigation and Timing (APNT)

The Alternative Positioning, Navigation, and Timing (APNT) program is investigating alternatives for providing a back-up for Global Positioning System (GPS) based position, navigation, and timing (PNT) services. GPS PNT services enable Performance-Based Navigation (PBN) and Automatic Dependent Surveillance Broadcast (ADS-B) services which are necessary for Trajectory-Based Operations (TBO), Area Navigation (RNAV), Required Navigation Performance (RNP), and other NextGen improvements. Presidential Policy Directive 21 (PPD-21) and National Security Presidential Directive 39 (NSPD-39) require that the FAA establish a resilient backup in the event of a GPS outage or interference event to maintain safety and security and prevent a significant economic impact in the NAS. The objective of the NextGen APNT program is to provide critical PNT services if GPS services become temporarily unavailable so that users can seamlessly continue RNAV and RNP operations to a safe landing.

The FAA currently relies on existing legacy systems including Very High Frequency Omnidirectional Range (VOR), Distance Measuring Equipment (DME) and Tactical Air Navigation (TACAN) as a back-up to GPS navigation, but these systems do not fully support RNAV, RNP or TBO. The NextGen APNT program will continue exploring a full range of alternatives that will leverage the use of existing NAS system infrastructures to minimize the need to deploy more systems in the NAS and minimize the cost of a future APNT solution. The existing system infrastructures under consideration include the DME network, the ADS-B ground station network, and/or a combination of both.

D. Wake Turbulence Re-Categorization

The purpose of the Wake Turbulence Re-Categorization project is to collaboratively develop wake separation standards that provide increased airspace and airport throughput capacity without aircraft equipage costs or runway expansions; which is a direct contribution towards the DOT Goal of "Maximum economic returns on transportation policies and investments." This project 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 throughput capacity of airports and airspace that will have heavy operational demand in the NextGen era. Associated work is incorporating new aircraft (i.e. Boeing 787, Airbus A-380, Boeing 747-8 and others) in this ongoing development of safe but throughput capacity efficient wake separation standards.

The last full review of the ICAO wake separation standards guidance used globally by air traffic control occurred nearly 25 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 have been introduced into the National Airspace System (NAS). As a result of the joint FAA and EUROCONTROL program, a more capacity throughput efficient Phase I wake separation standard was developed and presented to ICAO for review in 2010. FAA then developed procedures and changes to its ATC automation systems for implementing these Phase I wake separation standards. In November 2012, this project's Phase I 6 Category wake separation standards began use by FAA air traffic control at Memphis International Airport (MEM). Their use had an immediate impact on the operations of FedEx, the major user of MEM in the evenings and early mornings. FedEx saw their usual queues for departures shrink to near zero, taxi out times decreased by three to seven minutes depending on the runways being used and were able to send six additional departures per hour per MEM runway. FedEx also experienced faster transit through the MEM airspace resulting in two to six minutes decrease in transit time, saving 300 pounds of fuel per aircraft per minute.

The next phase of the Wake Re-Categorization program is now underway. This project developed sets of tailored leader aircraft and follower aircraft pair-wise static wake separation standards (Phase II standards) by the end of 2014. These more complex Phase II standards refine the current generalized Six Category Phase I aircraft-to-aircraft wake separation standards into wake separation standards optimized to provide the maximum runway throughput for an individual airport. The current Phase I standards provide maximum runway throughput capacity for some Core airports but are suboptimal for many other Core airports. Phase II standards will provide the runway throughput optimal wake separation standards/procedures for these other Core airports.

E. Oceanic Tactical Trajectory Management

The Oceanic Tactical Trajectory Management (OTTM) program addresses current performance gaps in the areas of capacity, productivity, efficiency, safety, and environmental impacts in the oceanic environment. The OTTM mid-term concept addresses Oceanic Trajectory Management in Four Dimensions (OTM-4D).

The key objective of this concept is to use trajectory-based operations to improve fuel efficiency, system predictability, and performance by enabling airlines and other operators to flight plan and fly closer to their optimal (or preferred) 4D trajectories while in oceanic airspace. This requires new decision support capabilities and integration with traffic flow management. OTTM has adopted specific initiatives that address both the pre-departure and in-flight phases of the oceanic flight, as well as improvements that allow sharing additional information between the FAA and airspace users in a collaborative arrangement.

OTTM takes advantage of Airline Operations Center (AOC) and Air Navigation Service Provider (ANSP) oceanic capabilities, as well as evolving technologies (e.g., System-Wide Information Management (SWIM)) to develop these potential concepts. These oceanic capabilities involve procedural and automation changes. The implementation of these capabilities will occur incrementally and will eventually affect all domains and phases of flight to improve airspace capacity and allow more airspace users to optimize their flight trajectories through collaborative efforts with air traffic management resulting in savings of time, fuel, and emissions.

The current flight data management system and the current navigation systems do not support the flexibility that is needed from both a planning and execution perspective. Trajectory management means that true 4-D trajectories can be exchanged and monitored, and the system can support the exchange of multiple alternative trajectories in both separation management and tactical flow. This requires a capability beyond that of the current flight plan, which was developed in an era of human only interpretation and planning. Trajectory management and full use of the airspace also requires that aircraft can navigate off fixed routes and that new routes can be developed and published with minimum distances between. Keeping aircraft on historic routings with historic between route separations limits the use of airspace capacity in general and specifically to address weather and congestion limitations.

As demand has grown, 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.

OTTM will conduct research and development to provide User Trajectory Planning in the Pre-Oceanic Phase. Pre-oceanic trajectory coordination enables interactive flight plan collaboration between airspace users and the FAA in which the airspace user informs the FAA of his intended 4D oceanic trajectory and receives feedback prior to the flights entry into oceanic airspace (whether pre-departure or in-flight) about the likelihood of achieving that trajectory based on other oceanic flights intended trajectories. A flexible, web-based interface for collaboration between the FAA automation and the flight planner would allow most airspace users (with sophisticated and less-sophisticated flight planning capabilities) to participate. This capability will improve flight planning and execution by strategically maximizing the performance of the aircraft and optimizing the use of the airspace. Trajectory coordination capabilities under this include: Traffic Congestion Depiction, Flight Specific Likelihood Feedback, Pre-Oceanic Coordination Planner, Re-Profile Alert, and Controller 4D Trajectory Insight. These capabilities are all dependent on the 4-D Stochastic Trajectory Model, which provides a three-dimensional (longitude, latitude, altitude) density function of a flight position with respect to its planned flight time.

F. UAS Concept Validation and Requirements Development

UAS operations are expected to increase dramatically in both the public and civil sectors. This proliferation could introduce greater exposure and elevated risk to the safety of operations in the NAS. Air Traffic products, policies, and procedures need to be refined or developed through supporting research to permit safe UAS operations in the NAS. The UAS Concept Validation and Requirements Development activity will identify and mature capabilities within the NAS infrastructure to support the evolution of UAS operations in the NAS.

Advanced planning is essential for identifying and refining operational requirements requiring NAS infrastructure upgrades since lead times for developing technology and capabilities for full integration of UAS National Goals beyond 2020 could span many years. Integration needs, associated research, resultant development of systems enhancements and Air Traffic procedures and training must be conducted within an integrated framework in terms of relevance, timeliness and priorities with respect to all impacted programs and operations. This coordinated effort provides the most successful path to providing integrated UAS operations in the NAS.

Successful integration of UAS into the NAS provides benefits to both public and civil users. Studies indicate benefits when UAS are used in missions related to agriculture, search and rescue, border protection and pipeline monitoring among other applications. These public and civil users, as well as the general public and Commercial and General Aviation, benefit from the work being conducted under this activity since it leads to safe integration of UAS in the NAS, meaning, the UAS get to operate and the rest of the population knows that UAS operations are safe. If this activity is delayed, UAS operations will continue with a limited yet safe capability much like today until improvements can be defined and implemented into the NAS, enabling improved efficiency in handling UAS operations leading to increased UAS capacity.

G. Reduced Oceanic Separation

The current aircraft oceanic separation services range from 30nm to 90nm, depending on avionics equipage onboard an aircraft. The FAA has been evaluating various approaches for improving separation services by providing surveillance coverage in Oceanic Flight Information Regions (FIRs) and remote domestic airspace via a satellite-based solution, including, but not limited to, Space Based Automatic Dependent Surveillance – Broadcast (ADS-B). The existing communication satellite infrastructure is reaching the end of its lifecycle.

The FAA recognizes the potential high value benefits the new space-based capability can provide in oceanic operations. In addition, the new system leverages avionics required by the FAA's ADS-B Out rulemaking to potentially provide users with additional benefits. As the world's largest ANSP, the FAA will ensure its involvement in the development of this technology and is committed to ensuring that the technical performance along with the safety and security posture of the system will meet the Agency's operational needs.

The program is performing an investment analysis with an Investment Analysis Readiness Decision (IARD) completed on January 29, 2014, and Joint Resource Council Strategy Decision completed on October 15, 2014; proceeding to a Final Investment Decision (FID) in FY2016 to baseline Advanced Technologies and Oceanic Procedures (ATOP) modifications and other changes as required to implement the ability to utilize the service.

DOT Strategic Goals – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. ADS-B In Applications – Flight Interval Management

The funding required in FY 2016 will support some development of this key ADS-B In application for users.

B. Modern Procedures

The requested FY 2016 funding level will allow analysis for enhancement capabilities that leverage Separation Management concepts that increase NAS and controller efficiency through enhanced trajectory management, collaboration between tactical (R-Side) and strategic (D-Side) controllers, flight data management, and system support functions.

With the requested FY 2016 funding level, this program is planned and scheduled activities for the NextGen NSIP Bravo capabilities, therefore, completion of this program enables successful implementation of Trajectory Based Operation (TBO) capabilities and achievement NextGen operational improvements.

C. Alternative Positioning Navigation and Timing (APNT)

The requested FY 2016 funding level will allow APNT to complete the alternative analysis research required for the DME network and the ADS-B ground station network, continue limited bench testing of each alternative, and integration of results from integrity model for each alternative to support the conduct of a solution down select to achieve IID by the first quarter of FY 2017.

D. Wake Turbulence Re-Categorization

The requested Wake Re-Cat funding supports the FAA's external commitments to RTCA Task Force 5 and tier 1 NextGen Advisory Committee (NAC) priorities. The requested funding supports Phase II wake separation standards preparation for implementation at Core airports in FY 2017, providing the economic benefit to the airports (and the air carriers that operate at the airports) resulting in a seven to 10 percent increase in their runway throughput capacity.

E. Oceanic Tactical Trajectory Management

The requested FY 2016 funding will allow the program to continue concept development, system engineering, testing and evaluation and conduct demonstration to support of User Trajectory Planning in the Pre-Oceanic phase.

The NextGen Concept of Operations establishes that in order to meet the goals of the NextGen program, significant transformations across the air transportation system will need to occur. Trajectory Based Operations in the ocean are critical to achieving those transformations in nearly all areas of the air transportation system.

The current flight data management systems and the current navigation systems do not support the flexibility needed from both a planning and execution perspective.

F. UAS Concept Validation and Requirements Development

The UAS Comprehensive Plan, delivered to Congress in November 2013, committed to a number of National Goals for the integration of UAS into the NAS, two of which are directly supported by this activity. Those goals, are #3, "Routine Public UAS Operations in the NAS (2015)" and #4, "Routine Civil UAS Operations in the NAS (2020)." Given the duration required to get a capability from original concept to reality, compounded by the number of systems, organizations and interested groups involved, this work must start now and proceed intensely to support the dates committed to in National Goals 3 and 4. UAS operations in the NAS will continue on a case-by-case basis, as they are performed today, to ensure safe NAS operations until this commitment is achieved.

G. Reduced Oceanic Separation

The vendor is launching the next generation of satellites starting in FY 2015. The FAA must invest in advance of the launches to coordinate requirements, participate in vendor activities and ensure the new system meets FAA performance standards. The requested amount will support FAA receipt of pre-operational data between FY 2015 and FY 2017 to conduct service acceptance testing. This will ensure the Space Based ADS-B service is compatible with the avionics US operators will be equipping with to meet the ADS-B Out mandate and that the service would be suitable for use if the FAA decides to procure in the future.

The requested funding for this Program will allow for limited support of the following tasks:

- Support the Safety Case for Space-based ADS-B Out (Alternative 2) (FY 2015 – FY 2018)
- Support Collision Risks and Safety efforts at ICAO
- Conduct separation assurance and safety assessments for alternatives
- Participate in ICAO panels in support of ROS safety case
- Engage in testing and validation
- Conduct FAA Safety Management System (SMS) efforts for changes to the NAS
- Develop Final Requirements

Approval of new safety standard

If the system is in place and the service is available, certified and tested as planned in FY 2018, then the FAA could go to an FID to have ATOP mods approved and in place by 2020 at the latest and provide the service to participating airlines.

What Benefits Will Be Provided To The American Public Through This Request?

Enhancements to Separation Management will provide controllers with tools and procedures to manage aircraft in a mixed environment of varying navigation equipment and wake performance capabilities. Separation management in the National Airspace System (NAS) can be accomplished procedurally and/or by using automation support. Through this request, both procedure and automation support will be enhanced, thus improving safety, increasing operational efficiency, and expanding current capabilities throughout the NAS. Separation management is performed in a different way in each of the domains. New wake turbulence categories will provide controllers with new guidance on how to procedurally apply wake turbulence separation criteria in certain situations, primarily for arrivals and departures, thus improving efficiency. The automation changes required will assist controllers in performing separation management for specific conditions and types of operations in their respective domains, improving both efficiency and safety. In general, capabilities in this portfolio will enhance aircraft separation assurance by safely reducing separation between aircraft, and as a result improve capacity, efficiency and safety in the National Airspace System.

Capacity
Capabilities in this portfolio will support an increase in capacity by increasing airport throughput as a result of closer spacing of flights accepted from TRACON airspace and managed on final approach. Automation capabilities will also enable air traffic controllers and pilot through reduced separation between aircrafts to manage increasing traffic levels in oceanic airspace.

Efficiency
This portfolio will provide improved efficiency through the introduction of capabilities that will enable more oceanic flights to ascend and descend to their preferred altitudes. Controllers will also be able to approve additional pilot requests for direct routes and more efficient altitudes.

Safety
This portfolio will provide controllers automated information about wake vortex separation requirements for any given aircraft pair, along with accurate wind data which will help predict more accurate and safer separation standards.

A. ADS-B In Applications – Flight Interval Management

Expected benefits include reduced need for downstream path-lengthening, and consistent, low variance spacing between paired aircraft that improves arrival capacity. FIM-S is also expected to reduce ATC instructions and workload without an unacceptable increase in flight crew workload.

B. Modern Procedures

Separation Management automation is defined to include all ATC automation capabilities that assist controllers in maintaining safe aircraft separation while optimizing use of airspace system capacity. This program will provide the following major benefit:

- Enhance Trajectory Based Operations (TBO) by improving Separation Management and Modern Procedures
- Increase NAS safety and efficiency to the flying public and the air carriers
- Increase controller confidence and ability to maintain safe separation of aircraft
- Modernize the controller human interface for situational awareness on both R-side and D-side
- Increase automation support to controller for identifying and applying efficient separation criteria during busy operations while decreasing controller workload

C. Alternative Positioning Navigation and Timing (APNT)

FAA gains an RNP backup to GPS that may enable further decommissings of VORs in the Minimium Operating Network. In the event of a GPS outage, airspace users will get increased flight efficiency, and despite the outage, users would be able to continue flying RNAV and RNP routes and optimized profile descents, which by extension continues their energy savings through reduced noise and emissions.

D. Wake Turbulence Re-Categorization

It is expected that the use of the Phase II standards will increase airport runway throughput capacity by seven percent to 10 percent, allowing more flights into and out of airports during periods of peak air carrier operations.

E. Oceanic Tactical Trajectory Management

Aircraft will be able to fly more efficient, user-preferred oceanic routes. With increased system precision and enhanced automation, aircraft can more closely fly routes that realize the airlines goals for fuel efficiency and schedule reliability. Reduced separation standards for aircraft that rely on shared state and intent data will lead to fewer predicted problems, and as a result, fewer diversions from the preferred routing. Reduced separation standards will also result in increased capacity, allowing more aircraft to fly within flow-constrained airspace rather than being re-routed or delayed to avoid them.

F. UAS Concept Validation and Requirements Development

The UAS Concept Validation and Requirements Development activity plays a critical role in enabling UAS operations in the NAS without impacting "normal" operations and creating disruptions or delays and ensuring NAS operations will be as safe or safer than they are today. Government cost of allowing UAS operations will decrease due to the reduction of "exception handling" of UAS flights, and improvements to NAS capabilities and operations will be made cost effectively due to the integrated framework approach to addressing needs and solutions.

G. Reduced Oceanic Separation

By increasing the use of 30/30nm separation and pursuing reductions to 15/15nm separation standards or less, this investment will increase system capacity resulting in more efficient operations.

Detailed Justification for - 1A06 NextGen - Improved Surface/Terminal Flight Data Manager (TFDM) Portfolio

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Improved Surface/TFDM Portfolio
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Improved Surface/TFDM Portfolio	$23,139*	$38,808	$17,000	-$21,808

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Terminal Flight Data Manager (TFDM)	---	$15,000.0
B. Surface Tactical Flow (STF)	---	2,000.0
Total	Various	$17,000.0

A. Terminal Flight Data Manager (TFDM)

For FY 2016, $15,000,000 is requested to support the following key activities of TFDM:

- Complete the evaluation of the prime contractor proposals received in response to the TFDM Screening Information Request (SIR)
- Conduct and complete the following planning activities
  - Master Test Plan
  - Integrated Logistics Support Plan
  - Implementation Strategy and Planning Document
  - Post-Implementation review (PIR) Strategy
  - Safety Risk Management Preliminary Hazard Analysis
- Complete Investment Analysis (IA) – Establish a Program Baseline at final investment decision by completing the following:
  - Cost Basis Of Estimate (BOE)
  - Benefits BOE
  - Integrated Master Schedule through Final Site Implementation
  - Business Case Analysis Report
- Award Prime Contractor Conduct Program Management/System Engineering activities
- Start the Planning of Operational Transition and Implementation activities
- Begin Solution Development and Implementation by conducting the following reviews:
  - System Requirements
  - Preliminary Design
  - Integrated Baseline

As of August 2014, TFDM is in the Investment Analysis (IA) Phase. In March 2014, the program completed Initial Investment Decision (IID) and down selected to a preferred alternative to meet the TFDM requirements. At the IID, the FAA selected the most cost beneficial alternative for acquisition and implementation. In April 2014, the program completed the Request for Information (RFI) Release #3 and in May 2014 received JRC approval to proceed with Early Implementation activities.

In FY 2015 the program will continue IA activities, release the TFDM SIR, and begin evaluation of the prime contractor proposals. In FY 2016 the Program Office plans to complete the IA and receive a Final Investment Decision (FID) to begin design and development of the selected alternative. Program metrics and measurement criteria will be established to verify that the program delivers the benefits identified at establishment of the baseline.

B. Surface Tactical Flow (STF)

For FY 2016, $2,000,000 is requested to support the following key activities of Surface Tactical Flow:

- Conduct evaluation through simulation of capabilities incorporating runway load balancing, airport configuration and surface resource use prediction
- Complete an assessment of other surface capability shortfalls to focus research efforts on surface capability improvements
- Update Benefits Analysis including evaluation of prototype capabilities which will lead to the attainment of NextGen goals, namely to ensure safety, expand capacity, increase efficiency, and protect the environment

What Is This Program And Why Is It Necessary?

A. Terminal Flight Data Manager (TFDM)

The TFDM program is currently an acquisition program that delivers NextGen decision support capabilities to tower air traffic controllers and FAA traffic managers with decision support capabilities that integrate flight, surveillance, and traffic management information. The TFDM program will provide an integrated approach to maximize the efficient collection, distribution, and update of data including flight information in the terminal area (airspace around an airport and airport surface data) and to improve access to information necessary for the safe and efficient control of air traffic. The use of Electronic Flight Data (EFD) will allow tower controllers to maintain an integrated view of the air traffic environment, improving their situational awareness of the airport operations. The decision support capabilities will also provide more efficient and safe airport operations, in particular management of airport surface traffic sequencing and scheduling. The TFDM program will also automate the manual flight data processes to enable enhanced data sharing between the Tower ATC and the En Route ATC, Approach Control ATC, Traffic Flow Management (TFM), and Flight/Airline Operations domains.

A key component is the transition from paper flight strips to electronic flight data representation and exchange. This will facilitate flight data exchange between controllers within the tower facility, between Air Traffic Control facilities and between traffic flow management systems. This will also facilitate data exchange with aviation partners such as the airlines and flight operators to support collaborative decision making. This will eliminate the necessity of physical exchange of flight data, reduces telephone exchange of data between facilities, and reduces manual re-entry of data among multiple ATC systems.

The TFDM program will continue to support the recommendations of the RTCA Task Force 5, the NextGen Advisory Council (NAC), and the Operational Capability Integration Plan (OCIP) by providing some early TFDM capabilities in the NAS, starting in FY 2014 and continuing into FY 2018, including deploying early capabilities through existing National Airspace (NAS) systems. Improving surface operations and data sharing with the operators rated among tier one priorities for the NAC in their report "NextGen Priorities in a Budget Constrained Environment." TFDM will replace or enhance these capabilities significantly to meet stakeholder recommendations and agency commitments.

The capabilities provided by TFDM will deliver multiple NAS benefits, such as reduced surface delay, taxi time and fuel burn (with improved operational and environmental performance); better performance and airport capacity utilization during severe weather and other off-nominal conditions; improved usability and situational awareness and enhanced safety.

Surface Tactical Flow (STF)

The goal of STF is to mature new surface capabilities that make air transportation safer and more reliable while improving the capacity of the National Airspace System (NAS) and reducing aviation's impact on the environment. Using an applied research process, STF:

- Identifies remaining surface shortfalls at the busiest airports
- Performs evaluation activities to mature emerging technologies and validate the capabilities to address the shortfalls
- Analyzes benefits of surface capabilities
- Transfers mature solutions to the Program Management Office in the appropriate timeframe for implementation

Surface Tactical Flow supports the collaboration between National Aeronautics and Space Administration (NASA), public/private industry partners, customers, and operators in the evaluation of surface technologies and decision support tools. Surface Tactical Flow provides guidelines for the development of a collaborative Surface Traffic Management (STM) system with tools necessary to achieve a fully collaborative surface environment, where the input of airlines, airports and air traffic controllers are all used to provide a shared surface situational awareness. Surface Tactical Flow addresses and meets the rapidly changing needs of the aviation industry, by introducing innovative concepts and technologies in the air traffic system and conducts risk reduction activities for implementing programs.

The NextGen vision requires changes to procedures in the flight operator and Air Traffic Control (ATC) Tower (ATCT) environments. Surface Tactical Flow validates the concept and requirements development and allows incremental steps toward the complete concept, providing benefits at each step of the way and remaining aligned with the introduction of other NextGen technologies.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. Terminal Flight Data Manager (TFDM)

In FY 2016 $15,000,000 is required to complete investment analysis leading to the establishment of a TFDM Program Baseline, contract award, and initiate design/development activities for the TFDM capabilities. Terminal Flight Data Manager is a key ground infrastructure program for NextGen mid-term operations in the areas of flight planning; push back, taxi and departure; descent and approach; and landing, taxi and arrival. As shown in the implementation timeline in the NextGen Implementation Plan (NGIP), TFDM supports NextGen mid-term Improved Surface Operations as the primary contributor to the NextGen Operational Improvement (OI) 104209: Initial Surface Traffic Management.

The NAS relies on several flight data management systems in Air Traffic Control Towers (ATCTs) to provide flight object data and traffic management tools in the terminal environment. Many of these systems (including Departure Spacing Program, Airport Resource Management Tool, Electronic Flight Strips Transfer System and Surface Movement Advisor) will require replacement in order to continue to provide the current services through the years. In lieu of modernizing or replacing each of these systems/capabilities individually, it is necessary to develop an integrated Terminal Flight Data program that provides all of the data and tools currently available to controllers, as well as emerging capabilities such as departure metering, virtual queuing, runway load balancing, and EFD and shared situational awareness of the surface traffic for the TRACON, ARTCC and command center.

The NAS currently lacks understanding of actual surface demand among FAA services. Demand predictors are not driven by timely surface demand data, and lack integration with Flight Operator intent data. Since the demand in these areas will continue to grow, funding is required to ensure that enhanced capabilities will be available to meet both the current shortfall, as well as future demand.

B. Surface Tactical Flow (STF)

In FY 2016, the Surface Tactical Flow Project plans to evaluate the benefits and viability of tools to support more efficient surface operations. The planned work will focus on the development of efficient traffic flow management and collaborative decision making on the surface in support of NextGen. The program will leverage the System Wide Information Management research node data and Surface Tactical Flow lab facilities at WHJTC to enable simulations and modeling.

What Benefits Will Be Provided To The American Public Through This Request?

A. Terminal Flight Data Manager (TFDM)

The portfolio focuses on gaining efficient flow and management of aircraft on the surface at selected metroplex airports and the complex terminal airspaces within the NAS. High density airports typically see higher demand for runway capacity, operate multiple runways, and have complex airspace and ground interactions in the arrival and departure phases of flight. Prototype and Human-In-The-Loop simulation activities related to this work have already been conducted to validate the TFDM concepts and to reduce risks during TFDM investment analysis.

Once implemented, TFDM will provide the American public with benefits, such as reduced surface delay, taxi time and fuel burn resulting in reduced CO_2 missions; better performance and airport capacity utilization during severe weather and other off-nominal conditions; improved usability and situational awareness; and enhanced safety.

B. Surface Tactical Flow (STF)

Changes in surface operations will contribute to NextGen goals, directly benefiting the traveling public. The surface capabilities being researched are expected to improve both the efficiency of individual flights while optimizing runway throughput.

- Allow more efficient use of the airport and terminal airspace resources
- Reduce delays on the airport surface and in the NAS
- Increase throughput/capacity with better utilization of surface resources
- Reduce emission due to less engine run time on the airport surface and to/from the arrival/departure fix

These potential benefits will make travel safer for the traveling public, help reduce passenger delays leading to a better traveling experience, and contribute to less pollution.

Detailed Justification for - 1A07 NextGen – On Demand NAS Portfolio

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – On Demand NAS Portfolio
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
On Demand NAS Portfolio	$8,500*	$6,000	$11,000	+$5,000

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Flight Object	---	$2,500.0
B. Common Status and Structure Data	---	2,500.0
C. Flight Objects Exchange Services	---	5,000.0
D. Dynamic Airspace	---	1,000.0
Total	Various	$11,000.0

The On Demand NAS Information (ODNI) portfolio provides flight planners, Air Navigation Service Providers (ANSP) staff, and flight crews with consistent, complete, and easily processed information on changes of conditions in the NAS affecting safety, security, and efficiency. The NAS today uses relatively blunt tools to manage demand and capacity imbalances. These tools do not share objectives for flights, nor do they have a common picture of the structure and status of the NAS. The On Demand NAS services provided by NextGen will provide flight operators the necessary information to plan and coordinate flights to the maximum extent possible. This portfolio strives to provide necessary information for flight planners to have common situational awareness of NAS airspace constraints which optimizes interaction between pilots, controllers, and ANSP.

The ODNI Portfolio, as stated in the NextGen Implementation Plan (NGIP), ensures that airspace and aeronautical information is consistent across applications and locations and available to authorized subscribers and equipped aircraft. For FY 2016, the ODNI portfolio requests $11,000,000 to support the continued pre-implementation efforts for Common Status and Structure Data (CSSD) (Aeronautical Information Management Modernization (AIMM) Segment 3), development of the Flight Information Exchange Model (FIXM) standards, concept exploration and integration of a Flight Object Exchange Service (FOXS), service analysis of new tools to support traffic flow management procedures and automation, continued engineering in support of inter-agency information exchange and security, and concept readiness for new tools to enable real time, dynamic configuration of airspace and resource allocation.

A. Flight Object

NAS systems currently operate as separate entities servicing different flight domains (Preflight, Airport, Terminal, Enroute, and Oceanic). Similarly, International ANSPs also operate as separate entities servicing their own airspace. Even though flight data may be found in multiple NAS systems, a unified, complete, accurate, up-to-date, and easily-accessible picture of any and all flights does not exist today. The primary goal of the Flight Object program is to develop an International data standard - FIXM. This data standard will support the exchange of flight information between systems across multiple domains (including both NAS and International systems). FY 2016 funding will result in the development of the FIXM standards v5.0.

B. Common Status and Structure Data

The CSSD program provides requirements for ingesting, fusing, and distributing static and planned constraint information including Special Activity Airspace (SAA) and airport configuration data (i.e., airspace definitions and schedules, airport configuration definitions and business rules), Letters of Agreement (LOA)/Standard Operating Procedures (SOP) constraints, and relevant aeronautical data and information such as airspace activation, active runway, and additional status information from NAS systems including En Route Automation Modernization (ERAM) and Terminal Flight Data Manager (TFDM) respectively to deliver common status and structure data and integrated information products through web services. This program enables the FAA to provide integrated lifecycle management of the aeronautical information necessary to support NextGen capabilities.

Specifically this effort will support

- acquisition engineering within the ODNI Portfolio in the Bravo timeframe)
- Prepare investment analysis documentation for AIM Modernization Segment 3 Develop concept for legacy LOA/SOP hardcopy migration to electronic capability
- Develop concept, policy and procedure for electronic LOA/SOP capability

C. Flight Object Exchange Service

In addition to the FIXM standard, a means to exchange the flight data is also required. The Flight Object Exchange Service (FOXS) will establish the information architecture and NAS interface changes to transition to a modernized flight data exchange infrastructure necessary to support NextGen capabilities and international harmonization efforts. Flight data exchange is not new to the NAS, but an updated infrastructure is necessary to keep up with emerging capabilities. FOXS will work with the existing NAS systems to analyze the needs and define a new, updated flight data infrastructure. This work will continue from previous concept readiness work and preliminary work on an updated Concept of Use. Operational Scenarios and flight data exchange requirements will be generated, which will ultimately produce an Initial Investment Analysis package for implementation of consolidated national exchange of standardized flight data.

D. Dynamic Airspace

The Dynamic Airspace program will develop the requirements and algorithms for tools to enable air traffic managers to reconfigure airspace to expand or decrease air traffic control sectors to match the overall level of activity in the facility's airspace and dynamically manage restrictions on travel through designated areas. Airspace reconfiguration will be flexible, so that it can be applied across time horizons of varying scale – from years to months to days to hours. It will allow the transfer of airspace from adjacent areas within a facility, as well as airspace from adjacent facilities to improve efficiency of operations. Dynamic airspace supports robust aviation business continuity capabilities for a consistent NAS flow strategy.

What Is This Program And Why Is It Necessary?

The ODNI portfolio will implement programs and processes to ensure that NAS and aeronautical information are consistent across applications and locations and are available to authorized subscribers and equipped aircraft. Users will request NAS flight and aeronautical information when planning flights through services that will allow them to collaborate with Air Navigation Service Providers (ANSPs), resulting in improved flow management and efficient use of resources. In-flight Air Traffic Management (ATM) planning will be improved by making consistent data on constraints available to all NAS users. This effort encompasses the development of international standards for operational use of FIXM and Aeronautical Information Exchange Model (AIXM).

A. Flight Object

The Flight Object will be the standard medium for capturing and sharing the most up-to-date information on any flight and will serve as the single common reference for all system information about that flight. A Flight Object will be created for each proposed flight, and the Flight Object information will be updated throughout the entire time the flight progresses from gate to gate. The Flight Object will collect, manage and provide flight-specific data, such as aircraft identification, aircraft parameters, current flight plan information, operator preferences, flight capabilities, and security information. The Flight Object is not envisioned to include environment or weather information, since these are system-wide elements that affect multiple flights. The sum of information contained in the Flight Object will be much richer than today's flight data construct.

FIXM is an International data exchange standard for the Flight Object. FIXM is part of a family of information exchange models (including AIXM and Weather information Exchange Model (WXXM)) designed to cover the information needs of ATM. The FIXM content is driven and managed with the International community and will be used globally. This data standard will support the improved exchange of flight information between systems across multiple domains (including both NAS and International systems) enabling increased operational efficiency and increased situational awareness. The FIXM standard is released annually, with updates to add/delete/modify data elements as necessary. Without the necessary funding, the scheduled release will be delayed, risking damage to the international collaboration on the FIXM standard.

B. Common Status and Structure Data

The CSSD program provides the mission analysis and pre-implementation support for achieving NextGen goals of "Shared Situational Awareness" and "Trajectory Based Operations". The integration activities include provision of comprehensive flight planning and pilot briefing services, on-demand NAS operational performance information and integrated airspace management. This program enables the FAA to provide integrated lifecycle management of the aeronautical information necessary to support NextGen capabilities.

Key elements of the CSSD program include: Capturing and maintaining digital information about flow constraints, structure and status information affecting operations; publishing aeronautical status information digitally using international standards; enabling value added services using aeronautical status information such as improved flight planning and briefing services; and using the status information to improve operational performance metrics calculations and forecasting of airspace system performance.

To support future AIM Modernization Work Packages, CSSD will develop prototypes for Dynamic SAA and SOP/LOA web services. They will demonstrate functionality to support objectives and concepts from the On Demand NAS Information portfolio. Work will also include updating the web service standards to support enhanced temporality for dynamic data requirements.

C. Flight Object Exchange Service

The Flight Object Exchange Service (FOXS) is intended to be the service used by NAS for capturing and sharing the most up-to-date information on any flight and will serve as the authoritative source for all system information about that flight. The FOXS will create a flight object for each proposed flight, and the flight object information will be updated throughout the entire lifecycle as the flight progresses from gate to gate. The FOXS and authorized system clients will be able to create, modify, and delete flight object data and the FOXS will manage, distribute, constitute, and reconstitute flight object data, to NAS and Non-NAS clients based upon event and time driven events. The FOXS managed flight object data will contain FIXM data but is not envisioned to include environment or weather information, since these are system-wide elements that affect multiple flights. The sum of information managed in the Flight Object by FOXS will be much richer than today's flight data.

From the ATM perspective, the FOXS contains information needed for planning system resources and ensuring safety of flight while providing the requested service to the extent possible in the dynamic ATC environment. Today's NAS Flight Data Infrastructure needs to be updated to meet the needs of emerging capabilities that require robust, dynamic, accessible and accurate data. Working with the existing NAS systems, FOXS will provide a new Flight Data Infrastructure that meets the needs of these emerging capabilities.

D. Dynamic Airspace

Dynamic Airspace will enable FAA to best match available resource capacity with the demands placed upon the NAS, maximizing system efficiency. By establishing the necessary flexible infrastructure, FAA can reallocate airspace and supporting systems within or across ATC facilities to meet the projected demand elsewhere in the NAS, thereby maximizing the use of existing resources to manage demand/capacity imbalances where needed. This capability will also inherently provide greater agility in response to contingency operations, enabling the reallocation of resources to recover lost capacity during a systems outage.

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

$11,000,000 is required to continue execution of work within the NextGen ODNI Portfolio. The FY 2016 work furthers the development of the Investment Analysis Readiness Decision package for AIMM Segment 3; refines concepts related to Constraint Prediction, Monitoring and Alerting, Operational Response Development and Post-Operational Analysis and Training capability areas; continues the development of the FIXM standards; integrates FOXS; completes a survey of industry standard behavior modeling and tool sets to analyze NAS data and observe typical system behavior, and begins preliminary concept readiness for dynamic reconfiguration of airspace allocations.

What Benefits Will Be Provided To The American Public Through This Request?

The On Demand NAS portfolio encompasses information sharing within the NAS. The work supporting this portfolio 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 by fiscal year 2015.

- Mini Global Demonstration – Advances in digital communication throughout the world have necessitated the establishment of information exchange standards to ensure interoperability. International Civil Aviation Organization (ICAO) led the development of the Information Management (IM) roadmap, which was endorsed at the 2012 Air Navigation Conference (ANC 12). The IM roadmap lays a path to interoperability and is the establishment and adoption of the flight, aeronautical, and weather exchange standards. This demonstration, due to international dependencies, included an expanded number of partners including AirServices Australia, Japan's Civil Aviation Bureau (JCAB), NAVCANADA, Lockheed, Harris, Boeing, and SESAR. The demonstration showcased the use of the latest standards enabling information exchange between operators flying across (Flilght Information Regions (FIRs) and ANSP's. It included sharing of information and security protocols to ensure uncompromised information sharing.
  - Results from the Mini Global demonstration (1) led to requirements for the next version of the exchange standards (AIXM, FIXM and WXXM), (2) affected functional requirements for the next upgrade of the security infrastructure, and (3) and were reported out at the ICAO demonstration assembly.

FIXM and AIXM Standards development – The FAA leads the global harmonization and standardization of the Flight Information Exchange Model and Aeronautical Information Exchange Model via internal and external collaboration meetings with the appropriate Communities of Practices (CoPs) and international standards organizations (e.g. ICAO, IATA), Developing a standard model to exchange flight and aeronautical information provides enhanced levels of safety and reliability by providing the FAA and flight operators a consistent and universally readable status on flight data and airspace availability and restrictions. In order to harmonize these standards with the international community, the FAA serves as the lead member on the FIXM configuration control board (CCB) representing the United States. The CCB is responsible for approval of all changes to FIXM core which is the ICAO accepted standard for exchange flight information between international flight operators and airspace managers. The FAA also hosts an international panel of information providers and consumers at the annual Air Transportation Information Exchange Conference (which includes the AIXM and FIXM information exchange models and their extensions). This conference discusses upcoming changes to the exchange models and provides a forum for developers to showcase new ueses of the exchange models to create an enhanced collaborative decision making environment.

A. Flight Object

Flight Object will develop a global standard for flight information and will make NAS-wide information sharing easier than in the current NAS. The development of a standard set of flight information will benefit airlines by simplifying the flight planning process and provide information that will cross multiple ATC systems and domains with ease, leading to improvements in on-going traffic management initiatives and decision making. This should improve efficiency and minimize reduction in delays.

B. Common Status and Structure Data

The CSSD program will provide benefits to the American Public in the areas of safety, capacity & efficiency and cost avoidance. CSSD provides an increase in safety by increasing the amount of accurate, actionable information available to pilots, airlines and other NAS operators and by ensuring all NAS participants have a common, shared situational awareness which will reduce accidents that are attributable to pilot briefing errors, missing information and violation of NAS flow constraints and restrictions. Capacity and efficiency will be increased through the availability of better information leading to improved flight planning and improved traffic flow management via access to near-real-time NAS performance information. CSSD will support FAA cost avoidance in aeronautical information gathering, management and use across the NAS enterprise.

C. Flight Object Exchange Services

The FOXS program takes the global eXtensible Markup Language (XML) standard developed in the Flight Object program and provides for the implementation and use of this in the NAS. The American public will see a decrease in delays with the implementation of the FIXM standard due to the improved decision making capability and traffic management capabilities provided by a standardized language for the communication of flight information.

D. Dynamic Airspace

Dynamic Airspace will maximize system efficiency through the reallocation of existing resources where they are most needed to address demand and capacity imbalances, ultimately reducing NAS delays. Further, this program creates additional NAS agility in support of contingency operations, enabling an accelerated recovery to optimal operations following a system outage. Both of these improvements will benefit the flying public through decreased system delays, increased predictability, and enhanced access to the NAS.

Detailed Justification for - 1A08 NextGen – Environment Portfolio

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Environment Portfolio
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Environment Portfolio	$9,443*	$5,500	$1,000	-$4,500

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Environmental Management System and Noise/Emissions Reduction	---	$1,000.0

The Environment Portfolio would utilize an Environmental Management System (EMS) framework to track environmental performance of the national air space and examine mitigation solutions to reduce the impacts of aviation on the environment. In particular, this program will further develop our environmental assessment capabilities and then use them to identify solutions that could be used to meet the energy and environmental goals of the FAA. For FY 2016, $1,000,000 is requested to:

- Enhance terminal area capabilities within the Aviation Environmental Design Tool (AEDT) to enable the evaluation of environmental impacts from NextGen.
- Further integrate NextGen simulation models and data with aviation environmental tools.

In FY 2016, the efforts under this program will continue to focus on solution development to reduce aviation noise, emissions, and fuel burn thus helping to address the environmental and energy challenges facing aviation.

What Is This Program and Why is it Necessary?

The Environment Portfolio program is providing analysis to support the development of solutions to mitigate the impacts of aviation on the environment. At the core of the program is the development and use of an integrated aviation environmental tool suite to examine the national air space. These tools are built upon a sound scientific understanding, which is being developed as a part of the Environment and Energy RE&D A13.a Program. The program is using these models and knowledge to inform the development of environmental mitigation measures that will be needed if the U.S. is to ensure that environmental impacts are not a constraint on aviation growth.

Despite the technological advancements achieved during the last 40 years, aircraft noise still affects people living near airports, and aircraft emissions continue to be an issue at local, regional, and global scales. 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 are 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. FAA and all aviation stakeholders must work to address these impacts in order for aviation to meet increased demand while operating with flexibility and efficiency.

The FAA is working to mitigate the environmental impacts of aviation through a five pillar approach consisting of 1) improved tools for environmental analysis; 2) aircraft and engine technologies; 3) alternative fuels; 4) Air Traffic Management and operational procedures improvements; and 5) environmental policies and standards. The Environment Portfolio program and the accompanying Environment and Energy RE&D A13.a and NextGen Environmental Research RE&D A13.b programs are implementing this five pillar approach.

Environmental Management System Framework:

The FAA has designed the NextGen Environmental Management System (EMS) framework to evaluate progress towards aviation environmental and energy goals within the National Air Space (NAS) and to aid in developing new options to further mitigate aviation environmental impacts. The NextGen EMS framework relies on environmental assessment capabilities and their use to examine the current and future state of the NAS. This effort has led to enhancements of local to NAS-wide environmental assessment capabilities within the Aviation Environment Design Tool (AEDT), improved environmental impacts and economics capabilities in the Aviation Environment Portfolio Management Tool (APMT) as well as integration of these environmental assessment capabilities with NAS design tools, simulation models and performance monitoring systems. These environmental modeling capabilities are being used with a combination of the FAA Terminal Area Forecast (TAF), improvements in operational procedures (including those from NextGen incorporation), fleet technology advancement, and estimates of future alternative jet fuel penetration to estimate the current and future environmental performance of the NAS. Through these efforts, the NextGen EMS framework is providing a systematic examination of options for noise, fuel burn, and emissions reduction to support sustainable mobility growth.

Advanced Noise and Emission Reduction:

Implementation of advanced aircraft (both engine and airframe) technologies, and improved environmental and energy efficient operational procedures are keys to reductions in significant environmental impacts while improving system energy efficiency. Policy options, environmental standards and market based measures also provide mitigation that will help meet environmental and energy efficiency goals. This program will focus on assessing the impacts of surface, departure, en route, and arrival operational procedures and Air Traffic Management (ATM) related technologies that could reduce noise, emissions, and fuel burn. This program interfaces with the technology maturation efforts in the CLEEN (Continuous Lower Energy, Emissions and Noise) Program being pursued under the NextGen Environmental Research RE&D A13.b program.

DOT Strategic Goal - Environmental Sustainability

- Advance environmentally sustainable policies and investments that reduce carbon and other harmful emissions from transportation sources.

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

$1,000,000 is requested for the NextGen Environment Portfolio. This funding level will support the use of the NextGen Environmental Management system to evaluate progress towards meeting aviation environmental and energy goals and to aid in developing new mitigation options. It will also support the development of environmental assessment capabilities that are integrated with NAS design tools, simulation models and performance monitoring systems to allow for improved evaluation of the integrated noise, emissions and fuel burn impacts of changes in operational procedures including those from NextGen. It will also allow for limited efforts to evaluate ATM-related technologies and to assess the environmental benefit of environmental and energy efficient gate to gate operational procedures.

What Benefits Will Be Provided To The American Public Through This Request?

The NextGen Environment Portfolio has had considerable success in advancing the development of noise and emissions reduction solutions, evaluating the environmental performance of the NAS, and in developing the NextGen Environmental Management System. Some of these successes are listed below.

In the area of solution development, the NextGen Environment Portfolio has supported the CLEEN Program which has matured ATM-related technologies via ground and flight tests with some technologies already being planned for introduction into the fleet. This program has also supported the development of the N-Collaborative Control concept and its successful demonstrations at Boston Logan Airport. Based on these demonstrations, N-Collaborative Control is set for another demonstration at New York LaGuardia, and it is also being examined for its possible integration into Surface Trajectory Based Operations Capabilities. Finally, this program has supported the evaluation of environmental standards. During the ICAO CAEP/9 meeting, which took place in 2013, analyses performed under the NextGen Environment Portfolio were used by the U.S. to inform its decision making about the forthcoming international carbon dioxide standard.

This program is helping to meet the NextGen Concept of Operations requirement to provide a mechanism for integrating environmental protection objectives into decision making. The efforts have been focused on ensuring the Aviation Environmental Design Tool (AEDT), the next generation environmental consequences modeling tool, is available for environmental assessment of the NAS. AEDT version 2a was released in March 2012 and is now the FAA's standard regional noise model replacing the Noise Integrated Routing System (NIRS). The first phase of integrating AEDT with NextGen air traffic models work has been completed with a guidance document being delivered to support operations and environmental modelers in integrating the two modeling domains.

The industry outreach done by the FAA for the NextGen Environmental Management System has identified a demand for a formalized mechanism for industry to collaborate and share information on environmental challenges. As a result, the FAA launched an industry/FAA collaborative development program which identified core aviation stakeholders (including representatives from air carriers, airports, manufacturers, and FAA) to work to develop a reward/recognition program that aims to help address complex aviation environmental challenges.

The Continuous Descent Arrival operational procedure was developed through this program, and it is currently providing benefits to the American Public in the form of reduced emissions and often noise near airports. The continued funding of the Environment Portfolio program will reduce the chance that environment is a constraint on aviation growth thus ensuring the American Public can experience the benefit of increased mobility from NextGen.

Detailed Justification for - 1A09 NextGen – Improved Multiple Runway Operations (IMRO)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Improved Multiple Runway Operations (IMRO)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Improved Multiple Runway Operations (IMRO)	$9,000*	$5,500	$8,000	+$2,500

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Wake Turbulence Mitigation for Arrivals	---	$1,500.0
B. Closely Spaced Parallel Runway Operations	---	2,000.0
C. Ground Based Augmentation System	---	2,500.0
D. Demostration – Paired Approach	---	2,000.0
Total	Various	$8,000.0

The Improved Multiple Runway Operations (IMRO) Portfolio, as stated in the NextGen Implementation Plan (NGIP), improves runway access through the use of improved technology, updated standards, safety analysis, and modifications to air traffic monitoring tools and operating procedures that will enable more arrival and departure operations. This portfolio supports improving approach and departure operations to closely spaced, parallel, converging, and intersecting runways. For FY 2016, $8,000,000 is requested for use of improved technology, updated standards, safety analysis, and air traffic tools and operating procedures to enable more arrival and departure operations by work performed under the Wake Turbulence Mitigation for Arrivals (WTMA), Closely Spaced Parallel Runway Operations (CSPO), Ground Based Augmentation System (GBAS) projects. CSPO advances FAA's progress on the Improved Parallel Runway Operations Operational Improvement (OI) 102141 of the NGIP, WTMA advances progress on Wake Turbulence Mitigation for Arrivals: CSPRs (OI 102144), and GBAS advances progress on Ground Based Augmentation System (GBAS) Precision Approaches (OI 107107).

A. Wake Turbulence Mitigation for Arrivals

WTMA-Procedure (WTMA-P) allows reduced wake separations to be applied during instrument landing operations at airports that meet certain closely spaced parallel runway layout criteria. The procedures would be used by controllers in reducing wake separations imposed on aircraft following behind Boeing 757 or Heavy wake category aircraft when landing on an airports set of closely spaced parallel runways (runways less than 2,500 feet apart). WTMA-System (WTMA-S) will be used by controllers to reduce wake separations imposed on aircraft following "Heavy" wake category aircraft landing on the adjacent downwind parallel runway – resulting in higher runway throughput. WTMA-S allows controllers to reduce, and potentially eliminate, required wake separation for approaches to CSPRs if WTMA-S determines there is sufficient crosswind to prevent Heavy aircraft wakes from drifting into the arrival path of aircraft approaching the other CSPR. The operational improvement expected from WTMA-S is a greater reduction in wake turbulence separation, and therefore greater capacity enhancement, than can be achieved alone by WTMA-P due to the additional wake turbulence mitigation effects of the crosswinds. The FY 2016 funding will include the following:

- Develop and validate WTMA-S requirements via prototyping
- Complete Terminal Automation Modernization and Replacement (TAMR) Automated Terminal Proximity Alert (ATPA) Phase 2 adaptations for WTMA-P Software Modification
- Develop and deliver TAMR ATPA Phase 2 adaptations for WTMA-P software to Philadelphia International Airport (PHL) key site
- Develop and deliver TAMR ATPA Phase 2 training package to PHL
- Develop TAMR ATPA Phase 3 simulation capability for use with WTMA-S evaluations

B. Closely Spaced Parallel Runway Operations

The CSPO project will enhance procedures that allow dependent operations and simultaneous independent operations to parallel runways with separations between 2,500 feet and 4,300 feet. Additionally, CSPO will develop procedures for paired approaches to runways closer than 2,500 feet. These procedures will improve airspace capacity while maintaining safety at airports utilizing closely spaced parallel runways. Funding supports analysis and research to identify potential alternatives such as the application of existing and new technologies to current standards, reevaluation of the applicability of the blunder model assumptions and the use of the model on risk assessments, and the development of new standards to facilitate NextGen applications. The likely NextGen applications include the following:

- Complete analysis of the use of ADS-B w/FUSION: White Paper
- Finalize SAPA algorithm to Paired Approach to CAT II/III
- Complete High Update Rate (HUR) Surveillance studies with Final Report
- Perform additional Fast-Time Simulation for Paired Approach to CAT I minima
- Support the implementation of new standards for triple approaches and approaches utilizing HUR surveillance

C. Ground Based Augmentation System

A Category III Satellite Navigation (SATNAV) solution is desired worldwide, and this is leading to the development of International Civil Aviation Organization (ICAO) standards for Category III GBAS. These standards have been published and are currently in the validation phase. The funding will support the development of a prototype of a Category III GBAS capability (GBAS Approach Service Type D, GAST-D) for validation testing with an option for the vendor to seek a Category III non-federal approval using the developed baseline. The funding will accomplish the following:

- Perform initial System Design Approval (SDA) for GBAS Cat III Approach Service Type D (GAST-D) system
- Perform review of technical performance of Cat III prototype using FAA avionics and ground system prototypes
- Perform validation of ICAO Standards And Recommended Practices (SARPS) for the baseline set of GAST-D requirements

D. Demonstrations – Paired Approach

The Paired Approach will demonstrate how satellite surveillance of aircraft for controllers (ADS-B) and pilot self-separation, called flight-deck interval management defined interval (FIM-DI), can be combined to conduct simultaneous instrument approaches in all weather conditions to runways that are closely spaced and parallel to each other. This demonstration is expected to show benefits such as increased airport arrival rates, less time spent in the air maneuvering for a final approach, fuel savings for the airlines, and reduced emissions for the environment. The FY 2016 funding will include the following:

- Complete assessment of Paired Approach for CAT I concept and needed ground and aircraft capabilities for flight demonstration
- Complete demonstration use cases and operational scenario definition
- Initiate safety assessment for flight demonstration
- Complete Demonstration Execution Plan

What Is This Program And Why Is It Necessary?

Desired National Airspace System (NAS) efficiency can only be achieved when the nation's runways are operating at maximum utilization rates, regardless of weather conditions. Enhanced runway access is needed to maximize the use of parallel, converging, and intersecting runways to improve overall capacity at the busiest airports. This will increase the efficiency and capacity of those runways, which in turn will reduce delays. For instance, simultaneous independent approaches to parallel runways spaced less than 4,300 feet apart (without high-update radar) is prohibited during less than Visual Meteorological Conditions (VMC). This is due to an increased risk of collision caused by the potential for an aircraft blundering from one of the approaches toward the aircraft on an adjacent, parallel approach. Throughput to converging and intersecting runways today typically falls short of maximum capacity even in VMC because of the difficulty in gauging relative distances between aircraft and the risk of balked landings.

The IMRO portfolio enables the FAA to improve runway access through the use of improved technology, updated standards, safety analysis, and air traffic tools and operating procedures to enable more per hour arrival and departure operations. Use of this portfolio allows more runway operations per hour while maintaining safety without the major capital investment and time delay of building additional runways. Improving runway access equates to reduced delays that occur now when demand exceeds the capability of the airport's runways.

A. Wake Turbulence Mitigation for Arrivals

This program will evaluate air traffic control wake separation decision support tool capabilities and associated prototypes (e.g. ATPA) as possible enablers to safely meet the predicted NextGen demand for capacity to handle additional flights in the nation's air transportation system. If the capabilities demonstrated by the prototypes are evaluated to be beneficial and are incorporated into the terminal automation systems, more flights can be accommodated by existing airport runways and in the existing airspace due to safely reducing the required wake mitigation separations between aircraft. This program is taking the air traffic control wake mitigation concepts developed by the NextGen – Wake Turbulence research program and evaluating them via prototyping and simulations. Those concepts are being assessed for flight safety and expected throughput capacity benefit to the users of the NAS. Outputs of the program are procedures and requirements for associated air traffic control decision support tools that will implement the wake turbulence mitigation capability in the NAS.

This project will complete an adaptation of the Advanced Terminal Proximity Alert (ATPA) decision support tool to provide controllers a visual display of the required wake mitigation minimum separations to be applied during WTMA-Procedural operations. WTMA-P allows reduced wake separations to be applied during instrument landing operations at airports that meet certain CSPR layout criteria. Application of ATPA is not required for WTMA-P, but the design of ATPA must be consistent with the use of the WTMA-P procedure. ATPA is considered an enabling capability for WTMA-System (WTMA-S).

The WTMA capabilities, when implemented, will provide an economic boost to the nation's aviation system by restoring part of the airport landing capacity lost when an airport has to change its operation from visual approach operations to instrument approach operations and apply its attendant required wake mitigation separation minima between landing aircraft. High level analyses have indicated that the current air traffic control wake mitigation separations process, aided by technology, can be more capacity efficient while at the same time remaining safe. It is expected that the project's WTMA evaluation and requirements development products will allow a rapid integration of the WTMA capability into the NextGen era FAA automation platforms. It is also expected that the products will allow seamless integration of the WTMA procedures with recently implemented NextGen operational improvements such as Wake Turbulence Re-Categorization.

B. Closely Spaced Parallel Runway Operations

Closely Spaced Parallel Operations (CSPO) are simultaneous approaches of aircraft pairs to airports with single and multiple parallel runways that are closely spaced (runways that are less than 4,300 feet apart). CSPOs have been implemented at several Metroplex airports to meet the increased demand. Instrument Meteorological Conditions (IMC) can reduce the airport arrival rate by half since aircraft are scheduled on the assumption of good weather and cleared or released based upon current and forecasted weather. Simultaneous Independent Instrument Approach (SIIA) operations provide the maximum capacity increase when weather conditions do not allow visual approaches. Recently, dual SIIA operations were approved for runways when centerlines are separated by 3,600 feet or greater. If HUR surveillance is used, independent approaches can be conducted to runways separated by at least 3,400 feet, or in some cases, 3,000 feet if one of the approaches is offset from the opposite parallel runway approach path. In comparison, separation standards for dual simultaneous dependent approach operations (when there is a stagger between aircraft) along the parallel final approach course can be used when runways are separated by 2,500 feet or more. Dependent staggered approaches to runways separated by less than 2,500 feet are approved for a limited number of airports under specific restrictions. Dependent stagger approaches provide an incremental increase in capacity but do not increase capacity as much as independent approach operations.

The CSPO program will accelerate activities to provide increased arrival operations to airports with closely spaced parallel runways in IMC. CSPO will develop the performance requirements that enable the implementation of innovative procedures, tools and/or controller/pilot aids that increase capacity at airports utilizing multiple independent and dependent operations. This initiative will enhance procedures that allow dependent operations to closely spaced parallel runways or converging approaches to runways greater than 700 feet apart, as well as supporting independent operations to parallel runways between 2,500 feet and 4,300 feet. Furthermore, CSPO will identify potential alternatives for meeting functional requirements such as the application of existing and new technologies to current standards, reevaluation of the applicability of the blunder model assumptions and the use of the model on risk assessments, the application of emerging NextGen technologies to current standards, and the development of new standards to facilitate NextGen applications.

C. Ground Based Augmentation System

The GBAS augments the current Global Positioning System (GPS) service for terminal, non-precision and precision approaches in the NAS. GBAS is a cost effective alternative to Instrument Landing Systems (ILS) for Category II/III operations because a single device can serve an entire airport versus multiple ILS facilities (one at each runway end). GBAS will eliminate the need to install ILS localizers; however, approach lighting systems would still be required. The GBAS determines a correction to the GPS signal, and that correction is transmitted for use by aircraft instrumentation to ensure the accuracy necessary for guidance to a runway end during limited visibility conditions.

An FAA-owned GBAS (SLS-4000) installed in Atlantic City International Airport (ACY) will continue to be used as an interim platform to develop and validate Category III requirements under this project. This program will support activities necessary to complete the required integrity reviews and produce documentation describing the results. Also, the program will conduct specialized research and development activities to address GPS degradation due to Radio Frequency Interference (RFI) issues that were identified in the testing of a non-Fed LAAS (GBAS Cat I systems). In addition, the program will identify and address GBAS development risks, refine system and ground station requirements, and investigate potential development and alternative architecture opportunities to provide future GNSS Category II/III services.

D. Demonstrations – Paired Approach

The Paired Approach demonstration will validate capabilities using ADS-B and Flight Deck Interval Management (FIM) – Defined Interval (DI) to safely conduct dependent-like instrument approaches in all weather conditions to very closely spaced parallel runways. The trailing aircraft participating in the dependent pair would be spaced such that it is sufficiently separated with respect to collision risk with the lead aircraft, while staying ahead of the risk for a potential wake encounter. This demo would address operations for very closely spaced parallel runways, such as SFO runways 28L and 28R (750 feet between centerlines) or EWR runways 4L and 4R (950 feet between centerlines). The Paired Approach demonstration will utilize steps taken by the CSPO Program to provide initial assessment of this concept and completion of a revised Concept of Operations.

This demonstration is planned as a two year activity, with FY 2016 activities focusing on demonstration planning and preparation and year two focusing on the completion of required safety analyses and the demonstration execution.

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

$8,000,000 is required to continue the execution of work within the Improved Multiple Runway Operations Portfolio.

CSPO and WTMA funding at the requested level fulfills FAA's external commitments to RTCA Task Force 5 and tier 1 NextGen Advisory Committee (NAC) priorities. The funding for GBAS is requested to provide the support for system design approval (certification) of potential CAT II/III GBAS non-Fed systems into the NAS, as well as to maintain global leadership in partnership with SESAR for ongoing GBAS development activities.

The Demonstrations – Paired Approach funding is requested to mature the Concept of Operations for Paired Approach in CAT I conditions in support of the ADS-B-In Advisory and Rulemaking Committee (ARC) recommendation #8: "FIM-DI for Closely Spaced Parallel Runway Operations" for implementation in 2017.

What Benefits Will Be Provided To The American Public Through This Request?

The IMRO portfolio encompasses the majority of the terminal operation areas and airports within the NAS. Below are examples of such successes and planned activities that have and will continue to provide benefits to NAS users.

A. Wake Turbulence Mitigation for Arrivals

- Initial feasibility evaluation of the WTMA procedure and supporting decision support tool has been completed using a terminal automation engineering prototyping support system
- A specific wake vortex data collection and analysis of Boeing 757 and heavy wake category aircraft was accomplished at SFO and JFK. The collected data has been used to define what reduction of wake separation could be achieved through the use of the WTMA procedure and has enabled the safety risk management documentation which will be complete in FY 2014
- Developed procedures and associated safety analysis to enable use of WTMA by air traffic control at PHL, which will increase capacity by reducing the required wake separation during closely spaced parallel operations

B. Closely Spaced Parallel Runway Operations

- Completed authorization of reduced standards for simultaneous independent instrument approaches from 4,300 feet to 3,600 feet, enabling capacity improvements at impacted airports and potential for cost savings for future runway construction
- Completed analysis to revise dependent stagger distances from 1.5nm to 1.0nm for aircraft approaches, which will improve airport capacity during dependent CSPR operations in less than visual conditions
- Finalized the site-specific evaluation effort at Chicago O' Hare (ORD) and delivered a final report documenting opportunities for capacity enhancing procedures with the runways resulting from the modernization plan
- Acquired HUR data for analysis with closely spaced parallel operations to reduce separation standards during operations using HUR
- Developed departure concepts for paired aircraft to improve departure capacity by mitigating wake risk
- Prepared engineering analysis based on fast-time simulations for triple approaches to enable capacity enhancing procedures to airports with three closely spaced parallel runways
- Prepared engineering analysis based on fast-time simulations for offset approaches to enable capacity enhancing procedures for simultaneous operations to closely spaced parallel runways

C. Ground Based Augmentation System

- FAA GBAS research supports safe operations for the American public flying on GNSS equipment approved by other service providers
- Coordinated GBAS CAT I implementation activities with EUROCONTROL and international service providers, aiding in future GNSS implementation of GBAS CAT III
- GBAS Concept of Operations developed and harmonized with SESAR/EUROCONTROL

- GBAS CAT III avionics and ground system prototype procurement and testing as risk reduction for validation
- GBAS CAT III standards developed with international cooperation to ensure a globally harmonized solution

D. Demonstrations – Paired Approach

- Evaluation of paired approach operational scenarios and required air/ground infrastructure
- Coordination across FAA for safety assessment of Paired Approach demonstration operations for procedure risk mitigation
- Prototypes of cockpit avionics and ground DSTs to support Paired Approach flight operations
- Refinement of the Paired Approach Concept of Operations to enable increased efficiency and improved quality of service during IMC conditions after procedure authorization and implementation

Detailed Justification for - 1A10 NextGen – NAS Infrastructure Portfolio

What Is The Request And What Funds Are Currently Spend On The Program?

FY 2016 – NAS Infrastructure Portfolio
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
NAS Infrastructure Portfolio	$25,504*	$14,480	$11,000	-$3,480

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Weather Observation Improvements	---	$2,000.0
B. Weather Forecast Improvements	---	1,000.0
C. NextGen Navigation Engineering	---	1,000.0
D. New Air Traffic Management (ATM) Requirements	---	7,000.0
Total	Various	$11,000.0

For FY 2016, $11,000,000 is requested to fund cross-cutting research, development, and analysis of capabilities that have substantial cross-portfolio dependencies and/or legacy NAS Infrastructure cost-effective improvements. Additional efforts funded from this portfolio include the development and maturation of concepts for changes to Terminal automation as well as addressing issues that arise when an agency moves from managing and sharing information in a legacy environment into a network domain.

A. Weather Observation Improvements

For FY 2016, $2,000,000 is requested to conclude technical analysis activities that involve the monitoring and evaluation, during the winter-time months and at seven locations, of a conceptual automated winter weather observing capability. With the conclusion of the technical analysis activities, the program will then deliver a forward-compatible technical transfer package comprised of performance requirements and meteorological code and algorithms for vendor consideration.

The program acquired state-of-the-science weather sensors from industry and placed this equipment into the existing sensor proving grounds at the William J. Hughes Technical Center in Atlantic City, the Marshall Test facility in Colorado, and Joint Base Cape Cod in Massachusetts.

In FY 2015, funding will be applied to expand the technical analysis, with the concept fielded in additional locations in order to capture a statistically significant sample of winter events that will enable a down-select of technologies and refinement of associated algorithms.

B. Weather Forecast Improvements

For FY 2016, $1,000,000 is requested to address the need to improve weather prediction and how to make better use of weather information in the future NAS. Sophisticated National Weather Service (NWS) forecast models will be integrated into models that forecast weather impacts for aviation purposes. In today's NAS, traffic managers and users must mentally interpret weather conditions and the potential impact of weather on ATC decisions. Weather Forecast Improvements (WFI) will improve the accuracy of aviation weather information, to include the automated objective indication of the constraints placed on the NAS, and incorporate this data into collaborative and dynamic decision-making.

C. NextGen Navigation Engineering

There are two projects in NextGen Navigation Engineering: Terminal area navigation (RNAV) Distance Measuring Equipment (DME)-DME and NextGen Navigation Support – Enhanced Low Visibility Operations (ELVO) Phase 3.

- Terminal RNAV DME-DME - This work supports the use of a DME-only supported airspace (not collocated with a VOR) that if implemented operationally will create additional airspace (Class A and/or Class B), it enables RNAV for other classes of aircraft than carriers, such as regional and business jets. Completing this work ensures RNAV operations will provide expected performance and will remove many critical DMEs
  - Determine the shortfalls of the current DME infrastructure in supporting an optimized NAS-wide performance-based navigation (PBN) route structure as envisioned by NextGen to ensure operations meet expected levels of performance, supporting all classes of aircraft using RNAV today
  - Accurate determination of RNAV DME shortfalls based on the completion in FY 2015 second quarter of the NAS-wide DME coverage analysis, including Hawaii and Alaska
  - Additional work to determine NAS RNAV capacity will be used together with the coverage analysis to determine accurate shortfalls for SIDs, STARs, T-routes, TK-routes, and Q-routes

- NextGen Navigation Support – Enhanced Low Visibility Operations (ELVO) Phase 3 – Low Visibility Operations/Surface Movement Guidance Control Systems (LVO/SMGCS) was created to address safety issues after several runway incursions in low visibility that led to loss of life, equipment, and property; this work moves LVO/SMGCS forward. Additionally, this work allows airlines to use their investment in advanced avionics, such as Enhanced Vision Systems/Enhanced Flight Vision Systems (EVS/EFVS), Head Up Display (HUD), Synthetic Vision Guidance Systems (SVGS), Combined Vision Systems (CVS) and others Head Complete work enabling fuller use of advanced avionics already onboard NAS fleet aircraft.
  - Provides additional operational credit allowing additional flight operations for advanced avionics already onboard NAS fleet
  - Support the LVO/SMGCS Operational Demonstration of Capability (ODC) to be conducted at Seattle International Airport (KSEA), the outcome of which may lead to appropriate allocation of low visibility taxi credit for advanced avionics such as EVS/EFVS, HUD, SVGS, CVS and others
  - Continue to identify impact of change from incandescent to Light Emitting Diode (LED) lighting on the NAS and these advanced avionics and asses other changes to ground-based infrastructure requirements for navigational aids and lighting and other airport infrastructure

D. New Air Traffic Management (ATM) Requirements

- New Radar Requirements (Surveillance and Weather) - This work addresses infrastructure cost-effective improvements by assessing the feasibility of phased-array radar technology as replacement of terminal primary surveillance and weather radar.
  - Integrate Radar Components and Capability
  - Execute Operational Demo
  - Complete Concept Maturity and Technology Development Work
- Weather Transition – This work will manage the development, validation, and allocation of aviation requirements for weather as well as the analysis of current FAA weather-related services and operational needs to develop initial operational concepts to satisfy those needs.
  - Develop and validate enhanced requirements for weather information based on operational needs and key NAS artifacts (e.g. ConOps, NSIP)
  - Perform research to determine how airborne observation data will be used in operational ATM decision-making
- Airborne Collision Avoidance System Xu (ACAS Xu) – This work will develop future collision avoidance requirements to support new classes of users to ensure that systems are interoperable within the NAS.
  - Develop interoperability requirement of UAS collision avoidance systems
  - Develop ACAS Xu system requirements specifications

  - Complete ACAS Xu Operational Capability Flight Demonstration flight test
- Synchronization of Air/Ground Procedures – This work will evaluate methods for ground systems to communicate procedures to the aircraft thereby reducing the strain on the limited-capacity storage on the aircraft Flight Management System (FMS).
  - Develop initial document for two-way communications procedures between FMS and ground systems
- Advanced Air/Ground Communications - This project will evaluate advanced communications standards such as L-band Digital Aeronautical Communication System (LDACS) or Satellite-based communication for operational usage.
  - Develop documentation of the development and test of L-Band communications standards with international community
- Enterprise Information Protocol and Exchange Standards – This project addresses the need for continued cross-agency and harmonization protocols and standards for enterprise information and involves external agency partners, including DoD and NWS, and international partners.
  - Collect and standardize baseline versions of exchange models
  - Develop enterprise solution to mediate across NAS systems

What Is This Program And Why Is It Necessary?

A. Weather Observation Improvements

This program manages the evolution of the existing aviation weather observation sensor networks to one that provides the optimal quantity and quality of ground, air, and space based sensors. A consistent and effective aviation weather sensor network is fundamental to NextGen. Of primary focus is the surface weather sensor network in the Terminal environment. Technical studies are underway to identify methods to optimize existing ground-based legacy surface platforms. In the near term, this program is addressing current limitations of the sensor network for the Terminal environment (e.g., the ability to discern the type and intensity of frozen precipitation types, which impacts the efficiency of winter weather and deicing operations) and conduct technical and operational risk assessment of potential alternative solutions.

Failure to fund the program will result in the continued use and potential expansion of costly operational workarounds. Absent an improved winter weather observing capability, new operational rules for aircraft less than 60,000 pounds may result in the grounding of such aircraft during numerous winter weather scenarios.

B. Weather Forecast Improvements

The Weather Forecast Improvements work will enable the integration of aviation weather information into collaborative and dynamic decision-making by implementing advanced aviation weather forecasting models to determine effects on traffic forecasts; metrics will also be developed and applied to evaluate how effective weather improvements can be in increasing usage of NAS capacity.

C. NextGen Navigation Engineering

This project supports access through innovation and increases the capacity of the NAS by ensuring that navigation requirements and any potential issues are identified and resolved in two areas:

- RNAV DME-DME: Increase and improve use of RNAV using DME in the terminal domain: This work addresses any DME infrastructure related issues required to enable PBN and will allow expansion of NextGen RNAV benefits to properly equipped aircraft beyond air carriers, such as regional and high-end business jets. NAS passenger and cargo flow depends upon the regional jets to bring passengers and cargo to the major hubs. Having only the carriers capable of RNAV does not completely enable NAS operations for full PBN operations
- ELVO Phase 3: Decrease delays, diverts, and cancellations by enabling flight operations to lower minimums than currently used for low visibility operations, both approaches and departures. This work will develop requirements for low visibility operations of less than 1,200 feet horizontal visibility for

landing and takeoff and support Operational Demonstration of Capability that will show feasibility of taxi credit in low visibility for aircraft with advanced avionics

In addition, this project provides systems engineering support for new and advanced NextGen navigational concepts and enables full integration and use of advanced avionics already onboard NAS fleet aircraft. This work addresses related requirements changes, such as in lighting, which may enable progress or hamper progress if unresolved.

D. New Air Traffic Management (ATM) Requirements

The New ATM Requirements program identifies new opportunities to improve the efficiency and effectiveness of air traffic management in terms of operations. The activities include research and development of procedures, tools, and systems to support operational improvements that will increase the number of arrivals and departures at major airports. These programs will develop products such as requirements, conduct risk assessments, develop algorithms for integration into support tools, identify shortfalls, and develop procedures.

It supports the NextGen goal of expanding capacity by developing decision support tools that improve the strategic management of operations in the NAS. The program conducts research on cross cutting/enterprise solution to develop systems that support the capacity enhancements for the NextGen portfolios (FAA Objective 1 - Increase capacity to meet projected demand and reduce congestion). It will develop requirements for new air traffic management systems and air traffic control processes to achieve the capacity performance target.

The goals of these activities include: assessing the feasibility of phased-array radar technology as replacement of terminal primary surveillance and weather radar, maturation of weather concepts coming from aviation weather research for operational use in the NAS, the development for requirements for future collision avoidance systems communicate data between air and ground systems, the evaluation of advanced communication standards, and this research to identify the shortfalls in moving from data sharing to a network environment. This research supports operational implementation by 2025.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. Weather Observation Improvements

$2,000,000 is required to satisfactorily risk mitigate the automated winter weather capability concept and to produce the associated performance requirements, code and algorithms for vendor analysis. The funding allows the program to successfully perform an exhaustive technical analysis of concept maturity during the relatively short winter season. At this stage of the program, funding shortfalls are directly correlated to increased risk to success as the program's ability to operate multiple evaluation sites for the capture of a statistically significant, diverse set, of winter weather performance data could be compromised. Given that the concept must be evaluated during winter weather, funding shortfalls could easily force at least a year delay (until another winter season is available).

B. Weather Forecast Improvements

$1,000,000 is required to continue execution of WFI work within the NAS Infrastructure Portfolio. Specifically, funding will support the following projects, milestones, and deliverables:

- Metrics - Weather Delay Mitigation:
  - Complete report on annual unavoidable weather-related impact
  - Complete study to identify highest impacts by airport for crosswinds, wind compression and winter weather
- Complete No-weather delay baseline annual update
- Metrics - Weather Post-Analysis Capability (Wx-PAC):

    - Complete Wx-PAC Requirements Definition Plan
    - Develop Draft Solution ConOps for Weather - Post Analysis Capability (Wx-Pac)
- Quality Management System:
    - Finalize transition package
- International:
    - Complete annual US position on ICAO draft Amendment 77 of Annex 3
    - Complete annual ICAO Manual on Meteorological Support for ATM
- ATM Weather Integration:
    - Complete Draft Preliminary Weather Integration Roadmap
    - Complete Final Weather Integration Roadmap
    - Complete draft post-Bravo user direct and indirect weather needs analysis

C. NextGen Navigation Engineering

This work is focused on near-term realization of operational benefits. To ensure RNAV benefits are realized as anticipated, the DME infrastructure must be able to support the NAS-wide RNAV route structure. Identification of any impediments to this is the work of this effort. Reductions in delays, diverts and cancellations have already been seen. The planned work will achieve the stated goals with the requested funding.

D. New Air Traffic Management (ATM) Requirements

$7,000,000 is required to continue work to support the capacity enhancements for the NextGen. The focus of this works includes: improved communication standards, UAS collision avoidance systems; integration of weather data into automated trajectory systems, new radar requirements

What Benefits Will Be Provided To The American Public Through This Request?

A. Weather Observation Improvements

Today's automated observing systems do not discriminate and report the occurrence and intensity of ice pellets, snow, rain, freezing drizzle and combinations thereof which significantly inhibits effective deicing and other winter weather operations. The availability of an improved automated winter weather observing capability will allow the agency to explore alternatives to the costly operational workarounds that are currently applied at major airports. The operational workaround for mitigating the observing shortfall requires human-based system interactions, which costs in excess of $50 million per year, limits the application to the top 130 airports. Furthermore, the capability could potentially be used at hundreds of additional airports if such observation requirements emerge in response to new operational policies and procedures for aircraft operations during winter conditions.

B. Weather Forecast Improvements

Weather Forecast Improvements tailors aviation weather data for integration into decision support tools for collaborative and dynamic NAS decision making. It enhances capacity by making fuller use of aviation weather information for operational decision-making. This supports the optimal selection of aircraft routing and precise spacing for arriving and departing aircraft. The increased accuracy of aviation weather observations and forecasts enables the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace.

C. NextGen Navigation Engineering

The NextGen Navigation Engineering program will provide the following benefits to the American public:

- Accurate knowledge of shortfalls in infrastructure required to support NAS-wide PBN.
- Expansion of RNAV benefits to regional and high-end business jets
- Potential for an increase in Class A and Class B airspace
- Fewer diverts, delays, and cancellations during low visibility conditions

- Increased throughout in choke point areas, such as the New York/New Jersey area
- U.S. economic benefit in that cargo and passengers keep moving whereas today they do not as fights are under a ground stop, delayed, diverted, or cancelled

D. New Air Traffic Management (ATM) Requirements

The New ATM Requirements program will provide the following benefits to the American Public:

- Reduction of weather-sourced and other off-nominal delays due to integration of weather data into automated trajectory management systems, resulting in reduced cost for operations increased safety benefits to flying public due to development and NAS integration of: UAS collision avoidance systems, including interoperability and specification requirements and testing; new radar requirements to support safe operations in off-nominal surveillance conditions; synchronization of Air/Ground procedures and communication to improve safe operational conditions
- Deliver benefits through technology of insertion, right sizing the surveillance infrastructure
- Increase flight efficiency through: integration of weather into automated trajectory management systems to support increased situational awareness during flight planning and execution; synchronization of Air/Ground procedures and communication

Detailed Justification for - 1A11 NextGen – Laboratory Support Portfolio

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – LaboratorySupport Portfolio
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Laboratory Support Portfolio	$25,094*	$13,000	$10,000	-$3,000

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. NextGen Laboratories - NIEC	---	$3,500.0
B. NextGen Laboratories - FTB	---	6,500.0
Total	Various	$10,000.0

For FY 2016, $10,000,000 is requested to support the following projects:

NextGen Integration and Evaluation Capability:

- Modernize the NIEC infrastructure and capabilities to support NextGen research, human-in-the-loop simulations, and proof of concept demonstrations for sponsors
- Identify and install NIEC upgrades and enhancements to support NextGen research, concepts and technology validation, human-in-the-loop simulations, and proof of concept demonstrations

Florida Test Bed (FTB):

- Perform technology refresh of FTB systems and support systems to support upcoming NextGen demonstrations, maintain reliability, improve performance, and ensure compatibility between systems
- Provide scenario development, validation, and data collection tools to facilitate Florida Test Bed pre/post demonstration activities
- Provide in-air communication capability for the exchange of information between ground systems and en-route aircraft to facilitate demonstration concepts

What Is This Program And Why Is It Necessary?

NextGen is a complex set of technologies, processes, procedures, and policies, the execution of which is being managed by a large number of program offices from within the FAA. The Lab and Support Portfolio focuses on evaluating future concept and technology to support a tech transfer to implementing organization, promote industry involvement, and to identify implementation challenges and research areas. This work entails the infrastructure needed to complete those demonstrations and studies, analysis of anticipated operational benefits, and performance measurements based on key variables of the NextGen capabilities.

NextGen Integration and Evaluation Capability (NIEC) Laboratory: The NIEC is a facility located at the William J. Hughes Technical Center (WJHTC) in Atlantic City, New Jersey. It serves as a research center to support the exploration, integration and evaluation of NextGen concepts through simulation activities. The NIEC provides a real-time, flexible, NextGen-capable environment that allows for early evaluations, concept development and validations through Human-in-the-Loop simulations and demonstrations. This program will continue to explore integration, development, and operations analysis capabilities. Systems will be integrated to support human-machine studies to measure and validate human performance, usability, workload, and safety indications. The program will include the development and validation of prototypes and analysis capabilities, which will support the definition of NextGen requirements while researching possible solutions to challenges posed by integrating NextGen technology. During FY 2016, this program will continue building upon the infrastructure and systems established in prior years.

Florida Test Bed: The Florida Test Bed is a facility located at the Embry Riddle Aeronautical University in Daytona Beach, Florida. It supports the integration of new and emerging technologies into the National Airspace System (NAS) through demonstrations and evaluations. These activities cultivate government, academia, and industry partnerships through collaboration. One of the main purposes of the Florida Test Bed is to provide an open-access location for industry, users, and vendors to demonstrate new capabilities and harness "NAS" architecture solutions. The Florida Test Bed will also support integrated demonstrations and large-scale modeling and simulation. During FY 2016, this program will continue building upon the infrastructure and systems established in prior years.

By having these sites at the disposal of the FAA, simulations are higher in quality and more research areas are possible due to the extensive corporate knowledge, NAS expertise, NAS systems, support systems, and simulation capabilities found in these test beds. SMEs for conducting simulations, integrating systems, implementing Air Traffic procedures, prototyping hardware and software are readily available and they support all test bed activities.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$10,000,000 is required to continue execution of work within the NextGen Lab and Support Portfolio. This portfolio provides a robust platform where early-stage NextGen concepts can be integrated, demonstrated, and evaluated. These sites provide the FAA and industry an agile environment for the rapid integration of new and emerging technologies. It also promotes contributions and R&D investment from industry and leverages industry's capabilities, which provides cost avoidance to the FAA and helps to accelerate NextGen development.

What Benefits Will Be Provided To The American Public Through This Request?

The American public benefits by having an efficient and flexible platform to support the development of the Next Generation Air Transportation System (NextGen). Concept demonstrations are conducted to evaluate future concepts and ensure that foundational technologies are developed and integrated with emerging technologies, procedures, and embedded automation systems. To conduct these demonstrations, the FAA requires an environment for the evaluation of NextGen concepts and technologies that will not affect day-to-day air traffic operations. The use of this platform supports new NextGen demonstrations to be conducted at an early stage without affecting the National Airspace System (NAS). This reduces risk by enabling the FAA to evaluate the viability of these new technologies and concepts before making further investments and decisions on potential implementation in operations.

Detailed Justification for - 1A12 NextGen – Performance Based Navigation (PBN) and Metroplex Portfolio

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Performance Based Navigation (PBN) and Metroplex Portfolio
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Performance Based Navigation (PBN) and Metroplex Portfolio	$22,451*	$26,500	$13,000	-$13,500

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. NextGen Performance Base Navigation (PBN) Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)	---	$10,000.0
B. Concept Development Integrated NAS Design/Procedures Planning	---	3,000.0
Total	Various	$13,000.0

A. NextGen Performance Based Navigation (PBN) - Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)

For FY 2016, $10,000,000 is requested to provide for the following:

- Complete Metroplex design work and pre-implementation evaluation activities at one Metroplex location (e.g., South/Central Florida)
- Begin Post Evaluation activities at one Metroplex location (e.g., Southern California)
- Complete Post Evaluation activities at two Metroplex locations specifically for benefits analysis and metric analysis. (e.g., Atlanta, Charlotte)
- Begin Metroplex documentation reviews at two Metroplex locations (e.g., Charlotte, Atlanta)
- Complete Metroplex documentation reviews, lessons learned and potential redesign based on benefits analysis, and process improvement activities at two Metroplex locations. (e.g., Washington DC, Northern California)

In response to RTCA's Task Force 5 recommendations and the NextGen Advisory Council (NAC's) prioritization list in 2013, funds will be used to conduct studies, to compile and assess data from select sites, perform environmental analyses, conduct human in the loop simulations, and provide performance metrics and assessments of the proposed and implemented procedures and airspace changes. Using the results of these studies and analyses, Design and Implementation Teams will integrate airspace and procedure design to optimize operations at select Metroplex sites based on the information provided by the studies. Metroplex work also includes procedural design to improve Metroplex ingress/egress to and from a given site as well as efficiency between sites.

The funding will update standards to better accommodate modern aircraft capabilities. Funding will also be used to study and implement improvements to Performance Based Navigation (PBN) separation standards for en route operations.

B. Concept Development Integrated National Airspace Design and Procedures Planning

For FY 2016, $3,000,000 is requested to allow the program to:

- Conduct human error conditions assessment for NextGen implementations to identify and mitigate hazards
- Complete the safety analysis and human performance assessment for the Established-on-RNP (EoR) approach scenario
- Initiate modeling, safety, and human performance analyses of new EoR approach scenario, and support procedure development from a human performance standpoint
- Conduct initial implementation of EoR scenarios at developmental site(s) to validate EoR operational concept
- Provide human systems integration (HSI) expertise across automation systems, decision support tools (DST), and alarms and alerts, to provide engineering and training needs guidance in order to ensure the safety, efficiency, and capacity benefits of NextGen are met

The FAA is currently conducting PBN Initiatives safety and human performance analyses to allow for the future NAS-wide implementation of Established-on-RNP (Required Navigational Performance) Instrument Approach Procedures (IAPs). EoR will allow air traffic controllers to clear aircraft on an RNP final approach without providing standard radar separation between aircraft currently established on approaches to parallel runways. Human factors work is being conducted to provide guidance for RNAV/RNP procedure development. Concept development activities will also validate concepts that increase capacity and improve efficiency and throughput, while leveraging PBN technologies.

FAA will facilitate the EoR concept of operation from a key developmental site to a NAS wide Document Changes Proposal (DCP). DCP is a major undertaking that involves modeling and simulating comprehensive scenarios of various simultaneous parallel runways operations and configurations. Some of these scenarios will happen in parallel, but the majority will occur in a consecutive progression as the analysis models for the more complex configurations are typically constructed from the framework of the less complex configurations.

In addition to the analyses scenario progression in regards to modeling and simulation, as the complexity of the approach configuration increases, so does the complexity of air traffic volume and patterns, concern of mixed equipage, graceful system degradation during adverse events, and the need for certain support infrastructure and tools to execute the concept. To address the issues resulting from increased complexity, it is critical that the role of the human be properly assessed as it is the most important piece of the overall air traffic system. All of these factors affect the extended duration of the research and development efforts.

What Is This Program And Why Is It Necessary?

A. NextGen Performance Based Navigation (PBN) - Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)

The Airspace Optimization Group will integrate airspace design and associated activities, including traffic flow analysis and facilitated design and procedures optimization. This will lay the framework for accelerating PBN initiatives, taking a systems approach for airspace design and procedure. 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 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. 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 leading to design work that will include analyses and simulations, assessments of alternatives, and modeling of projected airspace and procedures benefits. These efforts include:

- Study and Scoping: Identify issues and propose potential solutions through facility and industry interface meetings
- Design and Procedure Development: Creates the detailed Integrated Airspace and Procedure designs
- Evaluation: Conducted by the Design and Evaluation team after design and procedure development. It includes all necessary operational modeling, Safety Management System (SMS) analyses, and environmental reviews
- Pre-Implementation: Metroplex design package preparation, criteria evaluation, training plans, Safety Risk Management Documentation (SRMD) and publication preparation documentation
- Post Evaluation: Metroplex documentation reviews, lessons learned and potential redesign based on benefits analysis, and process improvement activities. Includes reviews of the implemented airspace and procedure changes to determine if they have delivered desired benefits and/or caused other impacts. Modifications or refinements may be made to the design process to better achieve desired benefits or address unforeseen impacts

Optimization of Airspace and Procedures facilitates an operationally integrated view of NextGen implementation. The Metroplex project will expedite delivery of key efficiencies for the nation's busiest metropolitan areas and will help to address the major operational issues faced in today's Metroplex locations: flow congestion, inefficient routing and altitudes, airports in close geographical proximity, and other limiting factors such as environmental constraints. Through the Metroplex initiative, we are implementing new routes and procedures that leverage emerging aircraft navigation capabilities, including PBN, and redesigning airspace to improve flight efficiency. These procedures include the safety oversight of the procedures themselves, and the approval of aircraft and operators to conduct these procedures.

B. Concept Development Integrated National Airspace Design and Procedures Planning

This program supports multiple NextGen initiatives, as well as, RTCA Task Force 5 recommendations, and integrates industry and agency efforts to maximize utility of aircraft performance capabilities, Standard Terminal Arrivals (STARs) and Optimum Profile Descents (OPDs). The primary focus of the program is to conduct design, safety analysis and implementation of various procedures in an effort to provide shorter, repeatable and stabilized paths to the runway for RNP aircraft. Human factors is critical to achieving this. EoR is expected to provide opportunities for increased efficiency including reduced track length, fuel burn, environmental footprint and noise exposure. Furthermore, EoR may be able to provide opportunities for increased capacity via reduced standard separation. To achieve these goals, human factors work is assessing the NextGen automation systems, decision support tools (DSTs), and alarms and alerts that support reduced separation and increased capacity. Human performance assessments are necessary to maintain NAS safety with the implementation of new procedures and technologies in air traffic. In addition, concept development activities will deliver operational methods to use capacity more efficiently, to accommodate future growth in demand and reduce gate-to-gate transit times in the PBN environment.

The program will conduct analyses from a safety and benefits perspective to support the Safety Risk Management Process (SRMP) and specific waivers that will then allow experimental EoR flight trials to be conducted. Segment Bravo human error conditions will be identified and assessed based on criticality in order to identify potential safety gaps in NextGen implementations. From the experimental operations/flight trials, additional data will be collected to support final safety and benefits analyses. These final analyses will be utilized in support of actual DCPs that would alter separation standards in FAA orders allowing NAS-wide use of the EoR operational capability.

Traditional arrival operations at high volume airports with parallel runways require most aircraft to be queued in long downwind legs prior to being vectored or turned onto final where the aircraft intercepts the extended runway centerline. Under current ATC rules, standard separation may not be lost until the aircraft is established and stable on the extended runway centerline. Designing new IAPs that deem RNP-equipped aircraft established prior to the turn onto the extended runway centerline while allowing reduced separation would enable the benefits described above.

DOT Strategic Goal - Economic Competitiveness.

- Maximum economic returns on transportation policies and investments

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

A. NextGen Performance Based Navigation (PBN) - Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)

$10,000,000 is required to fund key operational efforts that serve as the foundation of the transition to NextGen. Funding will allow for expedited design and publication of PBN procedures and their integration into the optimized airspace as part of the NextGen Metroplex initiatives prioritized jointly by the Administration and Industry (through the RTCA Task Force and the NextGen Advisory Council (NAC) Tier 1A programs), as well as Congress (as stated in Congressional hearings and Government Accountability Office (GAO) reports) as essential for the modernization of the National Airspace System NAS both by Government to deliver benefits to the users through improvement to the safety and efficiency of their operations and to the community in general through environmental improvements and reduced carbon emissions. Recommendations include a streamlined version of the current core process (request, design and development, approval, implementation and maintenance); auxiliary processes (Safety Management System (SMS)), environmental and operational approval); and data base consolidation (inability to electronically transfer data efficiently).

B. Concept Development Integrated National Airspace Design and Procedures Planning

The requested funding of $3,000,000 will allow the program to complete safety and human performance analyses for Segment Bravo capabilities, as well as the two EoR approach scenarios initiated in FY 2015. Furthermore, the program will utilize safety cases for those EoR approach scenarios to begin an initial implementation at developmental site(s) in order to validate EoR operational concept. The program will initiate the modeling and safety analysis of two new EoR approach scenarios. The program will provide HSI expertise to ensure the proper implantation of NextGen systems and procedures to ensure safety and efficiency goals of NextGen are met.

Concept development activities will research changes in roles and responsibilities between the FAA and airspace users, as well as the human interaction with automation systems.

What Benefits Will Be Provided To The American Public Through This Request?

A. NextGen Performance Based Navigation (PBN) - Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)

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 began in early 2011. Leveraging the study team approach at those two sites, the Optimization of Airspace and Procedures in the Metroplex initiative is expected to be a multi-year activity that will have addressed 13 Metroplex areas when completed. An expedited timeline was used at the Houston Metroplex as part of the White House Infrastructure Jobs Initiative. A compressed schedule was supported with additional staffing resources and a streamlined approach for the permitting process and should result in an earlier completion of these Performance Based Navigation (PBN) procedures and airspace changes when compared with the prototype Metroplexes resulting in the delivery of the associated benefits sooner than the baseline timeline.

The lessons learned and best practices learned from the prototype and the Houston sites will be applied to the rest of the Metroplex sites for their processes betterment. The positive reaction and high usage levels by the airline partners toward the utility PBN procedures in the Washington Metroplex demonstrated the high desire and support from Industry for this optimization initiative. In addition, benefits are expected for the American public through increased overall flight efficiency, fuel burn, and environmental impacts.

B. Concept Development Integrated National Airspace Design and Procedures Planning

Concept development activities will validate changes to current air traffic management operations and foster increased system capacity, efficiency, and throughput. They will also ensure that future concepts are feasible and will realize expected benefits.

This program ensures that the safety of the NAS is maintained by properly integrating new procedures and technologies through HSI best practices. HSI contributes to better design and implementation of new NextGen capabilities with continued safety as the critical goal in mind.

This program also provides rules change to the current Air Traffic Controllers (ATC) separation standards, described in the FAA Order for Air Traffic Control (JO 7110.65), for using Established on RNP IAPs across the NAS. EoR operations can result in improved utilization of aircraft's RNP capabilities to fly shorter, repeatable and stabilized paths to runway. In addition, EoR is expected to provide benefits to the American public for increased overall flight efficiency including reduced track length, fuel burn, environmental footprint and noise exposure.

Executive Summary – Facilities and Equipment, Activity 2

What is the Request and What Funds are Currently Spent on the Program?

The Facilities and Equipment (F&E) Activity 2 program is requesting $1,671,201,000 for FY 2016, an increase of $93,218,000 above the enacted FY 2015 level. The Activity 2 funding request is needed for the following programs:

- $509,850,000 is requested for NextGen technologies, tools, and systems
- $1,161,351,000 is requested for legacy systems, buildings, infrastructure, and sustaining a safe 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

The FY 2016 Budget for Facilities and Equipment includes two main priority areas, which are predominantly funded in Activity 2. NextGen is a priority, but the second priority is sustaining the current systems that NextGen is built on. FAA has a multi-billion maintenance backlog for programs areas included in the Air Traffic Control (ATC) Facilities Strategic Sustainment Plan.

NextGen:

The Budget includes funding for the following NextGen Programs and key programs, upon which NextGen is dependent:

- Automatic Dependent Surveillance Broadcast (ADS-B) will continue implementation of baseline applications. The national deployment of over 630 ADS-B ground stations was completed in 2014, and the requested FY 2016 funding will allow for the continued execution of Gulf of Mexico Expansion, In Trail Procedures, Airport Surface Surveillance Capability (ASSC), and NAS-wide deployment of Ground Interval Management – Spacing (GIM-s).
- In FY 2016 the performance based service fees for ADS-B infrastructure that is owned and operated by the prime contractor have been differentiated from the core ADS-B program and requested in a separate Activity 6 account.
- ERAM – The Core En Route Automation Modernization (ERAM) program will be completed, fully operational, and funded out of the Operations account in the second quarter of FY 2015. No F&E funding for the Core ERAM program is requested in FY 2016. ERAM System Enhancements and Technology Refreshment will introduce new capabilities under a NextGen Mid-Term acquisition baseline. ERAM Technical Refresh efforts are needed to perform critical component replacements as necessary in order to ensure en route's continued supportability and security.
- TAMR – To support NextGen's mid-term goals, the Terminal Automation Modernization/Replacement (TAMR Phase 3) program will continue full scale deployment of the Standard Terminal Automation Replacement System (STARS) hardware and software to continue the convergence to a single Terminal Automation platform. The FY 2016 Budget funding will be used for:
  - Segment 1 to accomplish Initial Operating Capability (IOC) at three additional sites
  - Segment 2 - to achieve IOC at 18 sites, for a cumulative total of 26 sites, Install hardware and complete Contractor Acceptance Inspection (CAI) at 36 operational sites and to procure 29 additional systems.

Sustainment of NAS Infrastructure:

$464 million is requested to advance the state of good repair for FAA infrastructure facilities. This undertaking targets funding at the following Activity 2 BLIs:

- 2A04 Air Route Traffic Control Centers (ARTCCs) and Combined Center Radar Approach Control Facility (CERAP) Building Improvements/Plant Improvements
- 2A07 Air Traffic Control En Route Radar Facilities Improvements
- 2B06 Terminal Air Traffic Control Facilities – Replace
- 2B07 Terminal Air Traffic Control Facilities - Improve
- 2B09National Airspace Systems (NAS) Facilities Occupational Health and Safety Administration (OSHA) and Environmental Standards Compliance
- 2E01 Fuel Storage Tanks
- 2E02 Unstaffed Infrastructure Sustainment
- 2E06 Facilities Decommissioning
- 2E07 Electrical Power Systems – Sustain/Support
- 2E08 FAA Employee Housing and Life Safety Shelter System Service
- 2E09 Energy Management Compliance

This infrastructure funding, under the Strategic Sustainment Plan (SSP) Portfolio of Programs, will improve and maintain the Facility Condition Index (FCI) ratings at FAA facilities that provide the backbone for the National Airspace Systems (NAS) and functionality. While the request represents a shift to re-invest resources in critical infrastructure that has been inadequately funded in prior years, the deferred maintenance backlog is so large that additional incremental increases for these facilities are necessary in order to reduce FAA operational risk. Funding the programs in this strategy will improve and maintain the facility condition index ratings at FAA facilities that provide the backbone for the NAS, and by extension, the backbone of NextGen. FAA is focused on improving conditions at facilities and for National Airspace (NAS) Infrastructure.

Funding in FY 2016 is requested for Communication, Navigation/Landing, and Surveillance Air Traffic Control (ATC) systems infrastructure. These systems allow the National Airspace System (NAS) to operate at the highest safety standards and provide airline operators and general aviation the dependable ATC services they require. Providing continued safe and expected services to these users requires sustainment of the aging systems infrastructure. The inventory of radio's supporting terminal communications is between 40 to 50 years old, voice switches used to communicate between pilots and air traffic controllers are 17 to 22 years of age, and on airport radars are 15 to 20 years old. Of the 1200 Instrument Landing Systems in operation today, 125 are over 25 years old. Majority of these systems are required to support advanced NextGen capabilities or to provide redundant and safety backup capabilities in the event of satellite service disruptions.

Additional key outputs that will be delivered with the requested budget include:

- The Data Communications Program (DataComm) funding will support the development of Segment 1 Phase 1 (S1P1) and Segment 1 Phase 2 (S1P2) work. Data Comm S1P1 includes Departure Clearance (DCL) service in the tower environment and will be implemented beginning in FY 2016. S1P2 includes enhancements to En Route services and will be implemented beginning in FY 2019.
- Major focus of the WAAS program will be on the 5th GEO satellite integration and development of the 6th GEO payload development, upgrading the WAAS Telecommunications Subsystem (TCS) and operationally deploying the equipment. Procedure feasibility studies, procedure design, procedure development, flight inspection, and surveys for 120 WAAS procedures are planned in FY 2016.
- Funding is requested to address Runway Safety Area (RSA) projects of varying size and complexity that are identified for completion prior to December 31, 2018. The funding being requested will allow the procurement of NavAids systems and the completion of approximately 75 RSA improvements. 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.
- On September 26, 2014 the Chicago Air Route Traffic Control Center declared "ATC-zero" and was the direct result of criminal destruction of major operational capabilities. A subsequent thirty day review was completed by FAA and concentrated on security measures that would prevent future events and contingency planning that focused on responses to event situations and mitigation of the problems to

the greatest extent possible. The FY 2016 budget includes initial funding for these contingency measures under the NAS Voice System (NVS) and Flight and Interfacility ATC Data Interface Modernization (FIADIM) programs. The work under to be accomplished with the FY 2016 funding will address immediate and near term activities that enhance telecommunication and automation systems.

What Is This Program And Why Is It Necessary?

Activity 2 supports major systems acquisitions and facilities infrastructure programs in the implementation phase. These programs and initiatives fund the procurement and modernization of air traffic control facilities and equipment, including all funding related to the acquisition of air traffic control facilities, navigation and landing aids, surveillance equipment and facilities, automation systems, and communications systems and equipment. Activity 2 programs provide funding for control equipment and agency-owned aircraft that are used for flight inspections and other activities.

With this funding, we continue to ensure that current operational facilities and equipment deliver reliable and accurate services until investments in new technologies are ready to deliver the operational improvements needed for enhanced safety and future growth.

Over the past five years, FAA has met the following goals:

- Operational availability for the nation's busiest airports
- Daily airport capacity
- Major acquisition system cost and schedule performance

Typical Activity 2 programs include:

- Upgrades to existing equipment
- Acquiring production systems to replace existing systems, extend serviceable life, or technology 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
- Decommissioning and disposal of the systems and facilities that have been replaced

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.

Aviation is a major driver of our nation's economy, impacting all sectors of business and directly contributing $1.3 trillion and 11 million jobs to the U.S. economy. A vibrant aviation system, supported by a high-performance aviation infrastructure, increases capacity at our large metropolitan airports, improves access to small and remote communities, meets passenger demand for travel, supports a thriving tourist industry, and enables strong American business development.

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

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

The requested funding level will minimize risk to near-term NextGen deliverables. In addition, the requested level enables funding for other, non–NextGen investments at levels that enable us to sustain ATC safety and services expected by the public, the military and other stakeholders.

What Benefits Will Be Provided To The American Public Through This Request?

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, FAA has replaced old technologies with new 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. FAA has efficiently operated and maintained these services through increased funding in Activity 2 programs and initiatives.

FAA has met most of the cost and schedule goals for the programs within Activity 2. Lessons that were learned during the deployment of ERAM were applied to TAMR Phase 3 and prompted FAA adjustments in the areas of schedule formulation, testing processes, and user expectation management. Activity 2 programs also contribute to the success of other Flight Plan metrics, including runway incursion reduction, ATC system operational availability, and NAS on-time arrivals.

Detailed Justification for - **2A01 En Route Automation Modernization (ERAM) System Enhancements and Technology Refresh**

What Is The Request And What Funds Are Currently Spend On The Program?

FY 2016 – En Route Automation Modernization (ERAM) - System Enhancements and Technology Refresh
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
ERAM System Enhancements and Technology Refresh	$35,000	$45,200	$79,400	+$34,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks

	Locations/ Quantity	Estimated Cost ($000)
A. ERAM System Enhancements and Technology Refresh		
a. Program Management	---	$10,800.0
b. System Engineering	---	15,000.0
c. Software Development, Test Development	---	51,600.0
Total	Various	$77,400.0
B. ERAM Sector Enhancements		
a. Program Management	---	$200.0
b. System Engineering	---	800.0
c. Software Requirements and Analysis	---	1,000.0
Total	Various	$2,000.0

A. ERAM System Enhancements and Technology Refresh

For FY 2016, $77,400,000 is requested for "ERAM System Enhancements and Technology Refresh". This funding will be used for high priority enhancements identified by Air Traffic, NextGen, Technical Operations, and other stakeholders.

B. ERAM Sector Enhancements

For FY 2016, $2,000,000 is requested for "ERAM Sector Enhancements". This funding will be used on first year implementation activities including system engineering, system level requirement analysis and associated preliminary software requirement identification.

What Is This Program And Why Is It Necessary?

This budget request consists of two programs: The "ERAM System Enhancements and Technology Refresh" program and the "ERAM Sector Enhancements" program. Each program has its own investment analysis, requirements, decision timelines, and implementation schedules. Each of these programs' unique requirements were approved by the appropriate investment decision processes and contain capabilities represented by multiple en route stakeholders needs; however, the genesis of each programs' requirements differ. Both programs provide enhancements and capabilities above and beyond core ERAM functionality.

Likewise, neither program includes functionality necessary to complete the waterfall deployment of the core ERAM program, which was enacted via a separate budget line item in FY 2015 and prior years. The FAA plans subsequent baselines of ERAM System Enhancements and Technology Refresh efforts from FY 2017 through ERAM's service life in order to meet user identified needs, and to perform critical component replacements as necessary to ensure the continued supportability, safety, and security of the FAA Air Traffic Control infrastructure.

A. ERAM System Enhancements and Technology Refresh

For the "ERAM System Enhancements and Technology Refresh" program, FY 2016 is the fourth year of the four year (FY 2013 - FY 2016) funding baseline. The FAA achieved a Final Investment Decision (FID) for the program in September 2013. The effort started in FY 2014 and completes in FY 2017. FY 2013 and FY 2014 funding primarily funded the technology refresh activities, while FY 2015 and the requested FY 2016 funding will primarily fund the System (or software) Enhancement activities. The program requirements originated from on-site ERAM user needs identified after ERAM was deployed and operational. The technology refresh portion or the requirements were generated via an analysis of en route's software and hardware potential obsolescence. Technology refresh was necessary because much of ERAM was procured as early as 2006, and still other en route automation components, which were never part of ERAM's scope to upgrade, are even older.

As air traffic levels and the need to allow more fuel efficient flight profiles increase, the Air Traffic Controllers' ability to maintain safe aircraft separation becomes a limiting factor, often resulting in the imposition of airspace structures and traffic restrictions that limit airspace capacity utilization. The "ERAM System Enhancements and Technology Refresh" effort improves the usability of the ERAM system to support air traffic management thus providing a more robust and capable platform. Further, the system enhancements provide for efficient and cost effective ERAM changes which increase usability and safety.

System enhancement investment and implementation demonstrates to the user community FAA's commitment to continuous support and improvement of ERAM. In FY 2016, System Enhancements consists of the following:

- Test and Training System improvements
- Flight data processing enhancements, enabled by the increased adoption of ICAO flight plan standards
- Controller usability enhancements
- Tracking and correlation processing enhancements
- Improvement of overall system Management, analysis and monitor and control functions

B. ERAM Sector Enhancements

The FAA approved an Investment Analysis Readiness Decision (IARD) for ERAM Sector Enhancements in July 2014 and projects a Final Investment Decision (FID) in the 3rd quarter of 2015. Thus, FY 2016 is the planned first year of a multi-year solution implementation effort. System engineering and software preliminary development activities are planned to begin in FY 2016. Program requirements were matured and derived primarily from NextGen investments. "Sector" Enhancements received its name as a result of the requirements to improve the coordinated efforts of the air traffic controller "sector" team.

ERAM Sector Enhancements provides software and hardware enhancements for the En Route sector controller team. FY 2016 is the first year of a multi-year effort to improve the efficiency and effectiveness of En-Route Sector operations through enhanced trajectory management and collaboration between the tactical (R Position) and strategic (D Position) controllers. It also involves flight data management and system support functions. ERAM Sector Enhancements will develop and implement improvements to en route automation and procedures, building upon existing ERAM capabilities and leveraging previous NextGen pre-implementation activities.

ERAM Sector Enhancements are composed of the following capabilities which provide enhancements for En Route sector controller teams to support increased sector operation efficiency and effectiveness:

- Trajectory Modeling Enhancements: Initial Point and Lateral Rejoin Logic, Vertical Profile Modeling, and Flight Plan Trajectory Modeling Improvements

- Conflict Probe Enhancements: Reduction of False and Missed Alerts, Extension of Conflict Probe to mixed 5nm and 3nm Airspace, and Introduction of Problem Detection Into the Radar Console (R-Position)
- Flight Plan Processing and Computer Human Interface (CHI) Support: Standardization of flight plans using ICAO flight plan format
- Updating Data Management Tools: Updates of ERAM Radar Assistant (RA) Displays and Controller Views
- Test and Training Laboratory (TTL) Enhancements: Implementation of Voice Recognition to Simulate Real Communication Scenarios in Controller Training and Increase Training Fidelity through Expanded Simulation Training
- ERAM Coordination Enhancements: Automates coordination of flight data and aircraft control with U.S.A ATS in Canada, Cuba, Dominican Republic and Bahamas
- ERAM Adaptation Enhancements: EADP Large Scale Modifications and Parameterization of Preset Values
- Characterization of Unmanned Aircraft Systems (UAS): UAS Aircraft Characteristics and UAS Equipment Codes

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

The core ERAM system will be operational at all 20 CONUS Air Route Traffic Control Centers (ARTCCs) by the end of the second quarter of FY 2015. The ERAM System Enhancements and technology refresh program is critically needed to increase user acceptance of the system by improving its usability. It will also refresh equipment that is in critical need of technology refresh. Lack of enhanced automation assistance in ERAM will impact the ability of Air Traffic personnel to handle traffic growth without increasing restrictions and delays.

The ERAM Sector Enhancements improve trajectory management by improving air traffic management efficiency and effectiveness and reducing the potential for operational errors.

What Benefits Will Be Provided To The American Public Through This Request?

A. ERAM System Enhancements and Technology Refresh

The primary objective of this program is to improve the usability of the ERAM system based on user experience with the deployed system. Improvements in the efficiency and effectiveness of air traffic management and reduction in operational errors are expected outcomes of this investment. The program has established specific measures to assess improvements in user experience upon implementation. Further, the primary performance metrics will continue to consist of the same ERAM contractual criteria for software acceptance such as change request pass rates, and test release and site operational release exit briefings.

B. ERAM Sector Enhancements

This activity will build upon the deployed ERAM system to harness full potential for operational effectiveness. Many of these capabilities have been matured and prototyped in research and development under NextGen Portfolio Programs and are expected to provide tangible positive operational results. The FID documentation will include a Benefits Basis of Estimate which will document the positive economic payback of the ERAM Sector Enhancements investment.

Detailed Justification for 2A02 En Route Communications Gateway (ECG)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – En Route Communications Gateway (ECG)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
En Route Communications Gateway (ECG)	$2,200	$6,600	$2,650	-$3,950

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Equipment Replacement and Program Support Services	---	$2,000.0
B. In-Service Engineering	---	650.0
Total	Various	$2,650.0

For FY 2016, $2,650,000 is requested to provide equipment Replacement and Program Support Services – Replace ECG Interface Processor, Magma Chassis, Intelligent Communications Adapter (ICA) cards and Random Access Plan Position Indicator (RAPPI) hardware. In-Service Engineering provides immediate response to emerging technology solutions.

What Is This Program And Why Is It Necessary?

The En Route Automation Programs provide automation infrastructure improvements at the 20 high-altitude centers in the continental U.S. Five interdependent projects comprise the program: En Route Communications Gateway (ECG); Host and Oceanic Computer System Replacement; En Route System Modifications; En Route Enhancements; and En Route Automation Modernization (ERAM). These automation systems provide the foundation for FAA's air traffic control system.

The ECG system, which replaced the aging Peripheral Adapter Module Replacement Item (PAMRI), is fully operational nationwide. The ECG system was procured using commercial-off-the-shelf (COTS) products. The performance gap is the short life-cycle associated with COTS products, which require more frequent technology refreshes. The ECG program allows the FAA to monitor, maintain, and evolve the ECG system to take advantage of technical advances.

The benefits of ECG over PAMRI are improved efficiency, capacity, and safety by providing controllers with newer, faster, and more capable technology. More importantly, ECG is necessary to provide the flight/surveillance data necessary for the new En Route Automation Modernization (ERAM) system in support of Air Traffic (AT) operations. ECG uses standardized interfaces and commercial operating systems that facilitate ERAM and allow the addition of EBUS as well as recently implemented interfaces with Flight Data Input/Output (FDIO), Surveillance and Broadcast Services (SBS)/Automatic Dependent Surveillance – Broadcast (ADS-B) and system Wide-Area Multilateration (WAM) at Denver ARTCC (ZDV) without architectural changes to meet mission needs and strategic goals. ECG is easily upgraded to support emerging programs and adaptations.

- The current ECG Interface Processor hardware is the Sun Fire 280R Server that has been at the end of service since January 2010. It needs to be replaced to accommodate new ICA cards that will use the newer Peripheral Component Interconnect Express (PCIe) bus standard.

- Magma Chassis is an integral part of the ECG interface processors. It provides an extension to the Peripheral Component Interconnect (PCI) bus in the base interface processor unit, allowing for installation of additional interface cards. It needs to be replaced to accommodate the new ICA cards that will use the newer PCIe bus standard.
- The Intelligent Communications Adapter (ICA) cards allow for connection of external interfaces such as from radar and weather systems to Host/ERAM through ECG. The current ICA cards are a custom build item with limited spares.
- The RAPPI PCs are obsolete and in need of replacement.
- Program Support services provides assistance with Operational Analysis (OA), Sustainment Technology Evolution Plan (STEP), Reliability Maintainability Availability (RMA) for the ECG Program, which help measure performance and cost of ECG operational assets against an established baseline and identify evolution opportunities, best alternatives, and the best solutions to maintaining and evolving the ECG technical baseline.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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 ERAM. ECG is a baselined program and is currently engaged in the engineering analysis and software development period as part of a technical refresh effort.

The ECG Operational Availability (OA) Report measures the performance of the ECG investment against an established set of cost, schedule, and performance parameters. The OA provides metrics associated with monitoring the fielded system performance. The results and recommendations of this report can benefit existing services provided by the ECG system as well as enhancing the capabilities of the ECG system to support emerging needs. The report covers all operationally fielded ECG systems, and spans the period from the first ECG site declaring Operational Readiness Demonstration (ORD) through March 31, 2014. This represents 1,610,424 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.

What Benefits Will Be Provided To The American Public Through This Request?

As discussed above, ECG is one interdependent piece of FAA automation systems that provides the foundation for FAA's air traffic control system.

Detailed Justification for - 2A03 Next Generation Weather Radar (NEXRAD)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Next Generation Weather Radar (NEXRAD)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Next Generation Weather Radar (NEXRAD)	$4,100	$7,100	$6,500	-$600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. NEXRAD Product Improvement (NPI)	---	$850.0
b. Procure Technology Refresh Hardware	---	250.0
c. Contract Support	---	500.0
d. Equipment SLEP	---	2,500.0
e. Facility SLEP Avtivities	---	1,000.0
f. MIT/LL NEXRAD Algorithms	---	1,400.0
Total	Various	$6,500.0

For FY 2016, $6,500,000 is requested to support National Weather Service's (NWS) NEXRAD Service Life Extension Program (SLEP) and technology refresh planning and procurement efforts. The FAA funding share for NEXRAD Product Improvement (NPI) is an annual requirement as established in the Tri-Agency Memorandum of Agreement (MOA) between the Department of Transportation (FAA), Department of Defense – United States Air Force (DoD - USAF), and NWS.

What Is This Program And Why Is It Necessary?

NEXRAD is a long - range weather radar that detects, analyzes, and transmits weather information for use by the Air Traffic Control (ATC) System Command Center (ATCSCC), En Route, Terminal, and Flight Service Facilities. NEXRAD detects, processes, and distributes for display, hazardous and routine weather information which are processed by FAA's Weather and Radar Processor (WARP), Integrated Terminal Weather System (ITWS), and the Corridor Integrated Weather System (CIWS) systems.

The Office of Management and Budget (OMB) directed NEXRAD to be a joint program between Departments of Transportation, Defense, and Commerce, with National Weather Service as the lead. The NWS is the agency responsible for the overall coordination of the development and implementation of the system upgrades. Agencies share developmental costs in proportion to the number of systems fielded by each agency.

Originally installed between 1990 and 1996 with an economic service life of 20 years, there are currently 160 operational NEXRAD systems in the United States and overseas, jointly operated and maintained by the Tri-Agency partners. By FY 2015 the average age of NEXRAD will have reached the end of its economic life. A major SLEP is required to extend NEXRAD's service life to 2030, when it can be replaced by a newer technology, such as the Phased Array Radar.

The NEXRAD SLEP has four main purposes:

- Along with its Tri-Agency partners, the FAA will provide support for product improvements to the legacy NEXRAD program in accordance with the MOA. In addition to annual cost-share requirements for NPI Science Evolution and infrastructure support, the FAA will be required to fund a pro rata share of allocated technology refresh costs.
- NEXRAD's obsolete radar video processor will lose vendor support after 2015, and will be the first SLEP activity undertaken. The other radar components that need to be refurbished include the radar transmitter and the radar pedestal. These three SLEP activities will be managed by the Radar Operations Center (ROC), and managed by the NWS.
- The FAA will refurbish NEXRAD physical facilities, which includes most of their towers, radomes, access roadways, and shelters. These SLEP projects will be managed by the NEXRAD Program Office, with coordination through the Service Areas (Western with 11 sites and Eastern with one site).
- The FAA will continue to invest in FAA-specific algorithms that improve NEXRAD weather products for use in aviation applications. In parallel with the recently concluded acquisition of Dual Polarization technology for their NEXRAD platforms, the NEXRAD program has been developing algorithms that use Dual Polarization products to discern and display in real time, incidences of in-flight icing and hail.

The FAA owns and operates 12 NEXRADs, located in Alaska (seven), Hawaii (four), and Puerto Rico (one).

Technical upgrades are necessary to enhance NEXRAD and provide air traffic control (ATC) with weather detection capabilities to improve safety by detecting and characterizing hazardous weather phenomena. NEXRAD will reach the end of its economic service life beginning in 2014, and will require a major SLEP if it is going to remain in operation until 2030, and beyond. The FAA's NEXRAD SLEP program will provide 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.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$6,500,000 is required to fund the FAA's continuing commitment to NEXRAD sustainment and product improvement, in accordance with the Tri-Agency MOA. The MOA, originally implemented in 1980, was renewed in January 2012 for a 10-year period. The MOA, which is essentially a contract among the participating members of the Tri-Agency, was signed by the FAA's Vice President of Technical Operations.

A funding reduction 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. Reduced funding could threaten the FAA's ability to fulfill existing tri-agency requirements related to the SLEP, technology refresh, and NEXRAD Product Improvement.

What Benefits Will Be Provided To The American Public Through This Request?

NEXRAD has been successfully operating in the CONUS, and in the NAS, since 1996. 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, which provides a two dimensional view of precipitation, has been utilized in the commercial weather radar community for over 20 years, it is only now being introduced onto the NEXRAD platform. Dual Polarization will only provide incremental improvements in overall data quality over the present day NEXRAD but the introduction of the in-flight icing and hail detection algorithms will provide features that enhance aviation safety and detection of weather conditions while aircraft are aloft.

Detailed Justification for - 2A04 Air Route Control Center (ARTCC) and Combined Center Radar Approach Facility (CERAP) Building Improvements

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Air Route Control Center (ARTCC) and Combined Center Radar Approach Facility (CERAP) Building Improvements
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
ARTCC/CERAP Building Improvments	$45,160	$59,000	$74,200	+$15,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ARTCC Facility Modernization and Sustainment	---	$71,900.0
B. In-Service Engineering	---	2,300.0
Total	Various	$74,200.0

For FY 2016, $71,900,000 is requested to continue ARTCC modernization and sustainment projects. Air Route Traffic Control Center (ARTCC) and Combined Center Radar Approach Control Facility (CERAP) modernization is one of the 12 programs included in the FAA's National Airspace System (NAS) sustainment strategy. Major construction projects will replace obsolete plant equipment and provide improved work areas. These projects will include asbestos abatement, replacement of mechanical/electrical systems, and the installation of fire detection and protection upgrades as well as interior architectural construction. All facilities will also receive smaller mission sustainment projects to mitigate the risk to operations associated with infrastructure failures. Also requested, is $2,300,000 for in-service engineering activities.

Specific mission critical and local sustainment projects will also be accomplished at each facility to replace obsolete equipment and infrastructure to support the air traffic control (ATC) mission, operation of the facility, and maintain the facility in an acceptable condition. En Route Facilities developed the FY 2016 and the out-year facility maintenance project prioritization using a methodology and approach consistent with the current Air Traffic Control Facilities project prioritization model. The FY 2016 request was developed by the evaluation of critical facility factors including: direct operational requirements, safety factors, indirect operational requirements, facility condition index value per site, and facility seismic factors. In addition, facility-specific operational requirements such as employee safety, physical security, mission criticality, environmental requirements, and risk factors were important factors in determining which projects should be funded.

Major Modernization projects planned for FY 2016 include:

Construction
- Control Wing Basement (CWB)/Major Mechanical Systems (MMS)–Oakland, Indianapolis, Cleveland, and Washington ARTCCs
- Building Automation Controls System Replacement–Kansas City and Albuquerque ARTCCs
- M1 Control Room Reconfiguration – Los Angeles ARTCC

Design
- CWB/MMS–Salt Lake, Seattle and Denver ARTCCs
- Building Automation Controls System Replacement–Los Angeles and Washington ARTCCs

The following is a brief description of the major modernization projects:

- **Control Wing Basement–**This project renovates portions of the control wing basement. It primarily consists of replacing old and obsolete mechanical and electrical systems throughout the control wing necessary to support the NAS equipment located in these areas. Existing fire detection and suppression systems will be maintained, and modified as necessary. Architectural finishes will be maintained and replaced as necessary to restore areas that have not been maintained/restored where NAS systems have been previously removed. Structural and architectural upgrades will be provided to meet current building codes. Upon completion of this project, the space will continue to be in use to house NAS systems.
- **Major Mechanical Systems**–This project rebuilds or replaces the ARTCC chillers and cooling towers along with associated mechanical systems such as piping, pumps, fans, filters, and controls.
- **Building Automation Controls System Replacements**–This project replaces the aging Direct Digital Control Systems (DDCS) that monitors and controls the facility environmental systems, such as heating, ventilation, air conditioning equipment, chillers, cooling towers, pumps, air handlers, and computer room air conditioners, as well as monitoring water leak detection systems. The new "BACnet" (a communications protocol for building automation and control networks) replacement system will be an open communication standard protocol that was developed by ASHRAE (founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment), specifically for building automation and control networks. This project will provide standardization of Building Automation Control Systems at all FAA En Route Facilities.

What Is This Program And Why Is It Necessary?

The ARTCC/CERAP Building Improvements program is an ongoing multi-year facility modernization and sustainment program that addresses physical plant requirements for the FAA's 21 ARTCC's as well as the CERAP facilities at San Juan and Guam. These facilities were originally constructed approximately 50 years ago and expanded in phases since then. This program supports the FAA's mission by providing efficient, reliable and safe work environments for En Route ATC operations. This program replaces obsolete equipment.

The En Route Facilities Modernization and Sustain program is necessary to support ATC operational requirements, to reduce the risk of ATC delays caused by infrastructure failures, and to minimize future capital liabilities associated with infrastructure failures. 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 ATC positions to continue operations during one such occurrence. Roof leaks, pipe failures and malfunctioning heating, ventilation and air conditioning (HVAC) equipment can also contribute to mold growth and adversely affect the health of employees within these facilities. The presence of asbestos fireproofing continues to pose a risk to maintenance personnel and significantly increases costs associated with maintenance or repair activities. Fire protection systems must be added in some areas of the buildings to meet building codes and structural upgrades are also necessary at ARTCC's in seismic areas.

DOT Strategic Goal–Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The requested funding will reduce the risk of infrastructure failures that could affect ATC Operations and and will therefore decrease operational liabilities. Funding at the requested level will result in a decrease to the deferred maintenance backlog and improve the condition of the facilities, decreasing the risk to operations.

What Benefits Will Be Provided To The American Public Through This Request?

Over the past seven years this program has been able to reduce the national backlog by approximately $30,000,000. The associated reduction in out-year capital liabilities is approximately $120,000,000.

Operations risks have been mitigated by focusing sustain projects on the most crucial 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.

Detailed Justification for - 2A05 Air Traffic Management (ATM)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Air Traffic Management (ATM)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Air Traffic Management (ATM)	$13,800	$5,729	$13,700	+$7,971

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. TFM Infrastructure Field/Remote Site Technology Refresh	---	$7,000.0
B. TFM Service Enhancements	---	3,000.0
C. Commercial Space Integration into the NAS	---	2,000.0
D. In-Service Engineering	---	1,700.0
Total	Various	$13,700.0

The Traffic Flow Management System (TFMS) 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. For FY 2016, $13,700,000 is requested to support the following activities:

A. $7,000,000 is requested for TFM Infrastructure Field/Remote Site technology refresh to complete site surveys, engineering analysis and begin the hardware procurement for remote site hardware replacement.
B. $3,000,000 is requested for TFM Service Enhancements in FY 2016 to conduct operational analysis, engineering analysis, solution development, and solution implementation activities.
C. $2,000,000 is requested to advance the Commercial Space Integration into the National Airspace System (NAS) Program through the Mission Analysis phase of the Acquisition Management System (AMS).
D. $1,700,000 is requested for In-Service Engineering activities to allow for immediate response to emerging technology solutions.

What Is This Program And Why Is It Necessary?

TFMS is the nation's primary source for capturing and disseminating flight information across the aviation community. The automation and communication mechanisms provided by the TFMS 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 TFMS 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.

A. TFM Field/Remote Site Technology Refresh

The program will provide a replace-in-kind technology refresh of the TFMS hardware used by the Traffic Flow Managers in the field, at more than 88 TFM equipped FAA facilities around the country. These facilities include: Air Route Traffic Control Centers (ARTCCs), Terminal Radar Approach Control Facilities (TRACONs), Air Traffic Control Towers (ATCTs), the ATCSCC facility, FAA Regional Offices, the FAA test facility located at the William J. Hughes Technical Center (WJHTC), and Prime TFM vendor test facilities. The FAA must maintain mission essential TFM operations at these facilities. The TFMS provides direct mission support to the FAA by ensuring efficient flow of air traffic through the NAS and is the primary tool used by Traffic Flow Units in the field.

The TFMS hardware is no longer produced and will not be supported by the hardware vendor after 2014. The TFM system exceeds the current hardware specifications and as a result, is experiencing performance degradation. Performance degradation forecasts have not taken into account the planned Collaborative Air Traffic Management Technologies (CATMT) Work Packages (WP) 2 and 3 functionality, which will utilize the same hardware, and thereby increasing utilization and risk of accelerated performance degradation. The TFMS technology refresh improves performance by replacing the hardware providing the central data processing capability for the TFMS. This will maintain operational availability, avoid hardware obsolescence, and avoid increased cost of maintenance and performance degradation.

B. TFM Service Enhancements

This program will support operational analysis, engineering analysis, solution development, and solution implementation activities designed to improve the delivery of TFM services. The scope of these NAS enhancements are limited to operational changes that do not require significant capital investments (and therefore formal investment activities, e.g. achieving a FID) or involve significant systems complexity, interdependencies, and NAS operational changes. The identification, management, documentation, and overall governance of these NAS changes will be articulated in an ATO Standard Operating Procedure and coordinated with applicable stakeholders.

C. Commercial Space Integration into the NAS

In FY 2013, the Office of Commercial Space Transportation (AST) licensed or permitted 18 commercial launches, a six-fold increase in activity over the previous year. By the end of FY 2015, a single company plans to conduct as many as 30 launches on its own. Many of the planned missions will include aspects that have never been undertaken, presenting an unprecedented level of complexity. The demands of these operations, and as many as six new commercial spaceports, will overwhelm the FAA's current capacity to safely and efficiently accommodate them in the NAS.

Today, the FAA is unable to optimize launch and reentry windows for NAS efficiency. The launch and reentry collision avoidance analyses that determine these windows are performed externally to the FAA and in isolation from the FAA's licensing and NAS planning processes. As a result, these windows are heavily constrained upon receipt, leaving the FAA with few planning options for safely accommodating launch and reentry operations in the NAS in a manner that effectively manages their effect on system efficiency. The result is manifested in reroutes and delays for other stakeholders and fewer launch and reentry opportunities for commercial space operators.

During a commercial space launch or reentry, the AST and the Air Traffic Organization (ATO) rely on existing tools that were not designed for commercial space purposes to monitor and manage the operation. This work is manual in nature, time consuming, and unable to respond to dynamic conditions. Interfaces for the ingest of space vehicle data into existing tools do not exist, so a small team transfers data across tools and networks verbally and on paper, enters the data by hand, and completes multiple checks to minimize the potential for error. As it is so resource intensive, the team struggles to keep pace with the increasing commercial space operations tempo.

AST, in collaboration with NextGen and ATO System Operations and Mission Support, will develop prototype automation solutions that will be essential to the FAA's ability to safely minimize the effects of these operations on NAS efficiency and capacity without impeding industry progress. Launch and reentry collision avoidance analysis capabilities will provide the FAA with advanced insight into mission plans, as well as the necessary automation with which to analyze options for adjusting those plans and air traffic flows to maintain the present level of safety, reduce reroutes and delays, and increase mission opportunities. During an operation, space data integration solutions will display a vehicle's position on traffic management tools relative to pre-determined aircraft hazard areas. This capability will allow an operator to dynamically modify these areas so as to release airspace that is no longer at risk as the mission progresses. Post-mission, statistics will be gathered and examined that will quantify the reduction in effort required in planning and the gains in efficiency realized during the operation. These metrics will be applied to the Mission Analysis that will facilitate an IARD and eventual deployment and broad application of these automation solutions.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. TFM Field/Remote Site Technology Refresh

Funding is required to conduct engineering analysis, site surveys and begin hardware procurement for the remote sites technology refresh. TFMS is the platform for the NextGen CATMT enhancements.

B. TFM Service Enhancements

Funding is also required to improve efficiency of Traffic Management Initiatives such as Airspace Flow Programs, Ground Delay Programs and Ground Stops. More efficient traffic management initiatives, strategies, and better use of resource capability will result in higher throughput, less delay, and savings in airline operating cost.

C. Commercial Space Integration into the NAS

Funding for the Commercial Space Integration into the NAS Program at the requested level allows for the FAA to evolve past the processes employed today of working on a mission-by-mission basis to identify and implement case-by-case planning and operational strategies. This program will introduce processes, procedures, and automated systems that will be significantly enhanced, allowing the FAA to identify multiple, complex constraints much earlier in the process and work them in parallel, maximizing the opportunity to address them in a way that best benefits the NAS.

What Benefits Will Be Provided To The American Public Through This Request?

A. TFM Field/Remote Site Technology Refresh

The TFMS Remote Site technology refresh is a hardware replacement of the operational hardware used by the TFM in the field. Once implemented, this will resolve hardware obsolescence, avoid system performance degradation and avoid impact on other programs. The TFMS performs today and provides benefits through the CATMT applications to improve capacity to minimize avoidable delays. The technology refresh program will allow TFM to maintain its ability to provide proven delay reducing services to the flying public and will reduce the cost of providing delay reductions and increase the lifecycle of the system hardware.

B. TFM Service Enhancements

TFMS automation enhancements through the TFM Service Enhancements activity will enhance decision support tools and help traffic managers implement more efficient Traffic Management Initiatives (TMIs). More efficient TMI strategies and better use of resource capacity will result in higher throughput, less delay, and savings in airline operating cost.

C. Commercial Space Integration into the NAS

Many benefits will be derived from the Commercial Space Integration into the NAS Program. They include Safety, Flight Efficiency, and Cost Savings. This program will enhance the current level of safety by automating resource intensive, layered approaches, improving planning processes through advanced insight into complex constraints, and reducing the potential for human error. It will allow NAS performance and capacity to keep pace with current and future demand, reducing delays and reroutes while increasing launch and reentry opportunities for each space flight. Additional benefits include the development of airspace management processes and procedures for transition from special operations to routine operations, reduced FAA long-term costs and decreased costs to NAS users that would be passed down to the public.

Detailed Justification for - 2A06 Air/Ground Communications Infrastructure

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Air/Ground Communications Infrastructure
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Air/Ground Communications Infrastructure	$5,500	$3,900	$9,750	+$5,850

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Communications Facilities Enhancement (CFE) Expansion	---	$7,000.0
B. Radio Control Equipment (RCE) - Sustain	---	1,000.0
C. Radio Frequency Interference (RFI) Technology Refresh	---	1,000.0
D. In-Service Engineering	---	750.0
Total	Various	$9,750.0

For FY 2016, $7,000,000 is requested to initiate 10 new CFE expansion/relocation sites, procure replacement radios, equipment racks, antennas, towers, and site preparation. The 10 FY 2016 sites are:

- Houston, TX Relocate Remote Communications Air Ground (RCAG)
- Platinum, KS Relocate Remote Communications Outlet (RCO)
- Grand Turk, TC Relocate RCAG
- Finger Mountain, AK Retrofit the Self Sustaining Outlet (SSO)
- Council Bluffs, IA Establish new RCO
- Hayward, CA Establish Duel Control
- Binghamton, NY Relocate a Remote Transmitter Receiver (RTR)
- South Lake Tahoe, NV Relocate RCAG
- Kansas City, MO Establish new RTR
- Cancun, Mexico Install an RCAG

For FY 2016, $1,000,000 is requested for RCE obsolescence study, supportability of repair facility, and RCE attrition support for NAS growth until NextGen requirements have been fully deployed.

For FY 2016, $1,000,000 is requested for engineering and technical services/support to mitigate Radio Frequency Interference (RFI) events in the NAS as well as procurement of 110 Receiver (RX) multicouplers, which will be used to mitigate RFI and maximize the overall throughput of the NAS. This program is needed to provide the Service Areas with RFI mitigation equipment such as filters, tools and support services necessary to quickly restore the NAS radio services.

Also requested is $750,000 for in-service engineering activities.

What Is This Program And Why Is It Necessary?

A. Communications Facilities Enhancement/Expansion (CFE)

The CFE program provides new communications facilities and equipment. The program also improves and/or relocates current communication facilities to meet new demands. In addition to providing funding for improvements to RCAGs, Back-Up Emergency Communications Facilities (BUECs), RTRs, and RCOs, the CFE program has identified the need to help sustain critical communication in very remote areas in Alaska by either replacement or refurbishment of SSOs.

B. 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.

C. Radio Frequency Interference (RFI)

The RFI Elimination program is designed to help resolve Radio Frequency Interference (RFI) events to maximize the overall safety of the NAS and to replace non-supportable receiver (RX) multicouplers in the NAS. The RX multicoupler allows for the connection of multiple radio receivers to one antenna which reduces RFI by utilizing the internal filters of the RX multicoupler and provides greater capacity by installing more frequencies on the limited number of antennas located at a Radio Control Facility (RCF).

There are approximately 1,100 RX multicouplers used in the NAS that are not supply supportable and have failing power supplies that cannot be replaced. In 2007, the FAA awarded a contract for 4 and 8 port RX multicouplers. Since awarding the RX multicoupler contract, 969 RX multicouplers have been replaced. A technology refresh is planned to replace the remainder of the approximately 131 RX Multicouplers in the NAS that are not depot supported.

The current air/ground communication system must be improved to provide increased capacity in the U.S. airspace system. New and relocated communication facilities will enable the establishment of new sectors to support capacity as well as enable new and more efficient flight patterns. 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 communications impede the ability of controllers to communicate with aircraft around affected areas. Radio frequency interference at an Air/Ground facility would severely disrupt air traffic services.

The FAA needs to mitigate and eliminate radio frequency interference that impacts Air Traffic Control communications. The RFI Elimination program is designed to expedite the detection and facilitate the resolution of radio frequency interference events to minimize delays and congestion thereby improving air traffic capacity, while maximizing the overall throughput of the NAS. This program is needed to provide the Service Areas with the tools and support services necessary to quickly restore NAS radio services.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The CFE program maintains and increases air traffic capacity by ensuring the availability of equipment and facilities that are essential components in pilot and controller communications. A reduction in funding would result in FAA not being able to purchase equipment or fund site surveys for several projects and will delay implementation of sites planned in FY 2016. The required funding for CFE also covers engineering and technical services/support to mitigate RFI events that occur in the NAS on a continuous basis.

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.

There are a significant number of RFI Elimination and technology refresh program requests that seek to improve communications capability in areas surrounding Core and Focus airports. Funding these projects will improve safety by eliminating gaps in air/ground communications in the NAS.

What Benefits Will Be Provided To The American Public Through This Request?

Air/Ground Communications Infrastructure will replace aging and increasingly unreliable equipment and communications facilities which will significantly improve safety. In addition, Air/Ground Communications Infrastructure will establish new communications facilities. New communications equipment will lower periodic and correctional maintenance costs associated with the old and technically obsolete equipment in the field and as a result will reduce maintenance cost.

Detailed Justification for - 2A07 Air Traffic Control En Route Radar Facilities Improvements

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Air Traffic Control En Route Radar Facilities Improvements ($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Air Traffic Control En Route Radar Facilities Improvements	$5,900	$5,100	$5,810	+$710

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Long Range Radar (LRR) Improvements Infrastructure Upgrades/Sustain	---	$5,160.0
B. In-Service Engineering	---	650.0
Total	Various	$5,810.0

The LRR Facilities Improvements program addresses the infrastructure requirements of the FAA-owned surveillance facilities serving the National Airspace System (NAS). This program is one of the programs included in FAA's Strategic Sustainment Plan (SSP). For FY 2016, $5,810,000 is requested to make repairs to the facilities that are in poor condition (i.e. Facility Condition Index below .9).

The scope of the Long Range Radar (LRR) infrastructure sustainment program includes system upgrade and/or replacement of electrical, mechanical, lightning protection, fire detection, facility security, building structural components, and facility access. Funding for LRR in FY 2013 enabled the accomplishment of 40 such projects. There are 27 sustainment projects currently planned for FY 2014, and 27 for FY 2015.

What Is This Program And Why Is It Necessary?

The NAS currently has 157 Long Range Radar (LRR) surveillance facilities that provide aircraft position information to FAA En Route control centers for air traffic control (ATC), and to the Department of Defense and Homeland Security for security monitoring of the NAS. The ATC En Route LRR surveillance equipment will be operational at least through year 2025.

About 80 percent of the LRR inventory is older than 30 years. Sixty-six of these sites were established in the early 1950's and have reached the end of their useful life. Records from the NAS Performance Analysis System showed approximately 22 percent of En Route surveillance service outages experienced in FY 2013 were attributable to infrastructure failures and deficiencies. Due to the extreme age of these facilities, the need for infrastructure maintenance and upgrades is urgently required at all of these sites.

The NAS requires reliable and continuous operation of surveillance equipment. The repairs, improvements, and modernization to existing infrastructure will enable the facilities to meet current operational, environmental, and safety needs. It will extend the service life of facilities, and most importantly, reduce the chance of outages that often cause air traffic delays and impact the requirement for continuous monitoring of the NAS.

Today, FAA ATC calls for seamless surveillance information provided within each air traffic controller's area of responsibility. In order to reliably provide flawless surveillance information in the en route environment and avoid operational outages that have severe and immediate impacts on the ATC services, the infrastructure deficiencies must be corrected without delay.

The existing air surveillance infrastructure has shortfalls that must be addressed sequentially for the system to continuously meet the users' 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.

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

To make repairs to the facilities that are in poor condition and have greatest impact to the NAS, $5,810,000 is required. It will extend the service life and lower the risk of NAS outages occurring. Evidence shows up to ten-fold savings if properly funded sustainment programs are instituted. The required funding level will enable a proactive approach to facilities management and lifecycle. A reduction from the FY 2016 funding required will delay the required repairs and upgrades to LRR facilities.

What Benefits Will Be Provided To The American Public Through This Request?

The planned infrastructure sustainment projects upon completion will provide greater efficiency and reduce operating costs in en route ATC and facility maintenance operations. The facility condition index (FCI) for LRR facility inventory has been improving to about 80 percent in FY 2015. The goal of the LRR infrastructure sustainment program is to reach 90 percent FCI by 2025.

Air Route Surveillance Radar (ARSR) equipment availability has continued in an upward trend (99 percent availability) as a direct result of the LRR Infrastructure Improvements made under this program. The LRR Infrastructure program helps LRR facilities continue to meet operational, environmental, and safety needs, well beyond their expected useful life. Without this program, infrastructure failures will result, causing surveillance equipment failures that directly impact the NAS and ultimately the flying public.

Detailed Justification for - 2A08 Voice Switch and Control System (VSCS)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Voice Switch and Control System (VSCS)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Voice Switch and Control System (VSCS)	$19,000	$13,800	$9,900	-$3,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. VSCS Sustainment Activities	---	$3,630.0
b. Engineering Analysis	---	3,300.0
c. Program Management	---	750.0
d. Contractor Support	---	2,220.0
Total	Various	$9,900.0

For FY 2016, $9,900,000 is requested to continue VSCS Technology Refresh Phase 3 activities including Local Area Network (LAN) Transceiver Retrofit, System Failure Analysis and Improvement Studies, Ground to Ground Switch Node Reduction, and Fiber Optic Tie Trunk (FOTT) Power Supply Retrofit.

Ongoing tasks for the program include engineering analysis, Local Area Network (LAN) Transceiver Retrofit, Ground to Ground Switch Node Reduction, and Fiber Optic Tie Trunk (FOTT) Power Supply Retrofitting.

What Is This Program And Why Is It Necessary?

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.

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.

The VSCS System is the existing legacy En Route voice switch system in the NAS, and it will have to remain operational until the full deployment of the NextGen NAS Voice System (NVS).

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$9,900,000 is required to ensure continued operation of VSCS, which is an Efficiency-Critical thread necessary to safely maintain Aircraft Separation in the National Airspace System (NAS). On average, 10 percent of failed units will not be able to be repaired by the Depot and sent back to a field site for use in the NAS, resulting in sustainability issues if spares are not supplemented. Reduced funding can impact the availability of Air Traffic Control (ATC) Communications in the En Route environment due to operational issues, inability to maintain system, and provide spares. If VSCS Technology Refresh Phase 3 is not fully funded, the potential consequences are as follows:

- VSCS availability will continue to decline; it is currently below the Safety-Critical NAS Services requirement of 0.99999 (National Airspace System [NAS] Requirements Document NAS-RD-2012: Reliability, Maintainability, and Availability [RMA] Section 3.2.1.1).
- Failure rate growth will increase instead of remaining constant. Technology refresh is necessary in order to retrofit or replace high-failure-rate items that have impacts both to system availability and sustainability.

What Benefits Will Be Provided To The American Public Through This Request?

VSCS is an integral part of a functional en-route air traffic control system; it provides the following qualitative benefits; Reliable access for 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.

Detailed Justification for - 2A09 Oceanic Automation System

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Oceanic Automation System
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Oceanic Automation System	$4,800	$3,508	$20,000	+$16,492

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Advanced Technologies and Oceanic Procedures (ATOP) Technology Refresh		
a. Oceanic Automation System (OAS) Prime Contract	---	$10,800.0
b. Program Management	---	1,200.0
Total	Various	$12,000.0
B. ATOP Enhancements		
a. Oceanic Automation Systems (OAS) Prime Contract	---	4,500.0
b. Program Management	---	500.0
Total	Various	$5,000.0
C. Oceanic Service Enhancements		
a. Oceanic Automation System (OAS) Prime Contract	---	2,700.0
b. Program Management	---	300.0
Total	Various	$3,000.0

A. ATOP Technology Refresh:

For FY 2016, $12,000,000 is requested to allow the ATOP Program Office to initiate the technology refresh of the ATOP system. The investment is a new system enhancement program that will address the continued evolution of the oceanic capabilities and services. This funding will further define the detailed engineering requirements for refreshing the hardware and the operating system (potentially AIX to Linux), and to initiate the procurement for those items needed for technology refresh. This will allow for improved system supportability, lower maintenance cost, and improved performance for the ATOP system to support NextGen, Surveillance Broadcast Services (SBS), and other NAS system improvements required in the oceanic domain.

B. ATOP Enhancements:

For FY 2016, $5,000,000 is requested for the ATOP Enhancements program. The investment is a new system enhancement program to address the continued evolution of the oceanic capabilities and services. In FY 2016, $500,000 will continue program management support for the ATOP program while the additional $4,500,000 will be directed to the existing prime contract, which expires in 2021.

C. Oceanic Service Enhancements:

For FY 2016, $3,000,000 is requested for the Oceanic Service Enhancements. The investment supports a category of requirements that address necessary and unplanned changes. These sudden needs are the result of operational changes like airspace re-designs for modifying or adding new sectors and International Civil Aviation Organization (ICAO) mandates that are small in nature and must be addressed quickly. In FY 2016, $2,700,000 will be directed for the operational analysis, engineering analysis, solution development, and solution implementation activities for ATOP system enhancements designed to improve the delivery of oceanic domain Air Navigation Service Provider (ANSP) services. The oceanic enhancements will be determined by the domain stakeholders in accordance with an ATO domain service enhancement Standard Operating Procedure (SOP). The remaining $300,000 will continue program management support for the ATOP program.

What Is This Program And Why Is It Necessary?

In 2009, the ATOP program replaced the original oceanic air traffic control system, updated procedures, and modernized the Oakland, New York, and Anchorage Air Route Traffic Control Centers (ARTCCs), which house the oceanic automation systems. A support system was installed at the William J. Hughes Technical Center (WJHTC). ATOP fully integrates flight and radar data processing, detects conflicts between aircraft, provides data link and surveillance capabilities, and automates the previous manual processes for oceanic air traffic control.

A. ATOP Technology Refresh

The technology refresh of the ATOP system is envisioned to provide compatible technology upgrades and/or replacement of the hardware at the three Oceanic Centers and the WJHTC. Based on both the hardware maintainability and the additional functionality to be initiated in the ATOP system during the FY 2016 to 2020 timeframe through the ATOP Enhancement program it is critical to begin this technology refresh starting in FY 2016.

The ATOP technology refresh program will support maintaining the ATOP systems at the 99.7 percent availability or higher with the installation of refreshed equipment and an operating system starting in FY 2018. The ATOP technology refresh will be measured by ensuring the equipment replacement is performed on schedule per the program baseline and appropriate measurements will be taken to ensure the operational availability levels are met or exceeded by this improvement to the ATOP infrastructure.

B. ATOP Enhancements

The ATOP Enhancements program will provide necessary large scale enhancements required to minimize the current systems operational shortfalls as the FAA moves forward with NextGen and other NAS upgrades. The ATOP Enhancements program will address four ATOP system shortfalls with 11 planned enhancements currently being assessed and planned for implementation after a final investment decision (FID) in the second quarter of FY 2016.

Current ATOP System Shortfalls:

- Suboptimal flight profiles result in excess fuel burn, emissions and delay
- Need to enhance target level of safety for oceanic Air Traffic Control (ATC) operations
- System Wide Information Management (SWIM) services are needed in the future in order for the ATOP system to realize benefits of new products and services from other FAA programs
- SWIM services needed in the future in order for ATOP system to support existing ATC services

The 11 enhancements are: Service Continuity Enablers, Approval of User Requests in Oceanic Airspace (Auto Re-Probe), Approval of User Requests in Oceanic Airspace (Conflict Resolution Advisory), ATOP in Stratified Surveillance Sectors, ATOP in Transition Surveillance Sectors, Enhanced Controller Coordination Interface, Enhanced Conflict Probe for ATOP Surveillance Airspace, Oceanic Conflict Advisory System

(OCAS), Data Exchange via SWIM (New Services), Data Exchange via SWIM (Interface Rehost and Publish Services), and Expanded Oceanic International Interfaces.

C. Oceanic Service Enhancements

The Oceanic Services Enhancements support operational analysis, engineering analysis, solution development, and solution implementation activities designed to improve the delivery of domain ANSP services. The scope of these NAS enhancements are limited to operational changes that do not require significant capital investments (and therefore formal investment activities, e.g., achieving a Final Investment Decision (FID) or involve significant systems complexity and interdependencies). The identification, management, documentation, and overall governance of these NAS changes will be articulated in an ATO domain service enhancement SOP and coordinated with applicable stakeholders.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The current baseline funding for the oceanic automation system will be completed in FY 2015. At this time there are no plans to retire the current oceanic automation system.

A. ATOP Technology Refresh

Funding for ATOP technology refresh will define engineering requirements for refreshing the hardware and operating system and will initiate the procurement for those items needed for technology refresh. The technology refresh reduces maintenance and logistics costs and incorporates software changes and new capabilities to support future NextGen, SBS, and other NAS system improvements requirements.

B. ATOP Enhancements

The ATOP enhancements is linked to the NAS Segment Implementation Plan (NSIP) and NextGen Operational Improvements (OIs) or Operational Sustainments (OSs). The program will provide necessary enhancements required to minimize the current system's operational shortfalls, which are defined by various stakeholder requests, as the FAA moves forward with NextGen and other NAS upgrades. The funding is necessary to initiate engineering analysis and solution development for a subset of the enhancements planned to be delivered from 2017 to 2020.

C. Oceanic Service Enhancements

The Oceanic Service Enhancements program will support operational analysis, engineering analysis, solution development, and solution implementation activities designed to improve the delivery of oceanic domain ANSP services. These small but critical enhancements are identified by current operations, and support FAA and/or ICAO changes.

There are no viable alternatives in the near future (FY 2016 through 2025) other than the development of a new oceanic ATC system to replace the ATOP system. This would be both expensive and unnecessary since the current ATOP system with enhancements will be able to meet the future requirements of the FAA at considerably lower cost than a total system replacement.

What Benefits Will Be Provided To The American Public Through This Request?

The ATOP technology refresh and ATOP enhancement program will provide the following benefits to the American public:

User Benefits

- Improved target level of safety by providing the oceanic Air Traffic controller better coordination, conflict probe, and surveillance tools
- Provides reduced operator and general aviation operating costs and reduced system delays by delivering coordination, data link, special use airspace, and user request capabilities that support more optimum flight profiles

FAA Benefits
- Maintenance cost savings
- Better flight coordination between oceanic, domestic, and international air traffic control operations

Detailed Justification for - 2A10 Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$20,250	$40,000	$43,600	+$3,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Nexcom Segment2 Phase 1		
a. Program Management	---	$4,000.0
b. Engineering Support	---	3,300.0
c. Hardware/Software	---	20,000.0
d. Logistics	---	1,000.0
e. Implementation	---	15,000.0
f. Independent Operational Test and Evaluation (IOT&E)	---	300.0
Total	Various	$43,600.0

For FY 2016, $43,300,000 is requested for NEXCOM Segment 2 Phase 1, which will install 2,700 Very High Frequency (VHF) and Ultra High Frequency (UHF) radios (receivers and transmitters) at 160 terminal and flight services facilities. Also requested is $300,000 for Initial Operational Test and Evaluation (IOT&E) of Next Generation VHF Transceivers.

What Is This Program And Why Is It Necessary?

NEXCOM will modernize the existing Air/Ground voice communication system using the limited available radio frequency spectrum more efficiently. NEXCOM will provide the operational flexibility and Voice over Internet Protocol (VoIP) capability required for NextGen. The two segments below are delivering the same capability, but were separated into two different implementation phases for both affordability and deployment reasons.

- Segment 2 Phase 1 (2009 - 2018) will deploy 12,000 VHF and UHF radios that will service the high-density terminal areas and the flight service operations.
- Segment 2 Phase 2 (2019 - 2027) will deploy 23,040 VHF and UHF radios that will service the high-density terminal areas and the flight service operations.

The existing VHF analog controller-to-pilot communications system lacks the capacity and flexibility to accommodate future growth in air traffic. Congestion reduction 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 important element of the Air Traffic Control (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 3,000 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, Budget Line Item 2A19); and improve reliability and reduce the growth of maintenance costs by replacing aging air/ground communications equipment with new digital equipment.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

NEXCOM Segment 2 site implementation is on schedule to complete the Acquisition Program Baseline (APB) milestone of Initial Operational Capability (IOC) at 450 sites for Phase 1 in FY 2018.

What Benefits Will Be Provided To The American Public Through This Request?

NEXCOM Segment 1a, predecessor to Segment 2 Phase 1, was completed successfully in FY 2013. That segment deployed 25,000 radios into 1,200 remote facilities with no schedule variance and less than one percent cost variance. NEXCOM Segment 2 Phase 1 has met the Acquisition Program Baseline (APB) milestones which will lead to on time equipment deployment in NAS. The program has incorporated product features that address FAA user concerns about operational suitability. The programs carefully executed taxpayer dollars.

The table below shows current measured radio equipment performance goals.

Metric Description	Frequency	Unit of Measure	FY 2014 Target	Most Recent Actual	Metric Status *	Updated Date of Most Recent Actual *
Provide cumulative Mean Time Between Failure for NexCom Very High Frequency radios.	Semi-Annual	Hours	45,000	76,000	Met	03-31-2014
Provide Mean Time Between Depot Returns for NexCom Very High Frequency Radio receivers.	Semi-Annual	Hours	35,000	79,000	Met	03-31-2014
Provide failure rate per year for NexCom Very High Frequency radio receivers.	Semi-Annual	Percentage	3	1.68	Met	03-31-2014
Number of NexCom Very High Frequency radios (receivers and transmitters) returned to Ops stock.	Monthly	Number	1,050	993	Met	03-31-2014
Number of NexCom Ultra High Frequency radios (receivers and transmitters) returned to Ops stock.	Monthly	Number	500	291	Met	03-31-2014

Detailed Justification for - 2A11 System-Wide Information Management (SWIM)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – System-Wide Information Management (SWIM)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
System-Wide Information Management (SWIM)	$66,550	$60,261	$37,400	-$22,681

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. SWIM Segment 2A		
a. SWIM Segment 2A Core Services	---	$2,150.0
b. SWIM Segment 2A Test and Provisioning Services	---	3,500.0
c. SOA Suitability Assessment, Sys Specifications Develop/Gov. Support	---	3,000.0
d. On-Ramping NAS Mission Services	---	3,000.0
e. NAS Enterprise Messaging Service (NEMS) Functionality Enhancements	---	3,000.0
f. Purchase and Deploy SWIM NEMS Nodes	---	5,250.0
Total	Various	$19,900.0
B. SWIM Segment 2B		
a. Enterprise Service Monitoring (ESM)	---	$500.0
b. SWIM Flight Data Publication Service (SFDPS) Phase 2	---	1,500.0
c. Identity and Access Management (IAM)	---	750.0
d. NAS Common Reference (NCR)	---	500.0
e. SWIM Terminal Data Distribution System Release 4 Software Develop	---	750.0
Total	Various	$4,000.0
C. Common Support Services, Phase 1 – Weather		
a. Prime Development Contract (Hardware and Software)	---	$9,641.0
b. Program Support	---	1,755.0
c. Information System Security	---	148.0
d. Telecommunications	---	722.0
e. Test and Evaluation	---	734.0
Total	Various	$13,000.0
D. Independent Operational Test and Evaluation (IOT&E)	---	500.0

For FY 2016, $19,900,000 is requested for SWIM Segment 2A – the implementation of SWIM Service Oriented Architecture infrastructure services, $4,000,000 is requested for Segment 2B - the initial development, configuration, test and operational implementation of the following SWIM Service oriented Architecture infrastructure services:

- Enterprise Service Monitoring (ESM)
- SWIM Flight Data Publication Service Phase 2
- Identity and Access Management (IAM) Phase 2

- NAS Common Reference
- SWIM Terminal Data Distribution System Phase 2 (Release 4.0 and beyond)

$13,000,000 is requested for development of the operational system including: continuation of CSS-Wx solution implementation activities, critical design review, software development, and site survey conducts.

Currently, SWIM funding has been used to support:

- SWIM Terminal Data Distribution System (STDDS) system engineering, testing, deployment, second level engineering of STDDS Release 3.0, 3.1 and 3.2 and interfacing the data acquired by STDDS to SWIM/NEMS
- SWIM NSRR, COTS and Wiki support
- SWIM Flight Data Publication Service (SFDPS) Phase 1 Software updates, system testing, deployment, second level engineering and interfacing the data acquired by SFDPS to SWIM/NEMS
- Purchasing and Deploying SWIM NEMS Nodes for the following Air Route Traffic Control Centers; Minneapolis (ZMP), Miami (ZMA), Los Angeles (ZLA), Boston (ZBW), Anchorage (ZAN), Oakland (ZOA), Jacksonville (ZJX), and New York (ZNY)
- Developing Segment 2A Core Capabilities
- On-ramping National Airspace System (NAS) Mission Services

What Is This Program And Why Is It Necessary?

The SWIM program is an information management and data sharing system for Next Generation Air Transportation System (NextGen). SWIM provides 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, 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.

In SWIM Segment 2A, the program continues to provide governance, standards, and software to NAS programs. SWIM is also implementing enterprise messaging via the NEMS for new service providers and facilitating the transition by Segment 1 SIPs to using the NEMS. 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 Segment 2B is working towards the Joint Resource Council (JRC) Final Investment Decision (FID) in June 2015.

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. 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 allows 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.

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. SWIM contributes to meeting the following 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.

Common Support Services, Phase 1 – Weather

CSS-Wx will be an instance of a common support services capability. CSS-Wx will establish an aviation weather publishing capability for the NAS. It will enable universal access and the standardization of weather information for dissemination to users by SWIM, a data management and sharing system the FAA is implementing for the NextGen. CSS-Wx will filter weather information by location and time. Consumers of the information published by CSS-Wx will include air traffic controllers, traffic managers, commercial aviation, general aviation, and the flying public. CSS-Wx will also make weather information available for integration into NextGen's enhanced decision support tools (DTSs). CSS-Wx will be the FAA's single provider of aviation weather data, consolidating several legacy weather information systems. CSS-Wx will also be scalable to facilitate the addition of new users and new systems. The system is scheduled to achieve Initial Operating Capability (IOC) in FY 2019.

The CSS-Wx System will make improved weather products provided by the NextGen Weather Processor (NWP), the National Oceanic and Atmospheric Administration's (NOAA) NextGen Web Services, and other weather sources, available to FAA and NAS users for input into collaborative decision-making. Final Investment Decision (FID) is scheduled for March 2015.

The CSS-Wx program is necessary because delays in the NAS are primarily attributable to weather. Based on Operations Network (OPSNET), which is the official source of NAS air traffic operations and delay data, 68 percent of air traffic delays over 15 minutes for 2003-2012 were due to weather. In addition, 73 percent of delayed flights and 86 percent of delay minutes for CY 2010 - 2012 have weather as the primary cause. Weather also impacts safety. Weather was cited as a cause or factor in over 20 percent of the accidents investigated by the National Transportation Safety Board (NTSB) in 2007 - 2009.

Weather products currently being provided by the National Weather Service (NWS), combined with recent improvements to FAA's air traffic management tools, have significantly increased the size and geographic distribution requirements for weather information within the FAA network. 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 and inefficiencies in today's weather dissemination system. 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 events, CSS-Wx will utilize open international data standards and access to aviation weather information for input into the FAA's collaborative decision-making tools for the NAS.

CSS-Wx will resolve the issue of multiple interfaces, inflexible and inefficient information data management, unique data types and point-to-point information exchange. Implementation of this capability will provide cost savings, improvement of capacity, efficiency and safety in adverse weather.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$23,900,000 is required for the development of SWIM Segment 2A and Segment 2B. For FY 2016, SWIM funding will be used to:

- Complete FY 2016 NEMS demand assessment and associated deployment of new NEMS Nodes. (APB milestone)
- Complete NEMS producer/consumer management enhancements
- Connect producers and consumers to NEMS (Aeronautical Information Management (AIM) Segment 2, Common Support Services – Weather (CSS-Wx), and etc.)
- Complete NEMS consumer self-service management deployment
- Complete Service Oriented Architecture (SOA) suitability assessments for NAS programs entering the FAA investment analysis process in 2016
- Continue to operate the NAS Service Registry/Repository, COTS Repository, the SWIM Developer WIKI
- Buy required SOA middleware licenses (FUSE) to develop, test, and operate SWIM-compliant capabilities
- Purchase and Deploy SWIM NEMS Nodes at the following ARTCCs: Denver (ZDV), Memphis (ZME), Indianapolis (ZID), and Houston (ZHU)

$13,000,000 is required in FY 2016 for the development contract for the CSS-Wx System. The development contract will include the necessary requirements reviews, design reviews and software development. The Preliminary Design Review (PDR) will be completed in FY 2016. Included in the request is funding for Program Support (e.g. Program Management, Engineering Support, Integrated Logistics Support), Information System Security, Telecommunications and Test and Evaluation (T&E) support.

In addition, $500,000 will be used to support IOT&E activities.

What Benefits Will Be Provided To The American Public Through This Request?

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
- Provide common interfaces that facilitate spontaneously adding new users and applications, for purposes of continuity of operations
- Enable the decommissioning of legacy weather data dissemination systems, which will reduce the rising operations and maintenance costs
- Develop/implement open international standards to format and exchange digital weather data to ensure harmonization and ease of future enhancement and implementation. The FAA is also leading the world with EUROCONTROL in developing the Weather Exchange Model (WXXM), which is the emerging worldwide standard for the exchange of weather data. The goal is to provide access to weather data tailored to each user's needs. This enables access by all decision support tools. External consumers such as Airline Operations Centers will also be able to access the weather information in the new formats

Detailed Justification for - 2A12 ADS-B NAS Wide Implementation

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – ADS-B NAS Wide Implementation
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
ADS-B NAS Wide Implementation	$105,089*	$63,790*	$45,200	-$18,590

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ADS -B NAS Wide Implementation - Baseline Services and Applications		
a. Program Management	---	$25,450.0
b. Services	---	15,950.0
c. Exelis Non-Subscription Costs	---	1,800.0
d. Gulf of Mexico	---	1,000.0
e. In Trail Procedures (ITP)	---	300.0
f Independent Operational Test and Evaluation (IOT&E)	---	700.0
Total	Various	$45,200.0

The main ADS-B acquisition has been structured as a multiple year, performance-based service contract under which the vendor will install, own, and maintain the ground-based ADS-B equipment that provides the surveillance information to FAA automation systems. The program has four primary activities: Baseline Services and Applications, Gulf Expansion, In Trail Procedures and Airport Surface Surveillance Capability.

For FY 2016, $45,200,000 is requested to provide for the continued implementation of baseline applications: Ground-based Interval Management (GIM), Traffic Situation Awareness, Airport Traffic Situation Awareness Enhanced Visual Approach, Cockpit Display of Traffic Information (CDTI) Assisted Visual Separation (CAVS), Traffic Situation Awareness with Alerts, Weather and NAS Situation Awareness. The funding will allow for the continued execution of Gulf of Mexico Expansion, In Trail Procedures, and Airport Surface Surveillance Capability (ASSC).

The anticipated FY 2016 accomplishments for ADS-B Baseline Services and Applications are as follows:

- Complete remaining Gulf of Mexico radio station construction
- Expand operational services for the Gulf of Mexico at Houston Center Acquisition Program Baseline (APB) Milestone)Achieve Initial Operating Capability (IOC) for Airport Surface Surveillance Capability (ASSC) at three sites

ADS-B NAS Wide Implementation - Baseline Services and Applications (Service volume) is the follow-on Capital Investment Plan (CIP) account to ADS-B NAS Wide Implementation – Segments 1 and 2, which ends in FY 2014. The majority of the funding for FY 2014 - resided in ADS-B Segments 1 and 2. The underlying subscription payments for ADS-B have been moved to the one-year funded Activity 6.

What Is This Program And Why Is It Necessary?

ADS-B is an environmentally friendly technology that enhances safety and efficiency, and directly benefits pilots, controllers, airports, airlines and the public. ADS-B is the cornerstone technology for NextGen. This new system promises to significantly reduce delays and enhance safety by using aircraft broadcasted position based on the aircraft's navigation system calculation using the Global Navigation Satellite System or other navigation inputs, instead of position information from traditional radar.

ADS-B is an advanced surveillance technology that provides highly accurate and more comprehensive surveillance information. Aircraft position (longitude, latitude, altitude, and time) is determined using the Global Navigation Satellite System (GNSS), and/or an internal inertial navigational reference system, or other navigation aids. The aircraft's ADS-B equipment processes this position information along with other flight parameters for a periodic broadcast transmission, typically once a second, to airborne and ground-based ADS-B receivers. The information will be used to display aircraft position on en route and terminal automation systems such as Common Automated Radar Tracking System (CARTS), Standard Terminal Automation Replacement System (STARS), Microprocessor En Route Automated Radar Tracking System (Micro EARTS), En Route Automation Modernization (ERAM), and Advanced Technologies and Oceanic Procedures (ATOP).

ADS-B NAS Wide Implementation supports the FAA mission and helps accomplish agency goals to increase economic competitiveness and safety. The new Air Traffic Systems (ATS) Directorate's activities influence the performance metrics for Average Daily Airport Capacity and NAS On-Time Arrivals. ADS-B Out is considered a foundational program for NextGen.

The following investments have a significant dependency on the successful implementation of ADS-B:

- Terminal AutomatiModernization Replacement (TAMR)
- Airport Surface Detection Equipment (ASDE-X)
- Time Based Flow Management (TBFM)
- Separation Management PortfolioRunway Status Lights (RWSL)

ADS-B has a significant dependence on the successful implementation of the following investments:

- Advance Technologies and Oceanic Procedures (ATOP)
- En Route Automation Modernization (ERAM)
- Airport Surface Deterction Equipment (ASDE)
- Terminal Automation Modernization Replacement (TAMR)
- Separation Management Portfolio

DOT Strategic Goals – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The national deployment of over 630 ADS-B radio stations in FY 2014 served as the entrance criteria for stakeholders to accelerate the installation of ADS-B Out avionics that meet the performance requirements of 14 CFR §91.227. This will allow for the ADS-B capability to deliver the benefits identified in the business case.

Operation and maintenance of Wide Area Multilateration for surface surveillance will continue. Gulf of Mexico Expansion and In Trail Procedures implementation will also continue.

The required funding of $45,200,000 will maintain the ADS-B schedule for Gulf of Mexico, ITP, and ASSC. The required funding will also support all of the NextGen programs with ADS-B interdependencies in addition to the national roll-out for ADS-B implementation in the NAS and subsequent avionics equipage. This will increase equipage rates and the identified program baseline benefits.

What Benefits Will Be Provided To The American Public Through This Request?

ADS-B is a technology that will allow implementation of new air traffic control procedures based on more accurate aircraft position information that will allow better use of existing airspace. This should result in an increase in capacity and will result in fewer delays and more optimal routing for aircraft. The efficiency benefits include reductions in weather deviations, reduced cancellations resulting from increased access to some Alaskan villages during reduced weather conditions, additional controller automation, and additional aircraft to aircraft applications. The efficiency benefits translate to savings in both aircraft direct operating costs and passenger value of time. The Business Case Analysis Report dated May 15, 2012 shows $3.2B in capacity and efficiency benefits.

The SBS baseline surveillance service includes ADS-B coverage for the U.S. portion of the Gulf of Mexico. Adding three ADS-B radio stations in Mexico will provide coverage over all of the Gulf of Mexico air traffic routes extending from U.S. airspace into Mexico, thereby allowing reduced separation for both sides of the border and enabling more efficient handoffs between U.S. and Mexican airspace. Reduced separation will allow for improved on-time arrivals by increasing the manageable volume of traffic.

In Trail Procedures will enable more frequent approval of flight level requests between properly equipped aircraft using a reduced separation standard in Oceanic Airspace, improving flight efficiency. Expected benefits include reduced delays and fuel burn, and consistent, low variance relative spacing between paired aircraft which will improve arrival capacity.

Airport Surface Surveillance Capability (ASSC) is a surface multilateration system that enhances the situational awareness for controllers located in the Air Traffic Control Tower (ATCT). ASSC consists of a multilateration subsystem, multi-processor subsystem, data distribution subsystem, tower display subsystem and a maintenance subsystem. ASSC receives surveillance data from ADS-B and terminal ASR to provide a comprehensive airport approach and surface surveillance picture.

Detailed Justification for - 2A13 Windshear Detection Service (WDS)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Windshear Detection Service (WDS)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Windshear Detection Service (WDS)	$2,000	$4,300	$5,200	+$900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Wind Measuring Equipment (WME) Development	---	$200.0
b. Weather Systems Processor (WSP) Production	---	2,000.0
c. Low Level Windshear Alerting System (LLWAS)/WME Pole Procurement	---	2,500.0
d. Contractor Support	---	500.0
Total	Various	$5,200.0

For FY 2016, $5,200,000 is requested for site preparation of Wind Measuring Equipment (WME), Low Level Windshear Alerting System (LLWAS) and WME pole acquisition, Weather Systems Processor (WSP) radar video processor replacement unit acquisition, and contractor support. This funding will be used to execute the technology refresh of these legacy windshear detection systems currently deployed in the National Air Space (NAS), and fund the contractor support necessary to integrate the replacement hardware into existing software platforms.

What Is This Program And Why Is It Necessary?

Windshear Detection Services (WSDS) Work Package 1 (WP1) is a portfolio program consisting of legacy windshear detection systems currently deployed in the NAS. The program will address obsolescence of the legacy systems WSP, LLWAS, and WME. The program will sustain existing service levels by upgrading components of existing systems to mitigate safety hazards and to resolve obsolescence/supportability issues of the 34 WSP, 60 WME, and 40 LLWAS-Relocation and Sustainment (RS) systems currently deployed in the NAS.

The program will accomplish several key milestones by the end of FY 2016:

- Acquisition of the replacement WSP Radar Video Processor (RVP)
- Development of the WME Upgrade
- Acquisition of LLWAS high mast poles and WME poles

The systems that are part of the WSDS WP1 portfolio alert controllers of dangerous wind shear events that are detected in approach and departure corridors. Since the deployment of these systems in the late 1980s to early 1990s, no major windshear related incidents have occurred in the NAS. WDS WP1 will resolve system obsolescence to ensure that Air Traffic Controllers will continue to receive the windshear alerts necessary to maintain the safety of the NAS.

DOT Strategic Goal – Safety
- Reduction in transportation related injuries and fatalities.

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

$5,200,000 is required to address pressing obsolescence and un-supportability issues plaguing LLWAS, WME, and WSP. This funding is needed to resolve the LLWAS Radio Frequency (RF) modem obsolescence issue where only a small quantity is available in the Depot. Additionally, of the 34 WSP sites, eight are currently running on spare radar video processors. It is essential that the FAA acquire the necessary upgrades to prevent system outages and the resulting loss of service.

What Benefits Will Be Provided To The American Public Through This Request?

The projects contained within the WDS portfolio contribute significantly to the overall safety of the NAS by preventing windshear related aircraft accidents. The WDS project intends to sustain the level of service provided by these legacy ground-based systems to Air Traffic Controllers and by extension, the flying public. WDS WP1 systems are deployed at commercial airports and provide increased aviation safety through the accurate and timely detection of hazardous aviation weather conditions. Operational benefits of these components include real-time detection of windshear, microbursts, gust fronts, wind shifts as well as prediction of wind changes that allow improved airfield efficiency when making runway changes.

Detailed Justification for - 2A14 Collaborative Air Traffic Management (CATM) Portfolio

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Collaborative Air Traffic Management Portfolio
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Collaborative Air Traffic Management (CATM) Portfolio	$36,700*	$13,491	$9,800	+$3,691

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Collaborative Air Traffic Management Technology – WP3	---	$1,800.0
B. Strategic Flow Management Application	---	3,000.0
C. Collaborative Air Traffic Management Technology – Work Package 4	---	5,000.0
Total	Various	$9,800.0

The Collaborative Air Traffic Management Portfolio, as described in the NextGen Implementation Plan (NGIP), involves NAS operators and FAA traffic managers, along with advanced automation, in managing daily airspace and airport capability issues, such as special activity airspace and weather. For FY 2016, $9,800,000 is requested to provide for the following three Capital Investment Plan initiatives:

- Collaborative Air Traffic Management Technology – Work Package 3 (CATMT WP3)
- Strategic Flow Management Application (SFMA)
- Collaborative Air Traffic Management Technology – Work Package 4 (CATMT WP4)

CATMT WP3 program will complete development and deployment by December 2015. The SFMA work furthers service analysis and concept engineering on the Airborne Reroute capability to include potential changes to the Traffic Flow Management System (TFMS), the En Route Automation Modernization (ERAM) and the Time-Based Flow Management (TBFM), which will support complex reroute execution and clearance in En Route. The program prepares analysis and documentation for the developed concepts in order to achieve final investment decision for implementation. The Collaborative Air Traffic Management Technologies program provides enhancements to the Traffic Flow Management (TFM) system. The TFM system is the primary automation system used by the Air Traffic Control System Command Center (ATCSCC) and the nationwide Traffic Management Units that assist the ATCSCC in management of air traffic flow and planning for future air traffic demand. The TFM system is the nation's primary source for capturing and disseminating air traffic information and is the key information source for coordinating air traffic in the NAS.

CATMT WP4 provides for the establishment of a new TFM development/sustainment contract including new capabilities to reduce delays and maximize capacity from FY 2016-FY 2020 and provide the general sustainment of the entire TFMS. The current Traffic Flow Management – Modernization TFM-M contract vehicle, which is the prime development and maintenance vehicle for the TFMS System and CATMT capabilities ends in FY 2016.

A. Collaborative Air Traffic Management Technology – Work Package 3

For FY 2016, $1,800,000 is requested to provide the following:

- Complete testing and deploy the last phase of TFM Remote Site Re-Engineering (TRS-R) to 80+ FAA facilities to improve messaging, report query capabilities and user response times. Complete CATMT WP3 transition and close-out activities.

B. Flow Control Management – Strategic Flow Management Application

For FY 2016, $3,000,000 is requested to provide the following:

- Updated SFMA solution Concept of Operations
- Additional Human In the Loop (HITL) plan, execution and report
- Updated SFMA preliminary program requirements
- Updated Rough Order of Magnitude (ROM) cost estimate
- Updated benefit estimate

Prior year SFMA funding will be used to develop a shortfall analysis, concept of operations, requirements, and cost and benefit estimates.

C. Collaborative Air Traffic Management Technology – Work Package 4

For FY 2016, $5,000,000 is requested to begin the transition of all TFMS related work activities from the current "TFM-M" contract to the new "TFM-2" contract.

What Is This Program And Why Is It Necessary?

The overall philosophy driving the delivery of Collaborative Air Traffic Management services in NextGen is to maintain/enhance efficiency in the NAS. The CATM services strive 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.

While great strides have been made in the management of flow, the lack of common objectives, status and structure constrains improvement. Constraining flights and inaccurate forecasting costs carriers and the traveling public both time and money.

A. Collaborative Air Traffic Management Technology – Work Package 3

The CATMT WP3 program provides two new capabilities: Collaborative Information Exchange (CIX) and TFM Remote Site – Re-engineering (TRS-R). These will be used to continue to reduce flight delays to the flying public by providing more rapid information to the traffic management units in the case of TRS-R, and quicker automated updates to system information in the case of CIX.

B. Flow Control Management – Strategic Flow Management Application

The SFMA program will identify operational shortfalls and gaps for rerouting of airborne flights, which will remain after the implementation of Airborne Reroute Automation (ABRR), Collaborative Trajectory Options Program (CTOP), and Data Communications (Data Comm). The SFMA program will develop capabilities designed to provide traffic managers and controllers with more automated flight-specific trajectory advisory functions that will consider a wide range of input factors (i.e., operator preferences, resource capacity, weather impact, and meter time assignments). The SFMA program will help resolve flow problems earlier, reduce unnecessary flying time and improve metering operations. These advisories will capitalize upon Data Comm-enabled complex clearances to improve the generation, delivery, and execution of reroutes.

Current TFMS automation provides limited functionality to help traffic managers and controllers conduct efficient tactical rerouting of airborne flights in collaboration with Flight Operations Center (FOC)/Airline Operational Control Center (AOC). As the conditions that served as the basis for original route filing change, airborne flights may require subsequent trajectory amendments to avoid convective weather. Today, due to a lack of flight-specific weather impact detection, airborne flights needing reroutes often do not get moved until they've reached the impacted sector. Such close-in rerouting is more workload intensive than rerouting flights in upstream sectors. As a preventative measure, Airspace Flow Program (AFP) rates and playbook reroutes are often implemented more conservatively than necessary. Additionally, tactical reroutes are often planned and executed without collaboration with FOCs/AOCs, or full awareness of the effects they may have on existing TBFM metering initiatives. The SFMA program will also develop automaton capabilities and tools to mitigate these shortfalls, so that traffic managers and controllers can generate, deliver, and execute the reroutes for airborne flights more efficiently and effectively.

C. Collaborative Air Traffic Management Technology – Work Package 4

The CATMT WP4 program proposes a series of software projects designed to deliver improvements on existing capabilities and new modeling functions for the TFMS. The primary function of TFMS is to enable improved traffic flows by supporting operational decision making with real-time demand and capacity estimates. The TFMS currently lacks important demand and capacity data, is only partly integrated with other key traffic flow support systems, and therefore provides incomplete views of traffic status for use across a wide range of stakeholders. The shortfalls identified below will be addressed by CATMT WP4:

- Erroneous alerts presented to En Route Supervisors of traffic exceeding Sector Capacity thresholds, causing inefficiencies in sector planning with direct impact on air operations. The estimated error in these alerts drives an additional $31.3 million in consequent avoidable annual expenses for airlines and passengers.
- Lost time and less-than-optimal decisions made by Controllers, Supervisors, Traffic Managers, and in airport operations in estimating the loss of capacity in the face of adverse weather, and then in negotiating traffic flow management actions (reducing arrival rates) in response to these losses, or in response to high air traffic volumes.
- Inaccurate surface weather predictions delivered to TFMS, which result in errors in capacity planning and in managing arrival rates at destination airports. These planning errors in turn lead to errors in the execution of ground stops and ground delays at the origination airports that feed traffic to these destinations.
- Follow-on, cascading effects from failure to estimate demand properly; these can result in delivery of an excessive number of aircraft to a given NAS element (route, fix, airspace sector, or airport) with no warning, prompting the need for controllers to resort to extraordinary re-routes or traffic vectoring in response.

The CATMT WP4 program, upon receiving a Final Investment Decision (FID) by the FAA JRC, will seek to address these shortfalls. CATMT WP4 will transition the development, implementation and sustainment work to a new contract.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. Collaborative Air Traffic Management Technology – Work Package 3

Funding is required for CATMT WP3 to complete its user requested/cost savings enhancements.

B. Flow Control Management – Strategic Flow Management Application

Funding is required to develop the following SFMA products:

- Updated SFMA solution Concept of Operations
- Additional Human In the Loop (HITL) plan, execution and report
- Updated SFMA preliminary program requirements
- Updated ROM cost estimate
- Updated benefit estimate

The above products are needed to develop the SFMA capabilities, the final Enterprise Architecture products and amendments, high fidelity HITL, final program requirements, final business case, and vendor requirements. The products and artifacts will meet the requirements of the AMS investment and will lead SFMA through IARD and FID.

C. Collaborative Air Traffic Management Technology – Work Package 4

Funding is required for CATMT WP4 to begin the transition of all TFMS related work activities from the current "TFM-M" contract to the new "TFM-2" contract.

What Benefits Will Be Provided To The American Public Through This Request?

Collaborative Air Traffic Management coordinates flight and flow decision-making by flight planners and FAA traffic managers to: improve overall efficiency, provide greater flexibility to flight planners, and make the best use of available airspace and airport capacity. Traffic managers impose Traffic Management Initiatives (TMIs) to account for congestion, weather, special activity airspace, or other constraints. The TMIs are the means by which traffic managers manage constraints. These initiatives can alter users' flight plans. The impact of TMIs can be reduced by tailoring flow management actions to specific flights. This can be done through a combination of increased information on the users' preferred alternative routes; enhanced tools for assessing the impact of rerouting decisions; and improved communications and display of instructions to the controllers who must implement the initiatives.

The TFMS is the nation's primary source for capturing and disseminating flight information across the aviation community. The automation and communication mechanisms provided by the TFMS, support the decision-making process used to adjust flight schedules and/or routes as necessary. When the NAS is impacted by severe weather, congestion, and/or outages, the TFMS 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.

Collaborative Air Traffic Management provides capabilities to improve TFMS system-wide, as well as, at the tactical or location-based level. The CATM capabilities will coordinate flight and flow decision-making by flight planners and FAA traffic managers to improve the following:

Capacity
- Fewer en route capacity constraints are imposed as congestion is resolved through tailored incremental congestion responses. This will enhance on-time performance and reduce passenger delay
- Automated congestion resolution tools match user preferences to airspace with available capacity

Flexibility
- User route flexibility is increased through negotiated trajectories for congestion resolutions
- Integrated Departure Route Planning decision support simplifies relieving departure queue and reduces surface delays
- Facilitates the ability of local traffic managers to balance workload even on days when there are no major impacts from severe weather
- Enables improved/optimal runway assignments considering airspace configuration changes

Efficiency
- Aggregate flight efficiency is increased by factoring individual flight trajectories into the congestion solution
- Reduction of arrival delay by identifying opportunities for reopening arrival airspace
- Advance forecast of impact and clearing enables decision to hold arrivals at higher altitudes or on the ground, reducing fuel burn and terminal congestion
- Optimization of flight trajectory before take-off (pre-departure) or entry into oceanic airspace (pre-oceanic) to reduce fuel consumption and environmental impact of oceanic flights

A. Collaborative Air Traffic Management Technology – Work Package 3

CATMT WP3 provides an increase in the availability and timely access to critical traffic management data, currently not fully available to all TFMS users, as well as automating the acceptance of some data currently requiring manual input. This rapid access and increased availability to TFMS data by all users (Traffic Management Unit, Airline Operations Centers, and other users) allows the quick response decisions, which reduce unnecessary delays in the NAS, yielding cost reductions to the flying public.

B. Flow Control Management – Strategic Flow Management Application

SFMA enhances Execution of Airborne Reroute (ABRR), which provides automation capabilities for rerouting of airborne flights and reduces flight delays, and NAS users will realize monetary benefits from delay saving. SFMA will generate more efficient airborne reroutes tailored for each individual airborne flight; therefore, it is expected to reduce more flight delays. Furthermore, SFMA leverages the capabilities of Data Comm, and helps traffic managers and controllers generate, deliver and execute more precise and more direct reroutes for airborne flights; thus, it will further reduce unnecessary flying time, flight delays, and fuel consumption.

C. Collaborative Air Traffic Management Technology – Work Package 4

CATMT WP4, once granted a FID, will seek to address the shortfalls listed above to reduce unnecessary delays in the NAS, yielding improved operational efficiency of the NAS and reduced travel time to the flying public.

Detailed Justification for - 2A15 Time Based Flow Management (TBFM) Portfolio

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Time Based Flow Management (TBFM) Portfolio
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Time Based Flow Management (TBFM) Portfolio	$13,984*	$21,000	$42,600	+$21,600

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Time Based Flow Management (TBFM) – Work Package 3 (WP3)	---	$38,000.0
B. Time Based Flow Management Technology Refresh	---	600.0
C. Demonstration – 4D Trajectory	---	4,000.0
Total	Various	$42,600.0

TBFM is a multi-faceted program designed to more efficiently manage demand-capacity. TBFM will re-architect the existing Traffic Management Advisor (TMA) system to maintain supportability. For FY 2016, $42,600,000 is requested to support the following activities:

A. Time Based Flow Management (TBFM) WP3

- TBFM WP3 will complete design for Terminal Spacing and Sequencing (TSS) and begin hardware engineering analysis for Integrated Departure/Arrival Capability (IDAC). This funding will enable the initial design of the STARS/TBFM interface.
- Continue System Specification Development (SSD) requirements development for the TBFM Functional Allocation System Specification Document Design (FA-SDD) and begin software development and test plans to support the TSS interface with TBFM. Specific focus is on initiating software development on TSS, which is a cross-platform capability that assists the Air Traffic Control Specialist with merging, spacing, and sequencing aircraft in terminal airspace by scheduling them to cross defined navigational points along their routes at specified times.

B. Time Based Flow Management Technology Refresh

- The TBFM technology refresh will replace the equipment that was deployed in 2012 with new modern equipment in the FY 2018 – 2019 time frame. The current equipment will begin to reach its end of life/end of maintenance by 2017. The TBFM program office, starting in the FY 2015 time frame, will begin the acquisition management process to reach a Final Investment Decision to replace this hardware.

C. Demonstration – 4D Trajectory

- 4D Trajectory Demonstration: The 4D Trajectory demonstration objective is to validate the capability of air/ground, (ATN baseline 2 data communication), and ground/ground, (flight object use in the air traffic flow management and Flight Operation Center (FOC) automation) to support advanced trajectory exchange (e.g. Required Navigation Performance (RNP) with curved path, time of arrival control) including operational sufficiency of the data sets.

What Is This Program And Why Is It Necessary?

A. Time Based Flow Management (TBFM) WP3

TBFM WP3 capability maximizes traffic flow and airport usage by improving flow management into and out of the busy metropolitan airspaces and corresponding airports. Essentially this helps solve the problem of 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 can achieve maximum throughput while facilitating efficient arrival and departure. TBFM originally focused on the tactical metering of traffic flows in the en route cruise environment. TBFM WP3 will improve upon the existing TBFM enhancements by extending the functions of TBM into the terminal environment.

TBFM WP3 is a follow-on phase of TBFM WP2 that will implement additional NextGen concepts, such as:

- TSS will provide efficient sequencing and runway assignment by extending time based metering to the runway
- Expansion of the IDAC to additional locations will increase efficiency of departure operations

The design, development and deployment of these concepts will occur during the 2015 - 2019 timeframe.

B. Time Based Flow Management Technology Refresh

TBFM technology refresh will replace-in-kind TBFM operational hardware deployed in 2012 - 2013 with new equipment in the FY 2018 - 2019 time frame to enable TBFM to continue to provide NAS efficiency benefits. Without this hardware replacement, maintenance costs of the TBFM system will increase and new enhancements in WP3 may be delayed.

C. Demonstration – 4D Trajectory

The 4D Trajectory project will demonstrate the exchange of aircraft trajectories and complex clearances between ground automation, Airline Flight Operations Centers (FOC), and aircraft. This is a foundational capability required to perform Trajectory Based Operations (TBO) and concepts such as Dynamic RNP. The project will leverage the availability of advanced Data Comm standards and technologies such as Data Comm ATN baseline 2 and the flight object baseline for trajectory exchange between Air Traffic Management (ATM) and FOC automation.

The project will demonstrate and highlight potential benefits (4D trajectories and Dynamic RNP) to help reduce operational impacts caused by weather, high density traffic, and Special Activity Airspace (SAA). This would maintain operational efficiency by reducing flow restrictions, ground stops, or other traffic management initiatives.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

Funding is required to extend time based metering to the runway, and to complete investment analysis to support technology refresh of the hardware that is reaching end-of-service/maintenance. FY 2016 funding at this level will enable TBFM WP3 to initiate software development for Terminal Spacing and Sequencing (TSS). These capabilities meet NextGen and FAA milestones of delivering enhancements that provide the benefit of avoided delays.

The Program Office will develop the documentation needed for Final Investment Decision (FID) for technology refresh in FY 2016. This technology refresh will allow the program to begin the replacement of obsolete hardware to avoid costly maintenance and system down times.

Demonstration activities provide a vehicle to test concepts and leverage individual transformational program and project technology to create multi-domain cohesive demonstrations. This addresses and meets the rapidly changing needs of the aviation industry, by introducing innovative concepts and technologies in the air traffic system, leveraging emerging technologies for operational NAS benefits.

What Benefits Will Be Provided To The American Public Through This Request?

WP3 capabilities are achieving increased arrivals and departures in areas where demand for runway capacity is high and close proximity airports with potential interference to airspace/approach. In FY 2016, WP3 includes funding to develop software, which includes design and coding for the Terminal Radar Approach Control (TRACON) Standard Terminal Automation (STARS)/Terminal Automation Modernization and Replacement (TAMR) and the ARTCC En Route Automation Modernization (ERAM) systems. With TBFM implementation, the public will experience fewer delays (TBM), reduced carbon emissions (TSS), and less airport noise (TSS).

Demonstration activities are planned to show how to reduce air traffic delays due to more efficient metering and spacing, increased capacity of the airspace, more efficient traffic flow management, and integrated arrival/departure routes. These activities will identify key implementation issues, assist the FAA in developing its operational improvement plans to meet NextGen goals and objectives, and assist with implementing initiatives in FY 2016 and beyond.

Detailed Justification for - 2A16 ATC Beacon Interrogator (ATCBI) Model 6 – Technology Refresh

What is the Request and What Funds are Currently Spent on the Program?

FY 2016 – ATC Beacon Interrogator (ATCBI) Model 6 – Technology Refresh
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
ATC Beacon Interrogator (ATCBI) Model 6 – Technology Refresh	$1,000	$0	$1,000	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($1,000)
Engineering/Logistics Analysis	---	$1,000.0

For FY 2016, $1,000,000 is requested to perform a supportability analysis to verify NAS requirements continue to be met and start preparations for the Investment Analysis process in support of an Investment Analysis Readiness Decision (IARD) in June 2016. The ATCBI-6 technology refresh is planned to receive Final Investment Decision (FID) in December 2017.

Current activities have included performing a sustainability analysis in support of investment analysis activities to determine if additional investment is necessary to ensure cost effective system operation through its designated lifecycle.

What Is This Program And Why Is It Necessary?

The ATCBI-6 technology refresh program will replace and upgrade obsolete ATCBI-6 Original Equipment Manufacturer (OEM) unique and Commercial Off-The-Shelf (COTS) hardware and software to ensure the continued reliable and cost effective operation of the radar system through its designated lifecycle. The original ATCBI-6 program procured 139, Monopulse Secondary Surveillance Radar (MSSR) with Selective Interrogation to replace old ATCBI model 4/5's operational beacons, and seven support systems for training, testing, logistics, and operational support. The ATCBI-6 was deployed into the National Airspace (NAS) at 130 locations from 2001 through 2013. The ATCBI-6 program commissioned the first system in FY 2002 and commissioned the last system in the United States in FY 2013. There is one remaining site, Freeport, Bahamas, scheduled for full operational capability in 2014. The ATCBI-6 is a cooperative surveillance system and provides air traffic controllers with selective interrogation capability, not available in the older systems, that significantly improves the accuracy of aircraft position and altitude data provided to Air Traffic Control (ATC) automation systems. Additionally, the ATCBI-6, in conjunction with a co-located primary Long Range Radar, provides back-up Center Radar Approach (CENRAP) surveillance service to numerous Terminal Radar Approach Control (TRACON) facilities in the event terminal radar services are lost.

The ATCBI-6 technology refresh program will ensure that all operational and support ATCBI-6 systems continue to meet all performance and availability requirements. It will identify and address any potential requirements to maintain system sustainability, operational availability and reduce life cycle cost until the planned deployment of the Next Generation Backup Surveillance Capability (NBSC) System, in accordance with the FAA's Enterprise Architecture (Surveillance) Road Map.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$1,000,000 is required for ATCBI-6 Program to continue a supportability analysis to verify NAS requirements continue to be met and support investment analysis to achieve IARD.

What Benefits Will Be Provided To The American Public Through This Request?

The anticipated benefits for this technology refresh program include operational maintenance cost control, maintain system/service availability, and ensure a reliable system/service that supports safety, flight efficiency and environmental benefits of the original ATCBI-6 program.

Detailed Justification for - 2A17 Next Generation Weather Processor (NWP) Work Package 1 (WP1)

What is the Request and What Funds are Currently Spent on the Program?

FY 2016 – Next Generation Weather Processor (NWP) Work Package 1
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Next Generation Weather Processor (NWP) (WP1)	$11,475	$23,320	$7,000	-$16,320

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Prime Development Contract (Hardware and Software)	---	$5,034.4
b. Program Management and System Engineering	---	1,456.0
c. Test and Evaluation	---	344.7
d. Second Level Engineering	---	93.5
e. Integrated Logistics Support	---	71.4
Total	Various	$7,000.0

For FY 2016, $7,000,000 is requested to provide the following:

- Complete NWP Work Package 1 (WP1) System Requirements Review (SRR), System Design Review (SDR), and System Specification Review (SSR)
- Software Development for NWP WP1

NWP WP1 is currently in Final Investment Analysis (FIA) with a Final Investment Decision (FID) targeted for the end of the second quarter of FY 2015. The NWP Program developed a Screening Information Request (SIR) package that was released in fiscal year 2014.

What Is This Program And Why Is It Necessary?

The goal of the NWP program is to establish a common weather processing platform that will functionally replace the legacy FAA weather processor systems and host new capabilities. As input, NWP WP1 uses information from the FAA and National Oceanic and Atmospheric Administration (NOAA) radar and sensors and NOAA forecast models. NWP WP1 uses sophisticated algorithms to create aviation-specific current and predicted weather information. NWP WP1 creates value-added weather information that will be available via the Common Support Services-Weather (CSS-Wx) system. It will perform weather translation, which will enable the use of weather information by automated decision-support tools (DSTs). NWP WP1 will also provide improved aviation safety related windshear and microburst products. Altogether, these features will aid in reducing the rising operations and maintenance costs by consolidating the following systems, funded under separate Budget Line Items (BLIs), over its lifecycle:

- Corridor Integrated Weather System (CIWS): Provides 0 - 2 hour aviation weather information to the Traffic Flow Management System (TFMS) and associated users;
- Weather and Radar Processor (WARP): Provides weather information to en route air traffic controllers, supervisors, traffic management coordinators, and Center Weather Service Unit meteorologists

- Integrated Terminal Weather System (ITWS), which is funded under 2B20: Provides weather information to terminal air traffic supervisors and controllers

Weather information is needed for air traffic management (ATM) and flight operations decisions. Current aviation weather processing infrastructure and abilities are inadequate to meet real-time needs of ATM DSTs, operational decision-makers, and NextGen. Existing aviation weather products lack the spatial resolution and time accuracy needed for decisions involving key weather phenomena impacting aviation. Current legacy information is in unusable form for integrated use in ATM DSTs for the potential impacts on aircraft. Aviation weather products for the same phenomena impacting aviation operations are often inconsistent, redundant, or are not accurate. Current legacy processing are closed architectural systems and incompatible with one another. Legacy weather infrastructure is too limited and unable to ingest and process observation, forecast, and modeling data to meet high-quality products with a longer time horizon. Existing legacy software is inefficient, difficult to modify, and unable or incompatible to serve users across multiple domains.

DOT Strategic Goal - Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

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

$7,000,000 is required to continue work for the NWP WP1 and achieve the Initial Operating Capability (IOC) milestone on-time. As stated above, NWP WP1 provides a weather processing platform that will replace the existing (aging) FAA weather processor systems and will also provide new capabilities to meet the anticipated needs of DSTs and operational decision makers in the NextGen era. Overall, NWP WP1 will provide the following benefits:

- Transition to operations of reliable, high resolution products of aviation-relevant weather that meet the needs of users and their DSTs
- Generate Weather information in a form useable by ATM DSTs such as indices that indicate the severity of weather conditions for various parameters (e.g., convection) and the impact of the conditions on various aircraft types and configurations
- Scalable and expandable processor architecture serving multiple domains with capacity to support the intensive processing demands of advanced applications
- Portable, non-proprietary, open software applications to subsume legacy functionality and meet NextGen requirements
- Probabilistic weather information with regard to specific airspaces

What Benefits Will Be Provided To The American Public Through This Request?

NWP WP1 is tied to producing aviation-relevant weather that meets the needs of users and their decision-support tools. When combined with the optimization of weather observations, improved predictions, probabilistic predictions, and translation into direct airspace constraints, users will be able 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 reducing airline operating costs (e.g. fuel) and passenger delays.

The Corridor Integrated Weather System (CIWS) Prototype has undergone extensive user demonstrations/evaluation. It has been evaluated and found to provide accurate results over a two-hour period. Prototype users have attested to its effectiveness in support of strategic planning. Similarly, the 0 - 8 hour prototype product has achieved highly positive user evaluation. The NWP WP1 Program has hardened the code and produced documentation associated with the legacy prototypes as part of a Government Furnished Information (GFI) package for this investment.

Detailed Justification for - 2A18 Airborne Collision Avoidance System X (ACAS X)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Airborne Collision Avoidance System X (ACAS X)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Airborne Collision Avoidance System X (ACAS X)	$0	$12,000	$10,800	-$1,200

<u>COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR</u>

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Airborne Collision Avoidance System X (ACAS X)	---	$10,800.0

For FY 2016, $10,800,000 is requested to support ongoing standards development activities of ACAS X within Joint RTCA SC-147/EUROCAE WG-75 forums (Xa and Xo variants). Efforts in 2016 will be focused around codifying system requirements within RTCA, continuing with the characterization of system hazards and mitigations, and formalizing system operational evaluation strategies and applicable agreements. Funding activities include:

- $2,000,000 for Requirements Substantiation, Justification and Traceability; Formalization of Draft ACAS Xa/Xo Minimum Operational Performance Standards (MOPS) Documentation; and Program Management Support
- $1,000,000 for Safety Risk Management and Advanced Stress Testing; Operational Outreach (Focus Groups; pilots, controllers, etc.)
- $3,400,000 for System Validation and Verification Testing; Test Suite Development
- $4,400,000 for System Logic Optimization and Tuning; Operational Validation and Suitability Assessment of System Performance; and Operational Evaluation Planning

What Is This Program And Why Is It Necessary?

The Airborne Collision Avoidance System X (ACAS X) is being developed to meet future collision avoidance requirements. The ACAS X program will provide guidance and technical expertise to RTCA in order to develop the functional architecture, functional interfaces and requirements for the next generation of collision avoidance capability, which will replace the existing Traffic Alert and Collision Avoidance Systems II (TCAS II). TCAS II is required in US airspace for all commercial aircraft with 30 or more seats and on all cargo aircraft greater than 33,000 pounds. ACAS X will reduce the number of nuisance Resolution Advisories (RA) in US airspace and better support future operations. The program will be performing simulations, developing prototypes, and advancing performance specifications that will result in the development of Minimum Operational Performance Standard (MOPS), Technical Standard Order (TSO) and Advisory Circular (AC) documentation. Manufacturers will produce the ACAS X equipment in accordance with those documents. The program will also provide sustainment of TCAS II field equipment, encounter models, toolsets and certification support for manufacturer equipment.

The ACAS X system will address shortfalls in the legacy TCAS II system. First, the system architecture will be designed so that changes to the threat detection and resolution logic can be made quickly using an automated process. This flexibility will be very useful for future adaptations to NextGen operations and for unmanned aircraft system (UAS) encounter profiles/patterns. Second, ACAS X will be able to accommodate a variety of different sensor types and will have enough flexibility to accommodate new generations of sensors where necessary (including data from ADS-B Airborne Position Messages); this will be especially important when it comes to adapting ACAS X for UAS. Third, ACAS X will reduce the number of "nuisance alerts" while simultaneously providing a reduced probability of near mid-air collision.

The initial ACAS X systems will have two variants:

- ACAS Xa: A variant of ACAS X which will use active interrogations and replies in concert with passive reception of ADS-B information to perform surveillance. ACAS Xa is the variant of ACAS X most similar to TCAS II in its form and function.
- ACAS Xo: A variant of ACAS X intended for use with NextGen operations where other variants of ACAS X would generate unacceptably high rates of RAs if used. An example of such an operation would be Closely-Spaced Parallel Operations (CSPO). This variant will be used in conjunction with ACAS Xa.

DOT Strategic Goals – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

As reflected in RTCA DO-337, Recommendations for Future Collision Avoidance Systems (published March 21, 2012), an improved future collision avoidance system is required to facilitate NextGen procedures and applications (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) and to compensate for issues in existing TCAS performance (i.e., nuisance alert rate).

TCAS, as it is currently designed, currently conflicts with everyday normal operations (i.e., 50 percent of RAs a result of 500 ft Instrument Flight Rules (IFR)/Visual Flight Rules (VFR) separation) and cannot execute envisioned NextGen reduced separation operations will be minimized. ACAS X will use the current 2020 ADS-B out equipage mandate as leverage to minimize potential future operator implementation costs. The program will also lead the development of collision avoidance capability for UAS platforms, as means to ensure forward/backward compatibility with existing TCAS systems.

What Benefits Will Be Provided To The American Public Through This Request?

ACAS X will create fewer false warnings of potential midair collisions and therefore provide better performance than existing TCAS II v7.1 logic. This improvement will greatly enhance its role in maintaining the high level of aviation safety that is critical in terminal air traffic areas. Preliminary results of system performance and safety analysis shows that ACAS X could produce 54 percent fewer alerts and be over 50 percent safer than existing TCAS II v7.1 logic.

Increased Efficiency - ACAS Xa produced 34 percent fewer total Resolution Advisories (RAs) as compared to TCAS II during simulation assessment of its safety logic assuming perfect compliance in the Pilot response model. Unnecessary RAs related to 500 ft VFR/IFR encounters were down 52 percent for ACAS Xa. All types of aircraft (Major/regional carrier, business jets and helicopters) experienced a reduction of 41 percent in RAs generated in Class B, C and D airspace. ACAS Xa consistently generated RAs of shorter duration than TCAS II.

Increased Safety - Simulation results based on the U.S. Encounter Model indicate that ACAS Xa increases safety by 52 percent as compared to TCAS v7.1 for the unequipped Mode C intruder case (Monte Carlo simulations of approximately 0.5 million encounters). ACAS Xa reduced the induced component of risk (risk of collision because of maneuver suggested by TCAS) by 35 percent and unresolved component (such as mitigate pre-existing risk) by 55 percent.

Comparison of the risk ratio for TCAS II and ACAS Xo for CSPO operations indicated that ACAS Xo is approximately 72 percent safer than TCAS II. For the available dataset, ACAS Xo had 64 percent lesser number nuisance alerts as compared to TCAS II.

Designed for NextGen Environment - NextGen operational concepts will reduce spacing between aircraft, such as three nautical mile separation en route and closely spaced parallel operations. TCAS II in its current form would alert too frequently to be useful in these situations.

Adapts to New Surveillance Technologies - NextGen makes extensive use of new surveillance sources, including satellite-based navigation and advanced ADS-B functionality. TCAS II relies solely on transponders but ACAS X will take advantage of the new surveillance sources**.**

Qualitative benefits include an increase in trust for ACAS X (due to trust in RAs), reduction in workload for pilot and ATC, faster and less expensive implementation of updates to ACAS X in the field, conducting operations (e.g. CSPO) under IMC conditions and increased flexibility to modify airspace more frequently.

Detailed Justification for - 2A19 Data Communications in Support of NextGen

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Data Communications in Support of NextGen
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Data Communications in Support of NextGen	$115,450	$150,340	$234,900	+$84,560

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Segment 1 Phase 1 (S1P1)		
a. Program Management	---	$9,482.5
b. Systems Engineering	---	970.7
c. Data Comm Test	---	2,300.2
d. DCL Service Implementation	---	1,020.8
e. Tower Data Link Service (TDLS)	---	1,590.1
f. En Route	---	13,844.9
g. Data Comm Integrated Services (DCIS)	---	15,134.5
h Data Comm Network Service (DCNS)	---	19,954.3
i. Avionics Equipage Initiative	---	20,302.0
j. Independent Operational Test and Evaluation (IOT&E)	---	600.0
Total (S1P1)	Various	$85,200.0
B. Segment 1 Phase 2 (S1P2)		
a. Program Management	---	$5,264.1
b. Systems Engineering	---	3,670.2
c. Data Comm Test	---	4,971.6
d. Operations	---	1,900.9
e. En Route	---	110,506.2
f. Data Comm Integrated Services (DCIS)	---	21,121.4
g. Data Comm Network Service (DCNS)	---	347.8
h. Tower Data Link Service (TDLS)	---	1,917.8
Total (S1P2)	Various	$149,700.0

For FY 2016, $234,900,000 is requested for the Data Communications (Data Comm) program. This funding supports the development of Segment 1 Phase 1 (S1P1) and Segment 1 Phase 2 (S1P2) work. Data Comm S1P1 includes Departure Clearance (DCL) service in the tower environment and will be implemented beginning in FY 2016. S1P2 includes enhancements to En Route services and will be implemented beginning in FY 2019.

The requested funding for S1P1 and S1P2 is also intended to support RTCA Task Force 5 Recommendations 16, 17, 39, 44, and 42, as well as the September 2013 NextGen Advisory Committee (NAC) prioritization report.

A. Segment 1 Phase 1 (S1P1)

For FY 2016, Data Comm is requesting a total of $85,200,000 for S1P1, of which $600,000 is for IOT&E activities. This funding will enable completion of the Departure Clearance Service, including the Operational Test and Evaluation and achievement of Initial Operating Capability (IOC).

The funding also provides funding for the Data Comm Avionics Equipage Initiative, which will result in 300-500 aircraft getting equipped with Future Air Navigation System (FANS) 1/A+ avionics. Funding is required to provide for training of controllers and technicians as well as the build-out and operation of the Data Comm Network Service (DCNS) air-ground communications infrastructure.

S1P1 milestones include:

- Complete integration and testing of the subsystems to deliver Data Comm Services – FY 2015
- Complete Enterprise Service-level Integration Testing – FY 2015
- DCNS Build 2 delivered at William J. Hughes Technical Center (WJHTC) – FY 2015
- TDLS and ERAM software releases (to support Data Comm) in use operationally – FY 2015
- Operational Test and Evaluation (OT&E) – FY 2016
- IOC for Tower Services – FY 2016
- Data Comm In-Service Decision (ISD) – FY 2017
- Key Site Operational Readiness Decision (ORD) – FY 2017
- Final IOC for Tower Services (57 Towers) – FY 2019

B. Segment 1 Phase 2 (S1P2)

For FY 2016, Data Comm is requesting $149,700,000 for S1P2. This funding will enable continuation of the ERAM upgrade to include Data Comm Initial En Route Services. In FY 2016, development activities will include completion and testing of the National Single Data Authority (NSDA) log-on capability, as well as coding and testing of the initial services. Requirements and design work on the full services will also be started in this timeframe. Additionally, funding is required to support the TDLS upgrades to accommodate the NSDA capability.

Funding is required to continue efforts for the network engineering and design for En Route services, as well as integration and engineering services such as support for systems integration, avionics validation and interoperability, system performance and capacity loading, failure modes and effects analysis, reliability/maintainability/availability, network security, human factors, etc. Studies include system performance planning studies, system implementation engineering as well as integration engineering activities.

S1P2 milestones include:

- Achieve Final Investment Decision (FID) for En Route Services – FY 2015
- Complete system requirements and design effort – FY 2016
- Complete software development for En Route Services – FY 2017
- Complete developmental testing – FY 2018
- Complete Ops Evaluation – FY 2019
- Achieve IOC for Initial En Route Services – FY 2019

What Is This Program And Why Is It Necessary?

The Data Comm program will provide data communications between Air Traffic Control (ATC) facilities and aircraft and will serve as an enabler for the NextGen operational improvements. Data Comm Segment 1 will deliver the initial set of Data Comm services integrated with automation support tools, which provides NAS benefits and lays the foundation for a data-driven NAS. Data Comm Segment 2 will enable more advanced NextGen operations, which would not be possible using the existing voice systems, and expands the intiaitive from the tower/terminal environment into the en route airspace.

Data Comm is needed to bridge the gap between current voice-only ATC and the data-intensive NextGen. Data Comm will enable air traffic controller productivity improvements and will permit capacity growth without requisite cost growth associated with equipment, maintenance, and labor. Data Comm is comprised of automation enhancements for air traffic control message generation and exchange (hardware and software) and the communications data link between ground and airborne users. 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. Data Comm will significantly reduce communications related operational errors and improve the safety of air travel. Segment 1 Phase 1 will lay the foundation for a data-driven NAS.

The capacity and productivity of the NAS will be improved by Data Comm. Initially, Data Comm will be used in conjunction with the current traffic control strategies as well as planned strategies such as traffic flow management (TFM) re-routes. Data Comm will increase controller efficiency by automating routine exchanges. As controllers become more productive, tower and En Route capacity will grow without the need to assign additional resources. This increase in traffic handling ability has a direct correlation to reduced delays and increased efficiency. Recent benefits analysis suggests airline operations will benefit from reduced gate delay and taxi times, improved on-time performance and the opportunity to expand flight schedules. The busiest positions in airport clearance delivery positions at Core 30 airports will see the most dramatic benefit.

Services at the Tower (S1P1) will improve operations in the following manner:

- Improve recovery from service disruptions, mitigate propagated delay, improve schedule reliability, and enable NextGen capabilities
- Improve communication accuracy and safety with digital communication (i.e., reduced read/hear back errors, reduced loss of communications events)
- Reduce controller and pilot workload
- Reduce environmental impact due to less fuel burn and emissions
- Direct operating cost savings from reduced delay enabled by reduced communication time for revised departure clearances

Services in En Route (S1P2) will improve operations in the following manner:

- Improve flight efficiency due to improved controller and flight crew efficiency by providing automated information exchange
- Improve rerouting capabilities
- More efficient routes for aircraft
- Decrease congestion on voice channels and provide an alternative communications capability
- Improve NAS capacity and reduced delays associated with congestion and weather
- Improve communication accuracy and safety with digital communication (i.e., reduced read/hear back errors, reduced loss of communications events)
- Reduce environmental impact due to less fuel burn and emissions
- Direct operating cost savings from increased throughput/efficiency realized through reduced delays and improved communications
- Direct operating cost savings from reduced distance flown enabled by more precise airborne re-routes

Services provided by Data Comm are conservatively estimated to save operators more than $10 billion over the 30-year lifecycle of the program and save the FAA approximately $1 billion in operating costs.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The Data Comm program needs to be funded at the requested level to achieve IOC for S1P1 tower services in FY 2016. These activities include: end-to-end integration testing, formal operational testing, field familiarization, testing and deployment of En Route Automation Modernization (ERAM) software and Tower Data Link Service (TDLS) software with Data Comm enhancements, training, ground telecommunications upgrades and installations, network service, avionics equipage, outreach to industry, and integration and engineering services. These activities are augmented by program management, operations, and systems engineering support.

Funding for Data Comm S1P2 will enable software engineering for the ERAM system to accommodate enhancements for En Route controller-pilot data communications. Additional activities include network engineering to deploy the Data Communications Network Service to En Route airspace, spectrum bandwidth clearing for En Route airspace, and Data Communications Integrated Services (DCIS) integration and engineering services. These activities are augmented by program management and systems engineering support.

What Benefits Will Be Provided To The American Public Through This Request?

Data Comm will reduce operational errors associated with communications, enhancing the safety and efficiency of the NAS. Data Comm will also reduce environmental impact due to less fuel burn and emissions. The program will improve NAS capacity and reduced delays resulting in estimated passenger time savings of over $16 million over the program life cycle.

Detailed Justification for - 2B01 Airport Surface Detection Equipment – Model X (ASDE-X) Technology Refresh (TR) and Disposition

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Airport Surface Detection Equipment – Model X (ASDE-X) – Technology Refresh and Disposition
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
ASDE-X Technology Refresh (TR) and Disposition	$12,100	$5,436	$13,500	+$8,064

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ASDE-X Technology Refresh and Disposition		
a. Hardware/Software Engineering Services	---	$7,092.0
b. Program Management	---	2,570.0
c. Second Level Engineering	---	838.0
Total	Various	$10,500.0
B. Airport Surface Movement Detection (ASDE-3) Service Sustainment		
a. Program Planning and Engineering Services	---	$1,250.0
b. Program Management Support	---	130.0
c. Logistics Support	---	1,620.0
Total	Various	$3,000.0

A. Airport Surface Detection Equipment – Model X (ASDE-X)

For FY 2016, $10,500,000 is requested to complete the hardware procurement for the ASDE-X processor replacement and the Universal Access Transceiver Receiver (UATR) Upgrade project. Funds will also be used to complete UATR key site testing. The ASDE-X team completed a study in FY 2012 to determine the equipment and software that needed to be upgraded, updated, or replaced as part of the ASDE-X technical refresh effort. Three of the five projects identified in the study were approved.

These projects were:

- Obsolescence/Spare Parts Procurement – This project increases the depot stock of components that are projected to be depleted from the ASDE-X Depot prior to the end of the ASDE-X lifecycle.
- ASDE-X Processor Replacement – This project replaces the obsolete ASDE-X processors with Linux based processors running applications updated via the Airport Surface Surveillance Capability (ASSC) Program.
- Universal Access Transceiver Receiver (UATR) Upgrade – This project modifies the existing UATR in each remote unit (RU) to the updated UATR2 to address existing UATR performance shortfalls.

Ongoing work includes; software development, purchase of processor hardware, key site testing support for the ASDE-X processor replacement project, and engineering activities for the UATR upgrade.

B. Airport Surface Movement Detection (ASDE-3) Service Sustainment

For FY 2016, $3,000,000 is requested to support continued ASDE Surface Surveillance System sustainment. FY 2016 funding will be used to support investment analysis and/or to procure any ASDE-3 sustainment hardware required as a result of the ASDE-3 sustainment study.

The ASDE-3 sustainment study will identify parts that are obsolete and/or facing diminishing manufacturing sources. Results of the ASDE-3 sustainment study will be key in determining the next steps for the ASDE-3 service sustainment and the study results could become the catalyst in accelerating or delaying the program's investment decisions. The sustainment study will be targeted for completion in FY 2016.

What Is This Program And Why Is It Necessary?

A. Airport Surface Detection Equipment – Model X (ASDE-X)

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 and the final system was installed in 2011. Some of the equipment has reached the end of its life and is no longer supportable. The ASDE-X technology refresh program provides for the replacement and upgrade of hardware to ensure the continued operation of the surface surveillance system through its designated lifecycle. The ASDE-X program baseline included costs for the periodic replacement of commercial off-the shelf (COTS) system components; e.g., processors, displays, computer operating systems, and commercially available software (CAS).

The ASDE-X technology refresh program will maintain the safety and efficiency benefits attained during ASDE-X system deployment. By replacing obsolete and high failure items, the technology refresh effort will maintain the current levels of 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 systems provide 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. Also, the Runway Status Lights (RWSL) system requires ASDE-X data to function. The RWSL benefits are not achievable without a reliable and available ASDE-X system.

All 35 ASDE-X systems are operational and commissioned in the National Airspace System (NAS). ASDE-X systems are located at the following 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 Int'l Airport, Minneapolis, MN
Memphis International Airport, Memphis, TN	John Wayne-Orange County Airport, Santa Ana, CA
Salt Lake City International Airport, Salt Lake, UT	New York LaGuardia Airport, New York, NY
Honolulu International – Hickam AFB Airport, Honolulu, HI	Dallas/Ft. Worth International Airport, Dallas-Fort Worth, TX
Chicago Midway Airport, Chicago, IL	San Diego International Airport, San Diego, CA
Las Vegas McCarran International Airport, Las Vegas, NV	Baltimore-Washington International Airport, Baltimore, MD
Ronald Reagan Washington National Airport, Washington, DC	

B. Airport Surface Movement Detection (ASDE-3) Service Sustainment

The Airport Surface Detection Equipment, Model 3 (ASDE-3) is a special-purpose, high-resolution ground-surveillance radar system used to detect and display ground based targets such as aircraft, vehicles, and other objects on or around the movement area. The ASDE-3 provides detailed coverage of runways and taxiways at an airport, enabling air traffic controllers to expedite and monitor movement on the airport surface during conditions of reduced visibility. The Airport Movement Area Safety System (AMASS) enhancement to the ASDE-3 provides air traffic controllers with runway safety advisory information, including alerts (cautions and warnings) of potential conflicts involving aircraft, vehicles and other obstacles within the movement area and arrival corridors. The combination of the ASDE-3 and AMASS are certified as the ASDE-3/AMASS System. At present, there are a total of nine operational ASDE-3/AMASS systems. These systems will be replaced by the Airport Surface Surveillance Capability (ASSC) program.

In addition, as part of the Airport Surface Detection Equipment, Model X (ASDE-X) program, 18 ASDE-3/AMASS systems were converted to ASDE-3X systems. The ASDE-3X is a combination of the ASDE-3 antenna, including the transmitter, receiver and antenna subsystems, combined with ASDE-X multilateration system to provide a more accurate and detailed picture of the surface movement area. These ASDE-3 surface movement radar systems are planned to be part of the ASDE-3X system indefinitely. It is these ASDE-3 systems that are the subject of this ASDE-3 Service Sustainment project.

All combined, there are a total of 31 ASDE-3 transmitter/receiver/antenna subsystems in operation in the NAS (some sites have multiple ASDE-3 transmitter/receiver/antenna subsystems). Nine of these ASDE-3 systems will be replaced by ASSC leaving 22 ASDE-3 systems in the NAS indefinitely.

The ASDE-3 has been in operation since 1990 and is beyond its planned 20-year life cycle. The purpose of this program is to update a sustainability study to determine which parts in the ASDE-3 system are obsolete, and/or are facing diminishing manufacturing sources, and procure additional spares or identify alternate sources for these subsystems in order to improve overall system availability and supportability.

DOT Strategic Goal - Safety

- Reduction in transportation related injuries and fatalities.

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

A. Airport Surface Detection Equipment – Model X (ASDE-X)

The ASDE-X Technology Refresh program will decrease system outages, and the Runway Status Light Systems are dependent on receiving data from ASDE-X.

B. Airport Surface Movement Detection (ASDE-3) Service Sustainment

The ASDE-3 Service Sustainment will provide ASDE-3 primary radar inputs to ASDE-X processing to yield safety and efficiency benefits. Additionally, it also prevents system failures related to unsupportable parts in the operational systems.

What Benefits Will Be Provided To The American Public Through This Request?

A. Airport Surface Detection Equipment – Model X (ASDE-X)

The ASDE-X technology refresh program will be considered successful if after the implementation of technology refresh equipment, the ASDE-X system reliability and availability numbers continue to meet the system specification and requirements especially as the system ages.

The program will be deemed a success if the number of Category A and B runway incursions is maintained at the current levels or further reduced.

B. Airport Surface Movement Detection (ASDE-3) Service Sustainment

The ASDE-3 Service Sustainment project will maintain the safety and efficiency benefits attained during ASDE-3X system deployment. By replacing obsolete and high failure items, this project will maintain the current levels of ASDE-3X system availability and reliability. If ASDE-3X systems are not operational, safety and efficiency benefits realized during system deployment will be lost.

The primary benefit, increased safety, is achieved by continuing to provide 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.

Detailed Justification for - 2B02 Terminal Doppler Weather Radar (TDWR) – Provide

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Terminal Doppler Weather Radar (TDWR) – Provide
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Terminal Doppler Weather Radar (TDWR) – Provide	$3,600	$1,900	$4,900	+$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Solution Implementation with Second Level Engineering	---	$3,600.0
b. FAA Logistical Support	---	500.0
c. FAA Power Engineering Group Support	---	500.0
d. Contract Support	---	300.0
Total	Various	$4,900.0

For FY 2016, $4,900,000 is requested for the TDWR Service Life Extension Program (SLEP) Phase 2 technology refresh. These funds will be used to execute contracts for the projects planned to address the obsolescence issues, high failure issues, and aging issues for the TDWR system. Final Investment Decision (FID) is planned to be obtained by the first quarter of FY 2016. This funding will be used for the following:

- FAA Second Level Engineering Support: TDWR experts will develop specifications, software changes, and solutions; hardware and software evaluation; engineering prototyping; and First Article Testing
- FAA Logistical support: Provide logistic information/support and engineering to the system and projects
- FAA Power Engineering Group Support: Expert development of specifications, engineering, site survey
- Contract Support: Address the requirement for TDWR Subject Matter Experts (SME), who provides technical support to the program and advise the TDWR Program Office on decisions regarding the overall TDWR Program

Tasks include: Business Case, Cost Analysis, and Artifacts Development; Service Order Agreements with FAA Logistics Center Support for development and analysis of logistical data, scope of work preparation, market surveys, and technical support; Program Directives will be obtained for FAA Second Level Engineering support with engineering studies, technical expertise and support, specification development, test and evaluation, and support with lifecycle cost estimates and benefits formulation. In addition, Contract Support will be utilized for program management of FID and contract procurement preparation, system engineering, and overall documents development and management.

What Is This Program And Why Is It Necessary?

The TDWR is an important component of the 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 to preclude an adverse, potentially disastrous, impact to the current aviation weather safety initiatives.

The primary mission of the TDWR is to enhance the safety of air travel through timely detection and reporting of hazardous weather conditions including wind-shear events, microburst, gust fronts, and thunderstorms in and near an airport's terminal approach and departure zones. TDWRs are installed at higher-density airports with high occurrences of thunderstorms, and provide controllers current information on severe weather so that they can issue warnings to pilots. TDWRs are operational at 46 airports. TDWR weather data is transmitted to FAA automation systems and also to other federal agencies; see below.

- **TDWRs Main Customers.** The TDWR Service Life Extension Program serves 46 major airports by providing weather data to the Integrated Terminal Weather System (ITWS) which disseminates wind-shear products based on TDWR data to major Air Traffic Control Towers (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 Windshear 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) or from the Automated Surface Observing System (ASOS). TDWR is also a major weather source for the Corridor Integrated Weather System (CIWS) which further integrates a suite of weather decision aids for en route aviation facilities in the U.S.
- **TDWR Serves Other Federal Agencies and The General Public.** TDWR provides weather radar data to 34 NWS 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 National Oceanic and Atmospheric Administration (NOAA) and 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.

The TDWR system has been in service since 1994. It is comprised of a substantial number of proprietary software and hardware components, many of which have become obsolete and present significant supportability problems that worsen with time. Without the SLEP, TDWR outages will become more numerous and lengthy, and support costs will rise faster than with the SLEP.

The previous TDWR SLEP project funding will end in FY 2015 and all projects will be completed by the end of FY 2017. These initial SLEP projects addressed the antenna drive systems, out of date computer processor systems, and several other assemblies which needed to be upgraded and modernized. TDWR SLEP Phase 2 will address other TDWR systems that have deteriorated due to aging, and have become obsolete or unsupportable.

Without TDWR SLEP Phase 2, all TDWR systems would experience an increasing number and duration of unplanned outages that, if occurring during hazardous weather, could result in an Aircraft Accident and loss of life.

DOT Strategic Goal - Safety

- Reduction in transportation related injuries and fatalities.

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

$4,900,000 is required to execute contracts for the projects planned to address the obsolescence issues, high failure issues, and aging issues for the TDWR and its component systems. TDWR SLEP Phase 2 follows on the previous TDWR SLEP with the intention of maintaining or increasing the reliability of the TDWR systems. This amount of funding for SLEP Phase 2 is required to initiate projects that will allow the TDWR availability rate to remain the same or increase. Without the SLEP Phase 2 the TDWR systems will start failing at an increased rate and the cost to maintain the system will rise.

The impact of not receiving or a delay in receipt of FY 2016 funding could hamper the overall SLEP Phase 2 schedule, and increase the number and duration of unplanned outages that, if occurring during hazardous weather, could result in an Aircraft Accident and loss of life.

What Benefits Will Be Provided To The American Public Through This Request?

TDWR SLEP Phase 2 follows the efforts accomplished under the initial SLEP program. The last windshear related accident at a TDWR protected airport occurred at Charlotte/Douglas International Airport on July 2, 1994 before its TDWR was installed and operational (Aircraft Accident Report (AAR 95-03)). In addition, weather related delays have been reduced, allowing savings in aviation fuel consumption.

Operational benefits of the system include the real-time detection of microburst, gust fronts, wind shifts, and precipitation, as well as prediction of wind changes that allow improved airfield efficiency when making runway changes. The program will continue to deploy improvements that will lower TDWR operations costs and improve its reliability.

Thus far, the SLEP has eliminated outages due to antenna gear failure, and maintained service availability by replacing parts of the system that are difficult to maintain and support.

Also, the FAA has an agreement with the National Weather Service to provide TDWR data. This information is further distributed to non-governmental organizations and companies such as Weather Underground (http://www.wunderground.com). This provides easy access by the public and other interested parties to TDWR information over the Internet.

Detailed Justification for - 2B03 Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1) ($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$45,500	$50,700	$81,100	+$30,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Task	Locations/ Quantity	Estimated Cost ($000)
A. TAMR Phase 1		
a. Software Design and Development	---	$8,570.0
b. MDM Hardware Procurement	---	3,374.0
c. G-4 Hardware Procurement	12	26,659.0
d. Site Preparation, Deployment and Installation	11	15,079.0
e. Logistics	---	4,765.0
f. Program Management Support	---	13,153.0
g. FTI	---	1,236.0
h. Prime Vendor Program Management Support	---	6,134.0
i. System Engineering (COTS/CAS)	---	2,130.0
Total	Various	$81,100.0

For FY 2016, $81,100,000 is requested for the continuation of STARS technology refresh and software enhancements. Software enhancements are necessary to implement required security and safety enhancements, and new functionality upgrades needed for enhanced performance and capacity in support of NextGen initiatives. These include additional tracker changes, priority Software Trouble Reports (STRs), and initial efforts for the first TAMR convergence build. The funding will continue to provide for program, system engineering, and technical support. Specifically, STARS will continue coding the merge of the operational builds (R27 and prior) with the TAMR builds (E1 and R7). This merge will result in a common software baseline to be used on all current STARS systems.

In addition, this funding is also requested for the replacement of the Sun Ultra 5 processors and the obsolete Sony Main Display Monitors (MDM) (the old Cathode Ray Tube (CRT) type displays) with current state of the art high definition flat panel LCD displays. The program will conduct site surveys, site prep and deployment at 11 sites and 12 hardware procurements for the G-1 to G-4 technology. In addition to the site specific activities, Commercial off the Shelf/Commercially Available Software (COTS/CAS) technology refresh sustainment engineering efforts will continue. This request also funds the program's non-prime support/activities that include Program Management, Systems Engineering, Risk Management, Financial Management, Deployment and Project Administration.

What Is This Program And Why Is It Necessary?

STARS is a joint Department of Defense (DoD) and FAA program to modernize terminal air traffic control automation systems.

The STARS program funded replacement of the automated radar processing and display systems at 47 TRACONs and their associated Air Traffic Control Towers with Ultra-5 processors and Sony 2K displays (1996 – 2005). The program is currently in a technology refresh cycle. 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 the terminal air traffic control equipment. Currently the program updates existing TRACONs and towers with state-of-the-art systems featuring, current processor technology, large-screen, high-resolution, LCD 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.

The current scope of the TAMR Phase 1 program is to technologically refresh and enhance those systems already deployed. To sustain operations, STARS requires technology refresh 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 refresh 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, stakeholders, and operating facilities personnel. This project funds required security enhancements, corrective and perfective changes to enhance system performance and functionality. 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.

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

STARS is essential to provide 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 products, including ADS-B. 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 terminal services. Replacing the original Sony 2K CRT (Cathode Ray Tube), that have degraded display capability, provides air traffic controllers with high definition displays.

To enable completion of the Ultra 5 replacement, qualification of a new processor, began in FY 2009 and continued into FY 2010 – FY 2011. Procurement and replacement of the first block of replacement processors occurred in FY 2011. This enabled current system availability to be maintained and allowed the

STARS to support proposed NextGen capabilities as they were/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.

$81,100,000 is required to support the continued high operational availability of STARS by incorporating software enhancements/refinements and hardware technology refresh. In addition, STARS supports the automation infrastructure on which to build future NextGen (ADS-B) operational initiatives.

A reduction in funding will defer procurement of Generation 4 (G4) STARSs processors. G4 processors are required to replace STARS G1 (SUN Ultra 5) processors that have been in service beginning in 2001. Without these upgrades, STARS cannot support ADS-B and advanced applications due to processor limitations. Reductions to proposed funding will also diminish the procurement of MDM replacement for existing SONY Cathode Ray Tube (CRTs). The Sony CRTs have reached end-of-life and must be replaced. Reduction to proposed funding will also delay the TAMR merge build.

What Benefits Will Be Provided To The American Public Through This Request?

The STARS platform is a currently operational vital link in the nation's air traffic control system. Over the past five years, the average equipment availability for STARS is 99.9996 percent. This program will fund the technology refresh activities at 47 operational STARS sites.

Detailed Justification for - 2B04 Terminal Automation Modernization/Replacement Program (TAMR Phase 3)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Terminal Automation Modernization/Replacement Program (TAMR Phase 3)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Terminal Automation Modernization/Replacement Program (TAMR Phase 3)	$155,550	$146,150	$159,350	+$13,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. TAMR Phase 3 Segment 1		
a. Solution Implementation	---	$9,450.0
b. Program Management	---	3,400.0
c. Systems Engineering	---	2,950.0
d. Test and Evaluation	---	3,400.0
e. Integrated Logistics Support	---	2,950.0
f. Implementation	---	6,850.0
Total	Various	$29,000.0
B. TAMR Phase 3 Segment 2		
a. Solution Implementation	---	$63,561.0
b. Program Management	---	11,147.0
c. Systems Engineering	---	9,557.0
d. Test and Evaluation	---	702.0
e. Integrated Logistics Support	---	142.0
f. Implementation	---	11,851.0
g. Telecommunications	---	2,813.0
h. ASR-8 Digitizers	---	20,227.0
Total	Various	$120,000.0
C. TAMR Phase 3 Segment 1 Enhancements		
a. Solution Implementation	---	$7,500.0
b. Program Management	---	1,000.0
c. Systems Engineering	---	500.0
d. Test and Evaluation	---	1,000.0
Total	Various	$10,000.0
D. Independent Operational Test and Evaluation (IOT&E)	---	$350.0

For FY 2016, $159,350,000 is requested for TAMR Phase 3, which includes $29,000,000 to continue the development of software, site preparation, equipment installation of STARS for Segment 1, and $120,000,000 for TAMR Phase 3 Segment 2 for hardware procurement, testing, site preparation, and equipment installation of the STARS system for Segment 2. An additional $10,000,000 is requested to provide new software and hardware requirements (post ORD) enhancements that are not a part of the Segment 1 baseline. In addition $350,000 is requested for Independent Operational Test and Evaluation efforts.

What Is This Program And Why Is It Necessary?

Terminal automation systems are essential for controllers to manage the operations at our nation's busiest airports. The automation systems rely on information from radar and weather sensors, along with flight plan information for each aircraft to inform controllers of the aircraft's location and intended path of flight enabling them to 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 associated Airport Traffic Control Towers (ATCT) throughout the NAS.

TAMR Phase 3 addresses the modernization/replacement of Common Arts (CARTS) automation systems at 108 TRACONs and associated Air Traffic Control Tower facilities with STARS to meet NextGen mid-term goals. System configurations to be replaced include 11 ARTS IIIE, 91 ARTS IIE and six ARTS IE. The FAA will continue to sustain the automation systems at these sites while monitoring system performance to identify any deterioration in service.

A. Segment 1

On December 21, 2011 the TAMR Phase 3 Segment 1 Program received a Final Investment Decision from the JRC to replace 11 ARTS IIIE automation systems and associated Air Traffic Control Towers with a STARS system in support of ADS-B and to enable convergence to a single Terminal Automation hardware and software platform by 2017.

The requested funds will be used as follows:

- Achieve Initial Operating Capability (IOC) at three additional sites
- Install and accept equipment at two additional operational sites
- Install and accept one training and support string
- Install and accept one Operational Support Facility (OSF)
- Initiate development of software to address new gaps required for continuous operations at Segment 1 STARS sites

The ARTS IIIE automation systems have commercial-off-the-shelf (COTS) hardware that is either aging or approaching the end of its useful life and will need to undergo technology refresh in order to support ADS-B services in the NAS. The 11 ARTS IIIE automation systems 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 - 2008 timeframe.

Additionally, the decision was made to converge terminal automation systems to a single terminal automation platform to avoid dual software development costs and resolve hardware supportability issues.

B. Segment 2

The TAMR Phase 3 Segment 2 program will replace 91 ARTS IIEs and six ARTS IEs and associated Air Traffic Control Tower facilities with STARS and will complete the convergence to a single Terminal Automation hardware and software platform by 2019. The Segment 2 program Final Investment Decision (FID) was approved by the JRC on September 19, 2012.

The requested funding will be used as follows:

- Complete IOC at 12th ARTS IIE site (APB milestone)
- Achieve IOC at 18 sites, for a cumulative total of 26 sites
- Install hardware and complete Contractor Acceptance Inspection (CAI) at 36 operational sites and seven support sites

- Procure 29 additional systems

The ARTS IIE sites have hardware that is aging, beyond its useful life, and must be replaced to support ADS-B services in the NAS. The 91 ARTS IIE sites must be modernized. These systems were installed in the 1970s, with processors upgraded to their current configuration in the 2000 – 2002 timeframe. Additionally, the ARTS IIEs, due to lack of processing speed and capacity, are suffering from software stability issues. Without resolution, these sites risk significant decreases in system availability and with that, increased safety risk.

The ARTS IEs will be replaced to complete the convergence to a single terminal automation system.

C. Segment 1 (Post-ORD) Enhancements

The STARS System Enhancements consists of capabilities above and beyond core STARS functionality. The STARS System Enhancements addresses needs identified by users of the STARS systems, and FAA stakeholders after it was deployed and operational. As validated enhancements are identified and prioritized, the TAMR Program Office will develop a detailed implementation plan for the engineering, design, development, testing, integration and delivery of those enhancements.

DOT Strategic Goals - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$159,350,000 is required to complete the activities associated with the baselined program. Funding at the required level will result in maintaining the program schedule as planned, decreased operational and maintenance costs to support terminal automation systems in the NAS, allowing the FAA to meet ADS-B and NextGen Segment Bravo operational enhancements, and completion of the convergence to a single terminal automation system.

What Benefits Will Be Provided To The American Public Through This Request?

By replacing the 11 ARTS IIIE, the 91 ARTS IIE, and six ARTS IE automation systems with a STARS solution it is expected that the system will have the same availability as the current STARS solution. STARS is already operational at 51 terminal sites, and over the past five years, the average equipment availability for STARS is 99.9996 percent.

Quantitative benefits (cost avoidance) expected include: cost avoidance to maintain aging equipment; maintaining a single software baseline versus two software baselines; lifecycle benefits of common displays and processors; and common hardware for re-use and expansions. Qualitative benefits are expected to enhance controller's situational awareness and lessen risk through efficiency and commonality.

The TAMR program 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 services in the NAS.

Detailed Justification for - 2B05 Terminal Automation Program

What Is The Request And What Funds Are Current Spent On The Program?

FY 2016 – Terminal Automation Program
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Terminal Automation Program	$2,600	$1,600	$7,700	+$6,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Flight Data Input/Output (FDIO) Replacement		
a. Technology Refresh Implementation	---	$1,806.6
b. Program Management	---	584.4
c. System Engineering	---	309.0
Total	Various	$2,700.0
B. Terminal Work Package 1		
a. Program Management	---	$400.0
b. Systems Engineering	---	1,000.0
c. Operational Requirements Tracking and Validation	---	1,500.0
d. Requirements and Functional Development, Software Design and Development (Vendor)	---	2,100.0
Total	Various	$5,000.0

A. Flight Data Input/Output (FDIO) Replacement

For FY 2016, $2,700,000 is requested to continue the procurement of hardware and software that will be used to replace obsolete or end of life equipment currently in the field, to fund program management support to procure and install replacement Flight Data Input/Output (FDIO) system components at FAA and DoD ATC facilities, and all related logistics activity needed for the issuance, receipt and transportation of procured components. Replacement components to be procured consist of printers and FDIO-Gateway equipment and related software updates that may be needed. Logistics activity would consist of keyboards, terminal servers, monitors, printers, and FDIO-G items. In 2016, it is estimated that 600+ printers will be procured and the 800+ printers procured in previous years will be installed.

B. Terminal Work Package 1

For FY 2016, $5,000,000 is requested to complete AMS development and support for Terminal Work Package 1, providing for program management, systems engineering, and requirements tracking and validation to achieve a Final Investment Decision. The primary artifacts to be completed for Final Investment Decision include: benefits and cost models, program requirements document, final business case, and the final implementation strategy and planning document. Additionally, this will provide support for the Terminal Automation system vendor to develop detailed development costs and system requirements.

What Is This Program And Why Is It Necessary?

A. Flight Data Input/Output (FDIO) Replacement

The FDIO system provides standardized flight plan data, weather information, safety related data, and other information to air traffic controllers at more than 650 Terminal NAS facilities. The FDIO system collects data from the En route automation system, both the Host Computer System (HOST) and the En Route Automation Modernization (ERAM) system, and provides flight data information to NAS Terminal facilities. The FDIO system prints this information on paper strips for controllers at FAA (TRACON, ATCT, and Radar Approach Control (RAPCON)) facilities. This information assists controllers both 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/ERAM.

The FDIO program is based on a five year replacement cycle for the various components in order to maintain system operational availability. Individual components are procured and replaced as they reach their end of life. This replacement program replaces the end-of-life/obsolete FDIO equipment with fully compatible (form/fit/function) COTS and modified COTS equipment. The FDIO system is mainly comprised of computers, servers, monitors, keyboards, printers, and circuit cards that are commercially available.

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) and System Wide Information Management (SWIM) architectures.

B. Terminal Work Package 1

The Terminal Work Package 1 investment is the next useful segment for the STARS platform, building upon previous investments designed to consolidate to one terminal automation platform. Its objective is to develop and implement capabilities necessary to enable trajectory-based operations in the terminal environment, as envision by NextGen. The current TRACON domain service is hindered during periods of adverse weather events and increased traffic. Today's air traffic control and traffic management decision support tools (DSTs) have significant limitations in the efficient transfer of flight information and constraint information between systems, facilities, controllers, pilots, and airport operators.

Terminal Work Package 1 will refine the definition of proposed concepts and validate them as viable necessary additions to the NAS. Concept engineering activities include analysis, evaluation, and assessments to develop and mature concepts for changes to Terminal/TRACON automation as well as identifying procedure changes needed to support automation change within the TRACON domain. Investment activities include completing all required artifacts and coordination necessary to obtain approval for this investment. The activities conducted in support of Terminal Work Package 1 development will reduce technical risk, quantify benefits, support alternatives development, and identify safety concerns.

The Terminal Work Package 1 primary areas of focus are:

- Enhanced inter/intra-facility coordination
  - Enhanced communication methods between control positions
  - Improved information sharing between facilities
- Facilitated airspace and sector management
  - Assess sector loading/demand prediction
  - Airspace changes – timing and impact of airspace changes
- Augmented flight data management at the control position
  - FDIO functionality at control position
  - View available route and altitude options from control position
- Decision support for managing air traffic operations
  - Support for merging and spacing, and conflict detection
- Improved operations at uncontrolled airports
  - Improved communication to pilots at uncontrolled airports
  - Display of aircraft position outside of surveillance coverage

- Collaboration with airspace users (Pilots/Flight Operation Centers/Airline Operation Centers)
    - Exchanging information with pilots and flight operators

DOT Strategic Goal - Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

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

A. Flight Data Input/Output (FDIO) Replacement

FDIO Components that were procured and replaced between 1998 - 2007 have again reached end-of-life or have become obsolete. Thus, to ensure the operational availability and that FDIO can adhere to the latest security requirements, the funding is needed to obtain components that adhere to the latest technology changes.

B. Terminal Work Package 1

The requested funding will enable completion of artifacts for a Final Investment Decision (FID), provide support for Terminal Work Package 1, and will provide enhancements to the existing Automation platform within the TRACON environment. Terminal WP1 will result in improved efficiency and productivity with the addition of new operational capabilities and is the next useful segment for the STARS platform.

What Benefits Will Be Provided To The American Public Through This Request?

A. Flight Data Input/Output (FDIO) Replacement

The American Public benefits can be demonstrated by a decrease in FDIO maintenance costs, improved operational effectiveness, and increased security. As newer technology is introduced, this equipment can be upgraded to meet the latest security requirements. Moreover, as the printers are replaced there will be a decrease in operating costs associated with the print head. As demonstrated by the NAS Performance Analysis System (NASPAS), FDIO has sustained an adjusted operational availability of over 99 percent for the reportable facilities that support the Nation's busiest airports through FY 2013. Continued replacement of FDIO components as they reach end-of-life or become obsolete ensures that the FDIO system can meet operational and security requirements.

B. Terminal Work Package 1

The enhancements to TRACON operations supported by Terminal Work Package 1 will result in benefits to both the FAA and the users. The changes introduced will provide TRACON controllers the support they need to offer an enhanced level of service. Users will experience cost savings due to a more efficient, more predictable service being provided by FAA.

Benefits will be fully determined as part of Investment Analysis activities. Some initial qualitative benefits that may be realized through implementation of Terminal Work Package 1 capabilities include:

- Increased efficiency of air traffic in the terminal domain and subsequent increases in air traffic capacity
- Increased aircraft flight track and schedule predictability
- Decrease in controller workload
- Enhanced safety
- Allow for increased ability to recover missed opportunities for efficiencies in the terminal domain

Detailed Justification for - 2B06 Terminal Airport Traffic Control Facilities – Replace

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Terminal Airport Traffic Control Facilities – Replace
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Terminal Airport Traffic Control Facilities – Replace	$69,000	$52,600	$45,500	-$7,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Segment 1 - Advance Requirements and Other Direct Costs	---	$8,200.0
b. Segment 2 - Land Acquisition/Site Prep/Design	---	31,200.0
c. Segment 3 - Construction	---	5,200.0
d. Segment 5 - Disposition, Demolition, and Decommissioning	---	900.0
Total	Various	$45,500.0

Terminal Airport Traffic Control Facilities–Replace is one of the programs included in FAA's National Airspace System (NAS) Strategic Sustainment Plan (SSP). Funding the programs in this strategy will improve and maintain the facility condition index ratings at FAA facilities that provide the backbone for the NAS, and by extension, the backbone of NextGen. The FAA is seeking funding to start construction at one new airport traffic control towers (ATCTs)/terminal radar approach control (TRACON) facilities as well as real estate acquisition/site prep for the New York TRACON (N90).

ATCT and TRACON replacement are large capital investments and, given constrained resources, the FAA is focusing on risk-based analysis to ensure those facilities in greatest need are replaced first. The FAA has a prioritized listing of all NAS Terminal sites and continues to conduct ongoing studies that determine if and when the FAA has a need to replace the ATCT due to siting, size, and unacceptable physical conditions. From that list, the FAA will then initiate siting and design studies, and ultimately construction of the facilities with the greatest need.

Segment 1 funding, in the amount of $8,200,000, is requested in FY 2016 to support advance requirements definition and program management costs for planning and overseeing the program. Activities supported under Segment 1 include the evaluation of unique operational and maintenance requirements that impact ATCT/TRACON Facilities, the development of business cases, mock-ups of the airport facility terminal integration laboratory to assist with evaluation of the attributes of proposed airport sites, actual site selection, and other advance engineering considerations.

Segment 2 funding, in the amount of $31,200,000, is requested in FY 2016 for the real estate acquisition/site preparation work on the N90 Replacement project.

Segment 3 funding, in the amount of $5,200,000, is requested in FY 2016 to support construction costs associated with the new ATCT/TRACON facility at Charlotte, NC (CLT). The expected full cost of constructing CLT is $68,200,000, and includes construction contingency funds that must be available for obligation during the entire construction period. A-11 capital budget requires that agencies request full funding for each useable segment. The FY 2016 requested funding will provide construction contingency to cover all facility construction for both the CLT tower and TRACON replacements that were appropriated in

FY 2014 and FY 2015 respectively. Moving forward, the FAA is closely evaluating construction cost estimations to ensure full funding levels are requested prior to beginning construction.

Segment 5 funding, in the amount of $900,000, is requested in FY 2016 for two facilities. This segment funds the disposition, demolition, and decommissioning of the facility that has been replaced. The facilities included in this request are the West Palm Beach, FL (PBI) ATCT/TRACON for $500,000 and the Las Vegas, NV (LAS) ATCT/TRACON for $400,000.

Replace Terminal Air Traffic Control Facilities:

Segment Description	FY 2016 ($M)
Advanced Requirements - Segment 1	**8.2**
Advanced Requirements Definition/Program Management	8.2
Land Acquisition/Site Prep/Design - Segment 2	**31.2**
New York, NY TRACON (N90)	31.2
Construction - Segment 3	**5.2**
Charlotte, NC Tower/TRACON (CLT)	5.2
Disposition - Segment 5	**0.9**
West Palm Beach, FL Tower/TRACON (PBI)	0.5
Las Vegas, NV Tower/TRACON (LAS)	0.4
Total	**45.5**

What Is This Program And Why Is It Necessary?

The FAA provides air traffic control services from more than 500 ATCT and TRACON facilities. Under this program, the FAA evaluates which buildings need to be replaced, sustained, or modernized (especially relative to other facilities across the country) to ensure an acceptable level of building condition and to meet current and future operational requirements. The average age of ATCTs in the FAA portfolio is 31 years, and the average age of a TRACON is 25 years. There are facilities that are 60 years old. In some cases, ATCTs and TRACONs built 20 years ago do not meet today's Occupational Safety and Health Administration, operational, and building requirements. The facilities also may not have been built to meet today's technological needs and, while some facilities can be modernized or sustained, replacement may be the most cost beneficial method for the FAA to meet operational needs and conform to current building codes and design standards.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

In FY 2016, $45,500,000 is required to ensure continued progress on construction, real estate acquisition/site prep, and disposition activities. The required funding will ensure the continuation efforts of replacing aging terminal facilities and will maintain the program schedule.

What Benefits Will Be Provided To The American Public Through This Request?

The benefits provided by the Terminal Air Traffic Control Facilities – Replace program include:

- Eliminating Line of Sight issues, thus increasing efficiency with safety
- Providing adequate space for all approved operational and support positions to enhance efficiency at the ATCT/TRACON
- Providing adequate space and infrastructure for new modern equipment and systems to facilitate the transition to NextGen
- Reducing the high cost of maintaining old and outdated buildings
- Increasing the overall facility condition index of Terminal Facilities by providing new buildings that meet modern codes

These benefits are instrumental in providing efficiency and effectiveness, which in turn will produce cost savings to the taxpayers.

Detailed Justification for - 2B07 ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve ($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve	$48,229	$45,040	$58,990	+$13,950

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ATCT/TRACON Modernization		
a. Initiate Modernization, Improvements, and Repairs System Engr. Configuration Mgmt. Risk Mgmt.	---	$52,780.0
b. Facility Planning and Program Support	---	1,510.0
c. In-Service Engineering	---	2,300.0
Total	Various	$56,590.0
B. Facility Realignment	---	$2,400.0

For FY 2016, $58,990,000 is requested for the following:

A. ATCT/TRACON Modernization: $56,590,000 is requested to initiate modifications, improvements, and repairs to ATCT/TRACON facilities. Funding will also support system engineering, configuration management, facility planning, facility condition assessments and program support services, and in-service engineering activities to promote the improvements.

Airport Traffic Control Tower (ATCT)/ TRACON Facilities–Improve is one of the programs included in FAA's Air Traffic Control (ATC) Facilities Strategic Sustainment Plan.

B. Facility Realignment: $2,400,000 is requested to develop and present preliminary findings of FY 2016 analysis to ATO and FAA leadership in preparation for a report containing the FY 2016 recommendations of the Administrator on realignment and consolidation of facilities and services. The report may also include any public comments received after the report is published in the Federal Register for comments.

What Is This Program And Why Is It Necessary?

The ATCT/TRACON Terminal Facilities Improvement program 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.

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 vital. In many towers, there is no room for additional equipment; therefore, base buildings must be temporarily expanded.

The program funds an average of 50 sustainment projects each year. Sustainment is defined as activities to continue the NAS/terminal service capability by modifying, repairing and replacing, and reconfiguring. Routine and ongoing maintenance activities are not funded from this program. The sustainment projects include many sites throughout the NAS and will consist of efforts such as:

- Waterproofing–replace/repair of building envelope components (e.g., siding, roof, windows, fascia's, eaves, gutters, downspouts, soffits)
- HVAC and Electrical/Mechanical–replace/repair HVAC (e.g., replace handling units, condensing units, controls, pumps, boilers, chillers, and roof top units)
- Electrical/Mechanical–(e.g., replacement/repair of electrical power cable, branch circuits and distribution wiring, light fixtures, outlets)
- Elevators–replacement/major refurbishment of elevators
- Plumbing–replacement/repair of facility plumbing system and components
- Specialties in Operations Areas–major replacement/repair of tower cab or TRACON consoles, renovation of interior finishes, reconfiguration of operational areas
- Exterior (Civil Components)–(e.g., establishment of new access road/parking, major replacement of access road/parking lot, refurbishment of facility grounds, replacement of curbs, walkways, step, railing)
- Interior Finishes–replacement/repair of interior finishes in administrative areas (e.g., doors, carpets, floor and ceiling tiles, stairs, handrails, catwalks, and reconfiguration of administrative areas)

The $2,400,000 requested will fund in-depth facility realignment of all the components of a subset of the roughly 500 ATCT facilities to perform a qualitative evaluation and generate prioritized lists of locations for investing in replacement, sustainment or building modernization efforts. The rough order of magnitude construction cost estimates are then generated for modernizing the existing facility and upgrading it into compliance with current codes and FAA Orders and standards, to the extent feasible.

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

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

For FY 2016, $58,990,000 is required to initiate modifications, improvements, and repair ATCT/TRACON facilities. The requested funding level will assist in the reduction of the current FAA backlog of deferred maintenance and life cycle requirements. This reduction will enhance life safety for employees and will decrease operational risks and maintenance costs.

What Benefits Will Be Provided To The American Public Through This Request?

The benefits of the ATCT/TRACON Terminal Facilities–Improve program are instrumental in providing efficiency and effectiveness, which in turn will produce cost savings to the tax payers. They include:

- Repairs to structures that facilitate the movement of Air Traffic

- Increases the overall Facility Condition Index of Terminal Facilities by providing buildings that meet modern codes

Detailed Justification for - 2B08 Terminal Voice Switch Replacement (TVSR)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Terminal Voice Switch Replacement (TVSR)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Terminal Voice Switch Replacement (TVSR)	$5,000	$2,000	$6,000	+$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Interim Voice Switch Replacement (IVSR) Procurement	7	$1,654.0
b. Prime Contractor Depot Level Support (CDLS) for IVSR	---	595.0
c. Prime CDLS for Conference Control System – Warrenton (CCS-W)	---	373.0
d. Prime Contractor IVSR Program Management and Tech Support	---	504.0
e. Prime Contractor Legacy Terminal Voice Switches Program Management	---	389.0
f. Prime Contractor Voice Switch By-Pass (VSBP) Program Management	---	64.0
g. Contractor Support Engineering, Program Management, Logistics for IVSR	---	1,621.0
h. Contractor Support Engineering for Legacy Terminal Voice Switches	---	164.0
i. Contractor Support Logistics and Contract Management for VSBP	---	112.0
j. Contractor Support Engineering and Subject Matter Experts for CCS-W	---	103.0
k. Legacy Terminal Voice Switch Recovery and Refurbishments	---	111.0
l. Information Security	---	100.0
m. Site Preparation	---	210.0
Total	Various	$6,000.0

For FY 2016, $6,000,000 is requested to procure, test, deliver and install seven terminal voice switch systems and refurbish and/or cannibalize associated legacy systems for spare parts to mitigate supportability risk of Terminal legacy voice switches. TVSR will also pay for Contractor Depot Level Support (CDLS) of 92 Interim Voice Switch Replacement (IVSR) systems and for the Conference Control System in Warrenton, VA (CCS-W).

Currently available funding is being used to procure, test, and install an estimated four Terminal Voice Switch Systems, refurbish an estimated two, and is planning to procure, test, and install a Voice Switch By-Pass (VSBP) for the Potomac Consolidated Terminal Radar Approach CONtrol (TRACON) in Warrenton, VA. TVSR is also paying for the CDLS of CCS-W and IVSR systems.

What Is This Program And Why Is It Necessary?

The ongoing Terminal Voice Switch Replacement (TVSR) II program involves replacing the aging, obsolete voice switches in Air Traffic Control Towers (ATCTs) and TRACONs. Voice switches enable air traffic controllers to select lines to communicate with pilots 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 multiyear equipment contracts for voice switches, including: Small Tower Voice Switches (STVS), Enhanced Terminal Voice Switches (ETVS), Rapid Deployment Voice Switches (RDVS) model IIA, Voice Switch By-Pass System (VSBP), and Interim Voice Switch Replacement

(IVSR) in addition to the Conference Control System in Warrenton, VA (CCS-W). The program also provides contract vehicles for the FAA to procure voice switch equipment for new or modernized Terminal facilities.

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 ATCT and TRACON facilities that require a new Terminal voice switch.

These voice switches provide Ground/Ground and Air/Ground communications. Many of the older STVS systems are currently being replaced under the Terminal Voice Switch Replacement (TVSR) II program. Replaced voice switches are then recovered for refurbishment or cannibalized for spare parts to restock the logistics depot.

The TVSR II program has been successful by replacing the older populated integrated digital voice switching systems in ATCT and TRACON facilities that provide non-blocking voice communication between the air traffic control operator positions, radio channels, and interphone land lines throughout the NAS for both FAA and Department of Defense (DoD) sites located in the contiguous United States (CONUS) and outside the contiguous United States (OCONUS).

Terminal voice switching systems provide key equipment 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.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

TVSR needs to remain active until a few years after its successor, National Airspace System (NAS) Voice System (NVS), has its In-Service Decision (ISD), which is estimated to be in FY 2019. TVSR needs to keep its existing contractual infrastructure in place until late FY 2019. As Legacy Terminal Voice Switches are replaced, they are recovered, refurbished and/or cannibalized for spare parts to help mitigate Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues as vendors discontinue support for parts that are unique to the FAA voice switches. This will help maintain Operational Availability and reduce increased parts costs for special production lines to support our antiquated equipment. Since IVSRs are planned to primarily replace legacy Small Tower Voice Switch (STVS) systems, this will help mitigate two immediate concerns:

- Critical Replenishment of Small Tower Voice Switch (STVS) Operator Interfaces and Position Panels. The FAA Logistics Center (FAALC) currently has a two month depot supply.
- Provide sufficient depot spares of the STVS Mitel Chip, a critical component which is not repairable or currently manufactured. A dramatic increase in failures is expected as a part of the generic reliability bathtub curve that applies to all new FAA procured and installed systems. There are currently 159 STVS systems in use and have started the End of Life (EOL) stage. As the majority of the STVS' were installed during 1994 - 1996, their median In-Service age will be 21 years in FY 2016, and 24 years in FY 2019 when NVS is scheduled to have its ISD. Terminal Voice Switches are not intended to last beyond 25 years even with a technology refresh.

What Benefits Will Be Provided To The American Public Through This Request?

TVSR II has been providing Terminal Voice Switches to the National Airspace System (NAS) since 1995 and provides three main benefits to the American Public:

Safety: The Terminal Voice Switch Replacement (TVSR) II program provides reliable voice communications in support of air traffic terminal operations. The reliability of communications from controller to controller and controllers and pilots is vital to a safe air traffic control system. By providing an essential element of FAA's communications network, TVSR II supports the safety of our transportation system.

Delay Reduction: In the Terminal environment, full voice switch failure typically means that the backup Voice Switch By-Pass (VSBP) system is then used to immediately clear the airspace until the voice switch becomes operational again, thus reducing delays.

Cost Avoidance: TVSR II reduces operational costs by reducing the current annual maintenance cost for legacy switches, reducing annual support costs, and reducing man-year costs associated with greater reliability.

Detailed Justification for - 2B09 NAS Facilities OSHA and Environmental Standards Compliance

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – NAS Facilities OSHA and Environmental Standards Compliance
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
NAS Facilities OSHA and Environmental Standards Compliance	$21,000	$40,000	$39,600	-$400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Environment and Occupational Safety and Health (EOSH) Compliance	---	$29,600.0
b. Fire Life Safety for Airport Traffic Control Towers (ATCTs)	---	10,000.0
Total	Various	$39,600.0

For FY 2016, $39,600,000 is requested to achieve compliance with occupational safety and health (OSH) regulatory and other requirements for the entire agency and compliance with environmental requirements for the Air Traffic Organization (ATO). Specifically, several discrete programs address significant life safety and environmental risks present in FAA operations. They include Fire Life Safety, general Occupational Safety and Health (OSH) Compliance, Environmental Compliance, Fall Protection, Electrical Safety, Indoor Air Quality, Incident Response, Safety Integration, EOSH Training, Requirements Integration, Workplace Inspections, and Hazard Abatement.

The Environment and Occupational Safety and Health (EOSH) program has developed a standardized work breakdown structure (WBS) for all component programs that describe the nature of work performed and services delivered to the FAA organizations. WBS elements include employee safety and environmental compliance training such as general hazard awareness training, advanced electrical safety training, and emergency response training; policies and procedures to integrate compliance into day-to-day FAA operations; technical support to FAA component organization in the form of subject matter expertise, workplace inspections, compliance reviews, policy guidance, and incident-response activities; deployment of specialized safety equipment and devices; and discrete projects to mitigate identified hazards such as electrical arc flash and non-compliant railings and fall-arrest systems.

The Fire Life Safety program manages the implementation of projects to upgrade ATCTs and other essential National Airspace System (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 and fire prevention and emergency action plans. It is also responsible 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 are 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.

What Is This Program And Why Is It Necessary?

NAS Facilities Occupational Safety and Health Administration (OSHA) and Environmental Standards Compliance programs will continue to provide comprehensive environmental, occupational safety and health management initiatives and core FAA-wide occupational safety and health management initiatives to meet federal, state, and local legal requirements in addition to negotiated agreements with employees. The EOSH Services Group is the lead organization within the FAA charged with the protection of employees' well-being and the environment. Through the development of policy guidance, technical assistance, employee training, compliance monitoring, and corrective actions, the EOSH Services Group designs and manages national compliance programs that integrate risk management into each level of the FAA infrastructure life cycle and promote FAA-wide employee occupational safety and health.

The Administrator authorized and funded a comprehensive study of the occupational safety and health (OSH) programs of the FAA in 2012. That study documented significant OSH compliance gaps in the agency's program. Examples of those gaps include the following:

- Eight out of 11 organizations interviewed were either unaware of their OSH responsibilities or had undertaken little or no actions to implement a compliant OSH program
- Most lines of business (LOBs)/staff offices (SOs) had not received funding and were at their infancy in meeting mandatory basic OSH program compliance requirements for federal agencies
- Accident investigators were sent to crash sites without personal protective equipment (thus being exposed to body parts, sharp fragments, and blood-borne pathogens)
- Numerous employees were not trained in basic safety awareness and were not cognizant of the job-specific hazards they encountered
- Since 2010, the FAA has incurred an on-the-job fatality, experienced 1,546 recordable cases of injuries and illnesses, and incurred 66,472 hours of lost staff time away from mission support resulting from OSH-related issues

A key recommendation of the study was to develop an empowered Office of the Designated Agency Safety and Health Official (DASHO) that would provide safety support to all FAA LOBs and SOs. The Chief Operating Officer committed to providing such a DASHO, and the Administrator appointed the Vice President of Technical Operations in the Air Traffic Organization as the DASHO on May 21 2013.

Non-compliance with federal, state, and local environmental, safety and health, legal, and other requirements imposes significant liabilities on the FAA in the form of interruptions to NAS operations, violations of bargaining unit agreements, regulatory fines and sanctions, civil and criminal lawsuits, post-incident response actions, such as costly cleanups, and a decrease in employee morale. Recent examples of non-compliance events include polychlorinated biphenyl contamination after an equipment malfunction at an air route surveillance radar site, and potential employee exposure to asbestos fibers during ceiling tile removal at an air route surveillance radar site. Monthly, approximately 31 events result in disruptions to NAS operations. The effective management of environmental and safety risks—in order to ensure that new acquisitions, installations, and modifications do not introduce new hazards and maintain compliance with regulations—requires the implementation of EOSH compliance programs to continually:

- Identify and assess risks
- Integrate risk reduction into system designs
- Implement controls and best management practices into daily operations
- Maintain a workforce with the knowledge to identify and mitigate EOSH risks at their source

DOT Strategic Goal – Organizational Excellence

- Diverse and collaborative DOT workforce.

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

To meet the OSHA minimum regulatory standards across the entire agency, the program requires a significant additional workload. The $39,600,000 is required to continue implementing nationally directed technical compliance programs designed to fully address federal, state, and local environmental and safety regulations and binding commitments. Within the ATO, the EOSH Services Group directs these programs in close collaboration with the service areas and service centers to ensure the safety and health of FAA employees.

Each year, employees are exposed to potential arc flash hazards at least 6,000 times. Past arc flash injuries have resulted in an average of 12 lost work days and 18 restricted duty days per incident. The FAA made a commitment to OSHA to upgrade fire life safety systems in 20 ATCTs annually. The average cost per ATCT upgrade is $500,000. Funds will also be used to ensure compliance with the numerous federal, state and local environmental requirements applicable to NAS facilities and operations (e.g., air pollution, hazardous waste, and water pollution). In addition, funds are needed to fully identify, characterize, and mitigate radiation safety hazards encountered by FAA employees responsible for the oversight of approximately 7,300 U.S. commercial airlines and air operators.

What Benefits Will Be Provided To The American Public Through This Request?

The result of these activities is to identify and reduce or eliminate occupational hazards and environmental liabilities present in FAA operations through a combination of compliance policies and procedures, continuous hazard identification and monitoring, targeted training, deployment of protective measures, and hazard abatement activities. Through these efforts, occupational safety and environmental risks are reduced, resulting in a safer, healthier workforce, a strong agency compliance posture, and reduced impacts to FAA operations.

Detailed Justification for – 2B10 Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP) ($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$10,900	$13,600	$3,800	-$9,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Implementation	---	$1,500.0
b. Program Management	---	2,300.0
Total	Various	$3,800.0

For FY 2016, $3,800,000 is requested to continue the ASR-9 Service Life Extension Program (SLEP) Phase 2 for installation of 40 Digital Remote Surveillance Communication Interface Processor (SCIP) Replacements (DRSRs) and 80 Transmitter Backplanes.

ASR-9 SLEP Phase 2 Final Investment Decision (FID) was June 27, 2012, with the anticipated completion date of September 2019. On-going activities include:

- Program Management
- Procurement of 148 DRSRs
- Installation of 50 DRSRs
- Procurement of 258 Transmitter Backplanes
- Installation of 112 Transmitter Backplanes
- Logistics Support

What Is This Program And Why Is It Necessary?

ASR-9 SLEP Phase 2 will consist of implementing modifications to the aging ASR-9 radar systems and peripheral equipment to sustain primary surveillance in terminal airspace through 2025. The sustainment of the ASR-9 aligns with the NAS Enterprise Architecture Surveillance Roadmap Decision Points[1], and the Surveillance and Broadcast Services (SBS)/Automatic Dependent Surveillance Broadcast (ADS-B) backup strategy.[2] Based on this strategy, ASR-9 systems will remain in service through 2025.

ASR-9 terminal service provides for maintenance of separation standards, reduces aircraft 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 SLEP 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.

[1] https://nasea.faa.gov/products/roadmap/main/display/7/tab/dps/
[2] https://nasea.faa.gov/products/roadmap/main/display/7/tab/assumptions/

The ASR-9 SLEP will mitigate issues of obsolescence, reliability and maintainability, and lifecycle costs for:

- **ASR-9 Communications Infrastructure:** The legacy Remote Surveillance Communications Interface Processor (RSCIP) is expensive, obsolete, and is not available in sufficient quantities to meet future TRACON expansions and/or consolidations. The DRSR will remove unnecessary assemblies, reducing power consumption and reclaiming stock for future use, where applicable.
- **ASR-9 Control and Monitoring 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 important 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 and reduce system outages and downtime.
- **ASR-9 Depot Replenishment:** ASR-9 SLEP Phase 2 will replenish the FAA Logistics Center inventory spares of Power Meters, Spectrum Analyzers, and ASR-9 Processor Augmentation Card (9PAC).
- **Air Route Traffic Control Center (ARTCC) Radar Data Access Point (RDAP):** ARTCC RDAP will replace the ARTCC Enroute Radar Intelligence Tool (ERIT) due to the antiquated architecture and outdated components. The ARTCC ERIT is no longer supportable.

Interdependencies:

- NextGen Surveillance Weather Radar Capability (NSWRC) is currently in investment analysis with an FID scheduled for December 2017. Replacement of systems will need to be considered in the scope as the investment analysis process proceeds to FID for ASR-9 SLEP Phase 3.
- The ASR-9 provides radar aircraft tracks to the Standard Terminal Automation Replacement System (STARS) and common ARTS for processing and presentation to the air traffic controllers.
- The Integrated Terminal Weather System (ITWS) uses the six-level weather feed from the ASR-9 weather channel to compile weather reports for the terminal area.
- The Weather Systems Processor (WSP) also uses the six-level weather data from the ASR-9 to detect wind shear and gust fronts and improves hazardous weather awareness for ATC.

The ASR-9 data is provided under Memoranda of Agreements (MOAs) to the Departments of Defense (DoD) and Homeland Security (DHS) through the Defense Radar Program and to the Department of Treasury and National Weather Service (NWS) through separate agreements. DoD uses ASR-9 surveillance data to monitor and detect non-transponder equipped "intruders" in terminal airspace. ASR-9 SLEP Phase 2 will reduce the overall lifecycle operation costs by improving system reliability and maintainability.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The ASR-9 was procured in the mid-1980s and fielded between 1989 and 1994. The system is expected to remain operational until 2025, 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 vital system at the required 99.7 percent operational level.

What Benefits Will Be Provided To The American Public Through This Request?

Extending the service life of the ASR-9 system will reduce outages due to performance deterioration and parts obsolescence. If realized, ASR-9 outages are a significant contributor to aircraft arrival and departure delays at major airports throughout the United States. 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.

ASR-9 SLEP Phase 2 is the continuation of a phased strategy to provide a service life extension of the ASR-9 systems at the highest traffic airports. Phase 1B was completed in October 2010 (four months ahead of schedule). Phase 2 is in solution implementation.

Detailed Justification for – 2B11 Terminal Digital Radar (ASR-11) Technology Refresh and Mobile Airport Surveillance Radar (MASR)

What Is The Request And What Funds Are Currently Spent On the Program?

FY 2016 – Terminal Digital Radar (ASR-11) Technology Refresh and MASR
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Terminal Digital Radar (ASR-11) Technology Refresh and Mobile Airport Surveillance	$19,400	$21,100	$9,900	-$11,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ASR-11 Technology Refresh, Segment 2		
a. Prime Mission Product	---	$1,022.0
b. Program Management	---	1,293.0
c. System Engineering	---	1,039.0
d. Second Level Engineering (SLE)	---	782.0
e. Uninterruptable Power Supply (UPS) Implementation	---	64.0
Total	Various	$4,200.0
B. Mobile Airport Surveillance Radar (MASR)		
a. Program Management	---	$594.0
b. System Engineering	---	1,080.0
c. System Production	---	4,026.0
Total	Various	$5,700.0

For FY 2016, $9,900,000 is requested to fund work for ASR-11 Technology Refresh, Segment 2 and the Mobile Airport Surveillance Radar (MASR).

A. ASR-11 Technology Refresh, Segment 2

The FY 2016, $4,200,000 is requested to continue prime contractor hardware qualification, software development and testing, and Second Level Engineering (SLE) support for test and evaluation of the Site Control Data Interface/Operator Maintenance Terminal (SCDI/OMT) replacement, support the procurement of UPS capacitor kits to allow for the final 15 of 50 site installations, and provide Program Management, System Engineering, and System Development.

The Segment 2 Final Investment Decision (FID) was received in December 2013. Ongoing activities have included: Procurement of Uninterruptable Power Supply (UPS) Capacitor kits to allow for the first 35 of 50 site installations and Prime contractor funding to start hardware qualification and software development efforts associated with the SCDI/OMT replacement.

B. Mobile Airport Surveillance Radar (MASR)

For FY 2016, $5,700,000 is requested to complete Development Test and Evaluation (DT&E), Operational Test and Evaluation (OT&E), System Development, Program Management, and System Engineering functions. Funds will also include acquisition of life cycle support requirements.

The MASR Program received the Final Investment Decision (FID) to proceed in June 2012. Ongoing activities have included: Completing refurbishment of two ASR-9/Mode-S Systems, procuring two Mobile ASR-11 systems, targeting the completion of Factory Acceptance Testing (FAT) by March 2015, and conducting DT&E of Mobile ASR-11 system at Prime Contractor facility in Massachusetts and at FAA Technical Center in Atlantic City, NJ.

What Is This Program And Why Is It Necessary?

A. ASR-11 Technology Refresh, Segment 2

The ASR-11 surveillance capabilities provide air traffic personnel with coverage performance suitable for air traffic control of aircraft arrivals and departures at airports throughout the United States. These capabilities permit safe and efficient movement of aircraft in and out of airport terminal areas allowing air carriers to maximize their resources without compromising the safety of air traffic services.

Technology refresh of the system will allow the Airport Surveillance Radar, Model-11 (ASR-11) to continue to provide terminal surveillance of aircraft in support of FAA and Department of Defense (DoD) air traffic control (ATC) operational needs throughout its intended service life. More specifically the program will address shortfalls created by SCDI/OMT, UPS capacitor replacement, and Employee Occupational Safety and Health (EOSH) safety issues and will ensure continued reliable and cost effective operation of the radar system through its designated lifecycle.

B. Mobile Airport Surveillance Radar (MASR)

The MASR capability will eliminate long-term surveillance outages resulting from airport modernization and construction projects that require planned in-service radar relocations, temporary radar service needs and emergency operations in a dense or complex airspace. Airport modernization and construction often requires the terminal radar to be relocated, which would cause a multi-month outage if not augmented by other systems. Large-scale radar catastrophic failures, while rare, also pose a particularly significant challenge since the deployed radars are no longer manufactured. The MASR system capability would bridge this gap and provide seamless transition from the existing legacy radar system to the permanent system that will continue to provide terminal surveillance service.

This performance shortfall will be addressed by procuring a terminal surveillance capability that can be deployed within known, short-duration timeframes and is compatible with any airport traffic control towers (ATCT), Terminal Radar Approach Control (TRACON) facilities, 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. The MASR system can be transported by truck, rail, or ship, and installed, and certified operational in as few as five days from the initial incident.

This proposed system architecture is a reusable, service-oriented capability with an emphasis on providing the terminal surveillance service efficiently and quickly. The program goal is to have interfaces for power, mechanical, data, and remote monitoring and control defined to be interoperable with all currently deployed ASR-8, ASR-9 and ASR-11 terminal radars and their associated automation interfaces.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. ASR-11 Technology Refresh, Segment 2

$4,200,000 is required for ASR-11 Technology Refresh Segment 2 to continue prime contractor hardware qualification, software development and testing, and Second Level Engineering (SLE) support for test and evaluation of the SCDI/OMT replacement, support the procurement of UPS capacitor kits to allow for the final 15 of 50 site installations, implementation of EOSH safety kits and provide Program Management, System Engineering, and System Development. At the requested funding level, the ASR-11 Technology Refresh Segment 2 in FY 2016 will fulfill its primary mission of providing terminal radar service to the National Airspace System (NAS) and reduce SCDI and UPS obsolescence issues related to future service reductions and/or outages.

B. Mobile Airport Surveillance Radar (MASR)

$5,700,000 is required for the MASR to complete Development Test and Evaluation (DT&E), Operational Test and Evaluation (OT&E), System Development, Program Management, and System Engineering functions. At the requested funding level, the MASR program will be fully implemented by December 2016 which coordinates the independent planned in-service relocation activities at several airports.

What Benefits Will Be Provided To The American Public Through This Request?

A. ASR-11 Technology Refresh, Segment 2

The Acquisition Program Baseline for the ASR-11 Technology Refresh Segment 2 began in FY 2014 and has been managed within the established cost and schedule baseline. This program ensures continued safe terminal radar service for the flying public by addressing the most urgent obsolescence issues.

B. Mobile Airport Surveillance Radar (MASR)

The MASR supports the FAA Strategic Priority to deliver benefits through technology and infrastructure. The MASR will eliminate an existing shortfall, which is the 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 program ensures continued safe primary radar coverage for the flying public. The MASR enables significant cost avoidance associated with long term airport radar service outages.

Detailed Justification for – 2B12 Runway Status Lights (RWSL)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Runway Status Lights (RWSL)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Runway Status Lights (RWSL)	$35,250	$41,710	$24,170	-$17,540

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. RWSL Implementation Phase 1		
a. Program Management	---	5,210.1
b. Implementation	---	3,272.2
c. Hardware Procurement	---	700.6
d. Construction	---	6,994.6
e. System Engineering	---	1,816.5
f. Logistics and Documentation	---	3,306.0
g. Second Level Engineering	---	800.0
h. Independent Operational Test and Evaluation (IOT&E)	---	500.0
Total	Various	$22,600.0
B. RWSL Prototype Sustainment	---	$1,570.0

For FY 2016, $22,600,000 is requested for RWSL Implementation Phase 1 and $1,570,000 for RWSL Prototype Sustainment.

A. RWSL Implementation Phase 1 activities in FY 2016 include: starting construction at one airport, delivering and installing the system at two airports, and achieving Initial Operational Capability (IOC) at two airports. Remaining funds will be used for implementation activities at sites scheduled for IOC in FY 2017, and 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 FY 2015, site implementation activities include site design, construction, system installation, and achieving initial operational capability. In FY 2014, remaining planned activities include commissioning two sites, achieving IOC at one site, and completing site acceptance testing at two sites. Completed FY 2014 activities include the commissioning of two sites and IOC at three sites.

B. RWSL Prototype Sustainment activities include the maintenance of the RWSL prototype systems in Boston, Dallas-Ft. Worth, and San Diego, which are not included in the Implementation Phase 1 production baseline.

What Is This Program And Why Is It Necessary?

RWSL integrate airport lighting equipment with approach and surface surveillance systems to provide a visual signal to pilots and vehicle operators indicating that 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. 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 backup and reinforcement of controller guidance.

- Four production sites are fully commissioned: Orlando (August 2013), Phoenix (March 2014), Houston (April 2014), and Washington-Dulles (July 2013)
- Three additional sites have achieved Initial Operational Capability (IOC): Minneapolis (January 2014), Seattle (March 2014), and Las Vegas (April 2014)
- Three additional sites have completed Site Acceptance testing (SAT): Charlotte (August 2012), Ft. Lauderdale (May 2013), and New York-LaGuardia (July 2014)
- Seven additional sites are under construction: Chicago, Detroit, New York-Kennedy, Newark, Los Angeles, San Francisco, and Baltimore-Washington

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 provide direct warning capability to the flight crews." RWSL address this recommendation by providing direct indication to flight crews and vehicle operators that it is unsafe to enter a runway or to begin a takeoff.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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

The requested funding supports the program's ability to maintain its baseline schedule and realize the safety improvement benefits upon which the investment is based.

What Benefits Will Be Provided To The American Public Through This Request?

RWSL provide an additional layer of safety to the dynamic runway environment. Automated surface surveillance systems alone may not be sufficient in certain time critical situations. RWSL display critical, time-sensitive safety status information directly to pilots and vehicle operators reducing the time it takes to alert them of potentially unsafe situations.

RWSL are designed to independently supplement existing air traffic controller tools and procedures without increasing the controller workload and without impacting safe efficient surface operations. RWSL do not replace air traffic control issued clearances.

Due to budget constraints and unexpected costs to implement the program, the FAA reduced the scope of the RWSL program from 23 airports to 17. As a result, the FAA will take an alternative approach to the RWSL Program at selected airports. The agency formed a Surface Safety Team to work with stakeholders at these airports to evaluate available runway safety technologies, develop a portfolio of innovative solutions, and identify funding options that include cost sharing. The team will work with the airports to provide solutions that address airport-specific challenges and improve safety and efficiency.

Detailed Justification for - 2B13 National Airspace System Voice System (NVS)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – National Airspace System Voice System (NVS)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
National Airspace System Voice System (NVS)	$16,000	$20,550	$53,550	+$33,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. First Article Test System Expansion	---	$3,524.1
b. Third Article Test System	1	1,294.0
c. Key Site Systems: Terminal	2	1,931.4
d. Enterprise Voice Network Engineering	---	9,230.4
e. System Engineering	---	4,417.1
f. Program Management	---	2,952.0
g. Contractor Support	---	7,691.4
h. Production Support Services	---	6,995.1
i. Installation	---	1,602.5
j. Testing	---	3,063.9
k. Second Level Engineering	---	1,945.3
l. System Manual and Training Development	---	1,505.9
m. Security	---	603.9
n. Telecommunications	---	243.0
o. Contingency Planning – Equipment Purchase	---	5,300.0
p. Contingency Planning – Hardware Installation	---	700.0
q. Independent Operational Test and Evaluation (IOT&E)	---	550.0
Total	Various	$53,550.0

For FY 2016, $53,550,000 is requested for first article test system expansion, a third article test system, two key site Terminal voice switch systems, and for Voice over Intranet Protocol (VoIP) network and systems engineering for the National Airspace (NAS) Voice System – Demonstration and Qualification. The FY 2016 request also includes funding for the procurement and installation of additional radio and telephone interface cards to expand capacity of the existing legacy voice switch systems to satisfy requirements in Air Traffic's ongoing contingency planning work. Included in the request is $550,000 to continue Independent Operational Test and Evaluation (IOT&E) activities in support of NVS.

Ongoing activities include work to deliver first and second article test systems, a Test Load Generator (TLG), and to continue systems engineering and software development. NVS received a Final Investment Decision (FID) from the Joint Resources Council (JRC) in September 2014 for NAS Qualification of the NVS system.

What Is This Program And Why Is It Necessary?

NVS will provide voice communications services to Air Traffic Control Specialists (ATCS), supervisors, and ancillary Air Traffic Control (ATC) operators in support of continuous ATC operations in the Terminal and En Route domains of the National Airspace System (NAS). Voice communications connectivity will be provided to aircraft flight crews and Unmanned Aircraft System (UAS) operators through Air to Ground (A/G) radio circuits or equivalent network connections. Voice communications connectivity between ATCS, supervisors and traffic managers will be provided through access to intra-facility and inter-facility Ground to Ground (G/G) voice circuits or equivalent network connections.

The current switch technology deployed in the NAS will not support the expected future NextGen concept of operations for networked facilities, or such concepts as dynamic re-sectorization (expanding or contracting a controller's volume of airspace electronically) and off-loading during non-peak operations. These capabilities require that lines connected to a controller's workstation be changed to add or eliminate lines as the geographical boundaries of the sector change. NVS will support current and future ATC operations as envisioned by both government and industry forecasters. In addition, the current voice switch system is aging and needs to be modernized to mitigate parts obsolescence and diminishing manufacturing sources.

The Contingency Planning work for NVS is a result of the fire that occurred in the Chicago Air Route Traffic Control Center (ARTCC) late FY 2014. The Air Traffic Organization (ATO) is currently working on a contingency Concept of Operations (CONOPS), which will include requirements for the expansion of A/G and G/G interface capacity in the current legacy voice switches. The expansion of the A/G and G/G interface cards will allow for voice communications to be re-routed to adjacent facilities, if necessary. This will provide a near-term solution until NVS receives its In-Service Decision (ISD) in FY 2020 and is deployed throughout the NAS in accordance with final waterfall schedule.

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
- 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
- Reducing potential costs to users from air traffic delays due to projected outages of the existing systems and increased user demand

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$53,550,000 is required to expand the first article test system from 87 to 200 positions and procure a backup, procure a third article test system, two key site Terminal voice switch systems, and for Voice over Intranet Protocol (VoIP) network and systems engineering. The current voice switch system is aging and needs to be modernized to mitigate obsolescence.

What Benefits Will Be Provided To The American Public Through This Request?

Three NVS demonstration systems were delivered in FY 2013. In early FY 2014, a demonstration was successfully performed to validate NextGen capabilities (e.g. resource sharing, load balancing, and enterprise management) in support of a production-ready system for deployment to any of the target environments.

NVS will replace the service that is currently provided by 11 different voice switch configurations including Terminal Voice Switch Replacement (TVSR) and Voice Switch and Control System (VSCS). The focus will be on designing a replacement system that can be scaled to facility size with standardized components that will reduce maintenance and parts inventory.

Detailed Justification for - 2B14 Integrated Display System (IDS)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Integrated Display System (IDS)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Integrated Display System (IDS)	$4,100	$16,917	$23,300	+$6,383

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Procurement, Production and Deployment of IDS-R Systems	18	$13,300.0
B. Requirements Development, Investment Analysis for E-IDS	---	10,000.0
Total	Various	$23,300.0

A. Integrated Display System – Replacement (IDS-R): For FY 2016, $13,300,000 is requested to procure and install workstations at 18 networks at Terminal Radar Approach Control (TRACON) Facilities and the associated Airport Traffic Control Towers (ATCTs).

B. Enterprise Integrated Display System (E-IDS): For FY 2016, $10,000,000 is requesting to complete concepts development through prototyping, Investment Analysis resulting in an Initial Investment Decision and preparation for Final Investment Decision.

What Is This Program And Why Is It Necessary?

A. Integrated Display System – Replacement (IDS-R)

The IDS-R is a local and wide area network information dissemination and display system that consolidates information from several operational FAA and National Weather Service (NWS) weather subsystems and from other operational sources onto a single display, and distributes the data to air traffic controllers and airspace managers at TRACON, Tower (ATCTs), 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 IDS-R program provides for the replacement of the legacy Integrated Display Systems-4 (IDS-4) with current technology. The program will replace 1,944 IDS-4 systems at approximately 256 sites nationwide. The equipment removed from the 256 sites will enable the depot to provide supply support for the remaining sites. The National Airspace System (NAS) relies on the continuation of the capabilities provided by the IDS. The existing IDS-4 has been operational since 1994 without any technology refresh of hardware/software. Replacement of the legacy equipment at the 256 facilities 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 prime contract was awarded in May 2010 and design efforts were completed in early 2011. FY 2016 funding supports installing 18 IDS-4 sites, and FAA anticipates completing all 1,944 workstations by the end of 2017.

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). As currently configured, the IDS-4 system is unsupportable and lacks the capacity to incorporate software updates. Essential 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 Air Traffic Control (ATC) workload, increase labor costs, and reduce ATC situational awareness thereby increasing flight delays.

B. Enterprise Integrated Display System (E-IDS)

E-IDS will replace obsolete standalone IDS workstations in Terminal and En Route domains with a common enterprise-based server and thousands of thin-clients in the field. The system will enhance situational awareness through a shared common operations picture between users. E-IDS will reduce manual entry and facilitate inter-facility coordination, integrate information into a separate view, remove display clutter and expedite information retrieval and assures data reliability through SWIM.

Not only will E-IDS Interface with and display data to the Air Traffic Controller from legacy systems like Automated Surface Observing System (ASOS), Automated Weather Sensors System (AWSS), Digital Altimeter Setting Indicator (DASI), Low Level Windshear Alert System (LLWAS), Terminal Doppler Weather Radar (TDWR), and Wind Measuring Equipment (WME), it will also provide the platform to display data from future programs/systems Aeronautical Information Management (AIM), Notice to Airmen (NOTAMS), and new weather programs to name a few.

The IDS-R program will not replace all IDS-4 systems, especially those at tier 1 facilities. As currently configured, the IDS-4 system is unsupportable and lacks the capacity to incorporate software updates. The E-IDS will complete the replacement of the remaining IDS-4 systems. The IDS models to be replaced by E-IDS include: the remainder of IDS Model-4 (IDS-4) that were deferred by the IDS Replacement (IDSR) program (quantity 483), all of the IDS Model-5 (IDS-5) (quantity 33), all of the ASOS Controller Equipment Integrated Display System (ACE-IDS) (quantity 709), and all of the En Route IDS (ERIDS) (quantity 1,628).

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. Integrated Display System – Replacement (IDS-R)

- The NAS relies on the capabilities provided by the IDS. Funding IDS-R at requested levels is necessary to ensure availability of NAS operations, because it supports the FY 2016 baseline for procurement and installation of the workstations at the sites as planned.

B. Enterprise Integrated Display System (E-IDS)

- Funding E-IDS at the requested levels is necessary to ensure that replacement of information display systems throughout the NAS (IDS-4, IDS-5, ACE-IDS, ERIDS, IDS-R, et. al.), many of which are at or near end of life status, occurs and creates one unique and seamless information display platform across the NAS.
- Funding E-IDS at the requested levels will provide a NAS platform that will be able to utilize developing FAA enterprise architecture products like Common Support Services Weather via the System Wide Information Management platform.
- Additionally, as part of the JRC decision for the IDS-R program, E-IDS was identified to meet near-term system failure concerns with the remaining IDS-4 system which would exist even after IDS-R is deployed.

What Benefits Will Be Provided To The American Public Through This Request?

A. Integrated Display System – Replacement (IDS-R)

- Replacing IDS systems with current technology will reduce outages, thereby reducing delays at the airports associated with the sites addressed by this investment
- Measurement criteria established upon final investment decision will focus on operational availability, which were assessed on an annual basis beginning in FY 2011
- The first IDS-R site achieved Initial Operational Capability (IOC) on September 16, 2013, and the system operational availability has been 100 percent since that date

B. Enterprise Integrated Display System (E-IDS)

- Data standardization and sourcing ensures sameness of data among facilities and will result in efficiency of data sharing throughout the NAS
- Common Computer Human Interface (CHI) across Air Traffic environments and users will reduce training costs
- Identical skill set for hardware and software maintenance across Air Traffic environments reduces the cost of maintaining disparate systems

Detailed Justification for - 2B15 Remote Monitoring and Logging System (RMLS)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Remote Monitoring and Logging System (RMLS)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Remote Monitoring and Logging System (RMLS)	$1,000	$3,930	$4,700	+$770

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Remote Monitoring and Logging System (RMLS) Technology Refresh	---	$4,700.0

Remote Monitoring and Logging System (RMLS) Technology Refresh

For FY 2016, $4,700,000 is requested to initiate the replacement of obsolete load balancers and servers used for remote monitoring and maintenance of the NAS, and as a repository for NAS maintenance logging information. The funds will be used to replace the equipment and update security requirements in two main hubs of the network the Pacific Operations Control Center (POCC) and William J. Hughes Technical Center (WJHTC).

What Is This Program And Why Is It Necessary?

The FAA relies on the Remote Monitoring and Logging System (RMLS) to insure all NAS facilities and systems are operational so that flights are safe and on time. The NAS Defense program and Homeland Security also relies on the data for 24/7 monitoring of the NAS.

Several key issues affect the FAA's ability to support the Operation and Maintenance (O&M) of the NAS. Many Technical Operations programs are not integrated, and the O&M data is shared through manual processes, e.g., voice communications, email, point-to-point message exchange services, and manually searching multiple databases. Updating system status by these means of communication often results in errors which can lead to potential safety hazards, delays in NAS status information as well as equipment repairs, execution of improper maintenance actions and improper direction for supply chain management.

Through the implementation of an RMLS technology refresh, it is expected the FAA will improve the way it provides air traffic services and realize a positive business impact in the following areas: tracking and traceability, configuration management, warranty control, reliability and maintainability data, inventory accountability, data quality, acquisition management, and vendor accountability.

RMLS technology refresh will replace aging RMLS core components for NAS growth to ensure the Remote Monitoring and Maintenance (RMM) infrastructure supports the agency's storage, bandwidth, and security needs.

The RMLS program directly supports the NAS operational availability maintenance metric of 99.7 percent. RMLS supports the FAA operational availability performance metric by capturing, quantifying, analyzing, measuring and reporting maintenance information to determine operational availability as well as error levels, responsiveness, and utilization of NAS components, systems, services, and the NAS as a whole. The maintenance information is used by the FAA to analyze trends and improve performance; make investment decisions and support budget requests for replacement, relocation, or modification of existing equipment; detect supportability problems; evaluate the efficiency and effectiveness of the overall maintenance program; and provide reports to Congress and FAA management.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$4,700,000 is required to continue technology refresh of RMLS commercial-off-the shelf (COTS) components and comply with the FAA's mandated security requirements before the support strategy (failure under warranty) fails. Solution implementation of RMLS technology refresh activities include: procurement, operational test and evaluation, technical data, supply support, site preparation, installation, and testing and activation.

What Benefits Will Be Provided To The American Public Through This Request?

The activity tasks within RMLS have shown previous success directly or are tied to previous successes within the agency. In FY 2007 - FY 2008 the FAA's Remote Maintenance System Engineering Team (RMSET) successfully designed, developed, and tested a proof of concept prototype for RMLS. The team also demonstrated success in FY 2013, as RMLS was made fully operational across the NAS. Benefits have been validated and were presented to arrive at the RMLS technology refresh Final Investment Decision in June 2014.

Validated cost avoidance benefits are the following:

- Improved maintenance systems integration
- Data standardization
- Improved system efficiency
- Integration with other supply chain programs as part of Supply Chain integration

Detailed Justification for – 2B16 Mode S Service Life Extension Program (SLEP) - Phase 2

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Mode S Service Life Extension Program (SLEP) - Phase 2
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Mode S Service Life Extension Program (SLEP) - Phase 2	$7,300	$8,100	$16,300	+$8,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Mode S Service Life Extension Program Phase 2		
a. Program Management	---	$1,350.0
b. Hardware Procurement	---	2,950.0
Total	Various	$4,300.0
B. ASR-9 and Mode S Service Life Extension Program Phase 3 Planning		
a. Program Management	---	$1,000.0
b. System Engineering Analysis and Design	---	3,000.0
c. Testing Development and System	---	5,000.0
d. Hardware Procurement	---	3,000.0
Total	Various	$12,000.0

For FY 2016, $16,300,000 is requested to:

A. Terminal Radar (ASR) Mode S SLEP Phase 2

For FY 2016, $4,300,000 is requested to continue procurement of High Gain Open Planar Array (HGOPA) and Non-Volatile Memory (NVMEM)) chips for Depot Replenishment. The Mode S SLEP Phase 2 Final Investment Decision (FID) was approved on June 27, 2012. Ongoing activities for the program include: Program Management, Procurement of High Gain Antenna (HGOPA), Procurement of Non-Volatile Memory (NVMEM) chips, redesign of four Critical Lowest Replacement Units (LRUs), and Redesign Logistics Support

B. ASR-9 and Mode S SLEP Phase 3 Planning

For FY 2016, $12,000,000 is requested to prepare required documentation to present to the Joint Resources Council (JRC) for Final Investment Decisions (FID) planned for March 2017. Funding is also needed to complete system supportability studies for both the ASR-9 and Mode S systems, market surveys for LRUs, and analysis of design and development proposals from responders. Completion of development and testing of prototypes for the ASR-9 Digital Communications Equipment (DCE), Receiver Protector and the Mode S four critical LRUs as part of risk reduction. Additionally, funding will be required for initial production contract awards after final investment decisions.

Ongoing activities include:

- Continuation of investment analysis documentation, in preparation for the ASR-9 and Mode S SLEP Phase 3 Investment Analysis Readiness Decision (IARD) in September 2015 and follow-on FID in March 2017
- Completion of ASR-9 DCE and Receiver Protector prototypes
- Complete testing of ASR-9 DCE and Receiver Protector prototypes and prepare for production contract awards
- Complete Supportability Studies
- Submit Market Surveys for multiple projects

What Is This Program And Why Is It Necessary?

A. Terminal Radar (ASR) Mode S SLEP Phase 2

Mode S SLEP Phase 2 will implement modifications to the aging secondary Mode S subsystems architecture and peripheral equipment to sustain secondary surveillance in terminal and En Route airspace through 2028. The sustainment of the Mode S aligns with the Surveillance Roadmap Decision[1], and the Surveillance and Broadcast Services (SBS)/Automatic Dependent Surveillance Broadcast (ADS-B) backup strategy.[2]

Based on this strategy, at a minimum, the Mode S systems at the 23 long range radar facilities and the top 50 high density terminal facilities will remain in service through at least 2028.

The Mode S SLEP Phase 2 will mitigate issues of obsolescence, reliability and maintainability, and lifecycle costs for:

- **Beacon Video Reconstitutor (BVR):** The BVR is comprised of assemblies and components that have reached the end-of-life and are not supportable. The FAA cannot repair or reverse engineer these assemblies. There are no other known sources of repair for the BVR assemblies. Without the BVR, these radar sites are precluded from the full Mode Select display functionality. Current separation standards cannot be applied using ASR-8 videos and the ARTS II position symbols (ARTS tags) alone.
- **Mode S High Gain Open Planar Array (HGOPA):** A five foot beacon antenna was deployed throughout the mid to late 1970's with a projected lifecycle of 20 years. All five foot beacon antennas currently servicing the National Airspace System (NAS) are operating at 10+ years past the intended lifecycle, and support for these obsolete assets is increasingly challenging. The primary means of repair/refurbishment is cannibalization of a limited number of unserviceable five foot beacon antennas for parts resulting in an urgent need to manage the supportability issues of the legacy five foot beacon antenna.
- **Mode S Depot Replenishment:** Mode S SLEP Phase 2 will procure LRUs and components to reinforce the FAA Logistics Center inventory of spares including High Gain Open Planar Array (HGOPA) and Non-Volatile Memory (NVMEM) Chips.
- **Mode S Development of Four Critical LRU Prototypes:** The Critical LRU Prototypes provide an alternative that will maintain current functionality balanced with the versatility to achieve future requirements. The Critical LRU addresses the issue of diminishing manufacturer sources and parts obsolescence issues at the LRU level.

B. ASR-9 and Mode S Service Life Extension Program Phase 3 Planning

ASR-9 and Mode S service provides for maintenance of aircraft separation standards, reduces delays, and improves safety at congested airports. During instrument meteorological conditions the radar provides air traffic controllers with information that allows closer aircraft operations and increases air traffic arrival and departure operations. This particular program, ASR-9 and Mode S Service Life Extension Program Phase 3, reduces the risk of unscheduled outages and ensures the continuation of maximum service capabilities. In addition, the ASR-9 and Mode S service life extension modifications will reduce the overall lifecycle operation costs by improving system reliability and maintainability. The sustainment of the ASR-9 and Mode S aligns

[1] https://nasea.faa.gov/products/roadmap/main/display/7/tab/dps/
[2] https://nasea.faa.gov/products/roadmap/main/display/7/tab/assumptions/

with the Surveillance Roadmap Decision Points, and the Surveillance and Broadcast Services (SBS)/Automated Dependent Surveillance Broadcast (ADS-B) backup strategy.

The Next Generation of Surveillance and Weather Radar Capability (NSWRC) and Backup Surveillance Capability (NBSC) are currently in the investment analysis phase. Replacement of the ASR-9 and Mode S systems with NSWRC and NSBC systems respectively will need to be considered in the scope as the investment analysis process proceeds to FID for ASR-9 and Mode S SLEP Phase 3.

The ASR-9 also provides data under Memoranda of Agreements (MOAs) to the Departments of Defense (DoD) and Homeland Security (DHS) through the Defense Radar Program and to the Department of Treasury and National Weather Service (NWS) through separate agreements. The DoD uses ASR-9 surveillance data to monitor and detect non-transponder equipped "intruders" in terminal airspace.

The Mode S system provides correlated radar and beacon reports and weather map reports to NAS En Route and Terminal Automation, U.S. Department of Defense (DoD) and Department of Homeland Security (DHS) through the Defense Radar Program, and to the Department of Treasury and National Weather Service (NWS) through separate agreements.

The ASR-9 and Mode S SLEP Phase 3 Planning will develop strategies and mitigate issues of obsolescence, reliability and maintainability, and lifecycle costs. The planning phase will include the investment analysis process and the following:

- Perform engineering studies to determine the scope of the ASR-9 and Mode-S SLEP Phase 3 programs. There are components of these radar systems that will not be supportable through 2028 and these analyses will determine the extent of re-engineering and system modifications needed
- Develop and test prototypes, and prepare production contracts for award for the prototypes for ASR-9 Data Communications Equipment (DCE) and Receiver Protector and prototypes for the Mode S four (4) critical LRUs
- Provide in-service support to improve radar performance, engineering and planning to correct performance/operational and reliability issues, resolution of performance issues such as radar interference, and sustainability management of ASR-9 and Mode S surveillance systems deployed in the NAS

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

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

A. Terminal Radar (ASR) Mode S SLEP Phase 2 will extend the service life of the Mode S system and will reduce outages due to performance deterioration and parts obsolescence. Furthermore, the Mode S service life extension will increase equipment and service availability. The requested funding will decrease maintenance costs and increase reliability.

B. ASR-9 and Mode S SLEP Phase 3 Planning is based on maintaining availability of service. Ensuring service will contribute to:

- Maintained separation standards for aircraft and reduce potential flight delays
- Continued reduction of operational costs and decrease of maintenance man hours for the Mode S four Critical LRUs

What Benefits Will Be Provided To The American Public Through This Request?

A. Terminal Radar (ASR) Mode S Phase 2 will extend the service life of the Mode S system which will reduce outages due to performance deterioration and parts obsolescence. Furthermore, the Mode S SLEP will increase equipment and service availability. The success of the program will be measured by analysis of Mode S outages attributable to system components affected by this modification, air traffic delays due to these outages, and related demand for spare parts. Mode S SLEP Phase 2 will reduce the overall lifecycle operation costs by improving system reliability and maintainability.

B. ASR-9 and Mode S SLEP Phase 3 Planning is the continuation of a phased strategy to provide a service life extension of the ASR-9 and Mode S systems at the highest traffic airports. Phase 1B was completed in October 2010 (four months ahead of schedule). Phase 2 is in solution implementation. ASR-9 and Mode S SLEP Phase 3 will be implemented in a similar fashion to achieve similar benefits (reliability and maintainability improvements and maintenance cost reductions).

Phase 3 will build upon previous successes by ensuring that proven Commercial-Off-The-Shelf- (COTS) 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 in compliance with the ASR-9 and Mode S Final Requirements.

Extending the service life of the ASR-9 and Mode S systems will reduce outages due to performance deterioration and parts obsolescence. Furthermore, the ASR-9 and Mode S service life extensions will increase equipment and service availability. The success of the program will be measured by analysis of ASR-9 and Mode S outages attributable to system components affected by this modification, air traffic delays due to these outages, and related demand for spare parts.

Detailed Justification for – 2B17 Surveillance Interface Modernization (SIM)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Surveillance Interface Modernization (SIM)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Surveillance Interface Modernization (SIM)	$6,000	$4,000	$23,000	+$19,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Program Mission Product Hardware	---	$8,830.0
b. Program Management	---	2,330.0
c. System Engineering	---	1,770.0
d. Integrated Logistics Support	---	305.0
e. Site Preparation, Installation Test and Activation	---	1,610.0
f. Telecommunications	---	4,520.0
g. RCL FTI/Removal	---	3,510.0
h. Disposition	---	125.0
Total	Various	$23,000.0

For FY 2016, $23,000,000 is requested to continue Investment Analysis Activities to complete JRC documentation to achieve Final Investment Decision (FID) by June 2016. The funding will support establishment of platform Program Level Agreements (PLA) and Service Level Agreements (SLA) in support of software development for surveillance and automation platforms. Funding will also initiate implementation of SIM into the Radio Communication Link (RCL).

The SIM Program achieved Investment Analysis Readiness Decision (IARD) in November 2011. Ongoing activities have included planned approval of Initial Investment Decision (IID) by June 2015 and Final Investment Decision (FID) by June 2016. Key outcomes will be initiating software development for surveillance and automation platforms.

The FAA is also initiating an Investment Analysis (IA) for the modernization of the flight data interfaces between ERAM and other National Airspace System (NAS) Air Traffic Control (ATC) automation systems that communicate with ERAM via the En Route Communications Gateway (ECG). This effort, for flight data modernization, performed in conjunction with the parallel effort for SIM, will enable direct Internet Protocol (IP) network connection between ERAM, STARS, ATOP, and the Flight Data Input/Output (FDIO) equipment in the Airport Traffic Control Towers (ATCTs) and Terminal Radar Approach Control (TRACON) facilities, and would allow the decommissioning of the ECG.

What Is This Program And Why Is It Necessary?

The Surveillance Interface Modernization (SIM) Program will modernize the interfaces between FAA surveillance radar, automation, and specific weather systems for both Terminal and En route. Surveillance data from today's legacy radars is distributed using Common Digitizer (CD) format [version 2] (CD2) over point-to-point serial interfaces to the nearest one or two automation systems. The point-to-point connectivity and CD2 message formats have inherent limitations that restrict the ease of distribution of surveillance information to users at other facilities and require additional physical connections. This program will implement a common industry standard communications architecture and format.

SIM's improvements are achieved by converting the radar and automation systems from the serial interfaces to flexible Internet Protocol (IP) addressable interfaces, over a secure network. Upgrading from serial to IP data transmission formats will simplify circuit management and provide a platform to enforce security policies, ensure delivery to each customer, and provide direct performance metrics. The result will be improved interconnectivity with less downtime and errors, potentially increased data precision, increased aircraft surveillance information delivered to the air traffic automation system, and increased operational efficiency. It is anticipated that by having all legacy radar interfaces and applications converged to a common data format, the cost of maintaining these interfaces as the NAS transitions to NextGen will be significantly reduced. The number of surveillance interface parts requiring repair and replacement will be reduced.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$23,000,000 is required to continue Investment Analysis Activities to complete JRC documentation to achieve Final Investment Decision (FID) by June 2016. The funding will support establishment of platform Program Level Agreements (PLA) and Service Level Agreements (SLA) in support of software development for surveillance and automation platforms. Funding will also initiate implementation of SIM into the Radio Communication Link (RCL).

What Benefits Will Be Provided To The American Public Through This Request?

The objective of the program is to standardize all FAA radar to automation interfaces from point to point, limited data architecture to net-centric expanded data architecture. The result will be improved interconnectivity with less downtime and errors, potentially increased data precision, increased aircraft surveillance information delivered to the air traffic automation system, and increased operational efficiency. This will reduce cost and performance risks associated with data limitations and non-standard interfaces.

Detailed Justification for - 2B18 Voice Recorder Replacement Program (VRRP)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Voice Recorder Replacement Program (VRRP)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Voice Recorder Replacement Program (VRRP)	$6,200	$1,000	$3,000	+$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks		Locations/ Quantity	Estimated Cost ($000)
A.	NAS Voice Recorder Program (NVRP)		
a.	Program Office Support	---	$1,700.0
b.	Cost Analysis Support	---	500.0
c.	Information System Security (ISS) Support	---	500.0
d.	Second Level Engineering	---	300.0
Total		Various	$3,000.0

For FY 2016, $3,000,000 is requested for the National Airspace System (NAS) Voice Recorder Program (NVRP) to conduct Investment Analysis, perform a Market Survey, and Screening Information Request (SIR) Development.

Currently available funding is being used for the procurement, installation, and delivery of 13 Digital Audio Legal Recorder (DALR) systems and for initial depot spares of the Next Generation VRRP and to support centralized remote access for safety analysis.

What Is This Program And Why Is It Necessary?

Voice recorders provide the legally accepted recording capability for conversations between air traffic controllers, pilots, and ground-based air traffic facilities. These recordings are used in the investigation of accidents and incidents and in the routine evaluation of ATC operations. These recorders are used in all Air Traffic Control (ATC) domains. As the voice recorder technology and voice recorder requirements have evolved, earlier digital voice recorders are experiencing obsolescence and supportability issues. Currently there are 465 recorders in service. Recorders have a 10 year operational life. The current model of voice recorders will begin to reach end of life starting in 2017.

The NAS Voice Recorder Program (NVRP) will replace the legacy Digital Audio Legal Recorders (DALRs) procured under the previous program, the Next Generation Voice Recorder Replacement Program (NG VRRP). NVRP provides improved digital voice recording functionality to meet new validated requirements. The FAA Air Traffic Organization (ATO) issued quality assurance and quality control orders, effective January 2012, that require a risk-based monitoring of air traffic operational safety events. FAA Order JO 7210.633, ATO Quality Assurance Program (QA), addresses the policy and process for identifying safety trends in the National Airspace System (NAS) and verifying the effectiveness of safety risk mitigations. Additionally, FAA Order JO 7210.634, ATO Quality Control (QC), defines the policy and process for quality monitoring and compliance verification for services provided by air traffic control facilities, technical operations, and flight service stations.

NVRP will support the NextGen NAS Voice System (NVS) by being capable of recording digital Voice Over Intranet Protocol (VoIP) telephones. The replacement of aging voice recorders will also reduce operational costs and address the increasing demand for more expeditious audio access and capabilities such as increased recording capacity and connect to FAA Telecommunications Infrastructure (FTI)'s enterprise Network Time Protocol (NTP).

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$3,000,000 is required for NVRP to conduct Investment Analysis, perform a Market Survey, and Screening Information Request (SIR) Development. The requested funding level supports pre-acquisition documentation development to award a new contract for NVRP in FY 2018. Full implementation of this program will result in the replacement of the legacy voice recorders, Digital Audio Legal Recorders (DALRs) that do not meet current Safety Requirements. Additionally, it will decrease the risk of Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues in order to maintain Operational Availability.

What Benefits Will Be Provided To The American Public Through This Request?

The previous program, NG VRRP, delivered 458 DALR systems to replace legacy voice recorders at NAS facilities. NG VRRP's Program Implementation Review (PIR) was conducted in early FY 2010 and concluded that the program meets the needs of its customers and that it has provided an overall cost savings due to lower maintenance costs. The PIR also validated that the program's original business case remains valid, which provides an estimated $7,400,000 of benefits annually.

NVRP will incorporate new Safety and Audit Requirements as well as provide a cost avoidance through a reduction in technology refresh costs of NG VRRP to support obsolescence and supportability concerns. Additional cost savings will be derived by preventing the Voice Switch (NVS) from having to procure digital to analog circuit connection panels as NVRP will provide Voice Over Intranet (VoIP) recorder functionality.

Detailed Justification for - 2B19 Integrated Terminal Weather System (ITWS) – Technology Refresh and Disposition

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Integrated Terminal Weather System (ITWS) – Technology Refresh and Disposition ($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Integrated Terminal Weather System (ITWS) – Technology Refresh	$1,300	$4,400	$5,400	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Test and Evaluation	---	$400.0
b. Logistics	---	2,000.0
c. Hardware	---	1,400.0
d. Systems Engineering	---	600.0
e. Implementation	---	300.0
f. Program Support	---	700.0
Total	Various	$5,400.0

For FY 2016, $5,400,000 is requested for hardware procurement and replacement at six ITWS locations. Planned activities include testing and evaluation, logistics, hardware, systems engineering, implementation and program support. The ITWS technology refresh will allow the FAA to sustain the generation of essential ITWS weather products to the Air Traffic Controller user community across the National Airspace System (NAS).

What Is This Program And Why Is It Necessary?

The Integrated Terminal Weather System (ITWS) provides automated weather information for use by air traffic controllers, supervisors, pilots and airline dispatch. The ITWS integrates data and information from FAA and National Weather Service (NWS) sensors such as the Terminal Doppler Weather Radar (TDWR), the Next Generation Weather Radar (NEXRAD), Airport Surveillance Radar (ASR), Low Level Windshear Alert System (LLWAS), Automated Weather and Surface Observing Systems (AWOS/ASOS), lightning detection systems, NWS weather models and aircraft via the Meteorological Data Collection and Reporting System (MDCRS).

Automated weather products produced by the ITWS include essential safety, windshear and microburst detection and predictions, storm cell intensity and direction of motion, lightning information, detailed winds in the terminal area and a one hour storm forecast. The graphical, full-color display provides an easy-to-use interface that does not require meteorological interpretation. ITWS weather information is available to air traffic managers, controllers and airlines via dedicated situation displays at FAA Air Traffic facilities, the web or an ITWS data feed. There are no other FAA weather programs that provide the type of airport-specific weather products that are generated by ITWS.

The ITWS technology refresh will include the systematic replacement of all ITWS Commercial Off-The-Shelf (COTS) system components, including: processors, situation displays, computer operating systems and software to assure continued supportability over the service life of the system. This will include the replacement of obsolete hardware at 145 Air Traffic facilities across the NAS.

In FY 2015, logistics support for the current ITWS sites will begin to diminish, according to an ITWS Supportability Study conducted by the FAA in 2010. System hardware spares, support tools and maintenance provisions for keeping the current ITWS sites operational will become unavailable, support costs will escalate and system outages will increase.

Interdependencies include NextGen Weather Processor (NWP) and Common Support Services – Weather (CSS-Wx). The ITWS program supports terminal requirements. Program beneficiaries range from commercial aviation and general aviation to the flying public and the benefits to them are safety, flight efficiency and delay reduction.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$5,400,000 is required to support the ITWS technology refresh. There are no other FAA weather programs that provide the type of airport-specific weather products that are generated by this program. Planned activities include testing and evaluation, logistics, hardware, systems engineering, implementation, program support and deployment. The ITWS technology refresh will allow the FAA to sustain the essential ITWS weather products to the Air Traffic Controller user community across the NAS.

What Benefits Will Be Provided To The American Public Through This Request?

The ITWS automated weather tool provides essential airport and terminal weather information. While difficult to quantify or measure, weather information that is timely, accurate, and easy to interpret clearly contributes to avoidance of delays and accidents. Maintaining the availability and functionality of ITWS is a significant contributor to the following:

- National Transportation Safety Board (NTSB) statistics indicate weather-related delays cost the aviation industry and the traveling public approximately $4.1 billion per year, of which $1.7 billion per year is considered avoidable.
- Through improved integration of weather data into timely, accurate aviation weather information, FAA can reduce delays and improve NAS capacity utilization while enhancing aviation safety.
- The ITWS technology refresh will extend the life of the commissioned ITWS systems, preventing system outages to ensure these benefits and savings continue to be realized.
- While the form, fit and function of the system will remain the same, updated hardware and software platforms will allow ongoing updates to maintain functionality and meet modern FAA security requirements.

Detailed Justification for – 2B20 Flight and Interfacility ATC Data Interface Modernization (FIADIM)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Flight and Interfacility ATC Data Interface Modernization (FIADIM)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Flight and Interfacility ATC Data Interface Modernization (FIADIM)	$0	$0	$9,000	+$9,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Investment Analysis Artifact Development	---	$4,400.0
b. ERAM FIADIM Solution Implementation	---	1,800.0
c. STARS FIADIM Solution Implementation	---	1,200.0
d. FDIO FIADIM Solution Implementation	---	800.0
e. FTI FIADIM Solution Implementation	---	800.0
Total	Various	$9,000.0

For FY 2016 $9,000,000 is requested for FIADIM to allow the program to identify and develop acquisition alternatives for the modernization of the flight data interfaces between the principal FAA Air Traffic Control (ATC) automation systems. FY 2016 funding will support Initial Investment Decision (IID), Final Investment Decision (FID), and the initiation of solution implementation by the first-priority systems: ERAM, STARS, FDIO and FTI. FY 2016 funding will also support the initiation of the migration of FDIO communications lines from TDM/serial to IP.

What Is This Program And Why Is It Necessary?

The Flight and Interfacility Air Traffic Control (ATC) Data Interface Modernization (FIADIM) is a multiple-system portfolio program. It will modernize the flight data exchange interfaces between the En Route Automation Modernization (ERAM) system and other Terminal and Oceanic client ATC systems that exchange flight and Interfacility data via the En Route Communication Gateway (ECG). The NAS Services being modernized by this investment are called the Flight Data Entry and Printout (FDAT) and Interfacility Data Transfer (IDAT) services.

The FIADIM program will replace the legacy ECG FDAT and IDAT data exchange interfaces with direct, modernized interfaces, requiring only standard FTI network services between the systems. In conjunction with the Surveillance Interface Modernization (SIM) program, the replacement of the ECG flight data interfaces will enable the decommissioning of the ECG equipment at all 20 Air Route Traffic Control Centers (ARTCCs). The resultant configuration of ATC automation systems will eliminate unnecessary system hardware and software components, be more sustainable due to the elimination of unsupportable legacy interface equipment, be more resilient to system outages and better support contingency operations via greater reliance on Internet Protocol (IP) switched network communications, and will better support ATC operations by providing more complete flight data than was supported by the legacy interfaces.

The ECG is the third generation of a legacy communications handler between En route ATC automation and Terminal ATC Automation. With each of the communication handler replacements, the technology and data formats of the ATC automation interfaces were retained, in order to reduce the programmatic risks of upgrading multiple systems simultaneously. As a result, the modern ATC systems of the 21st century are communicating much as they did in the 1970's.

The shortfalls of the current ERAM-to-client interfaces via the ECG include:

- Maintainability and supportability of antiquated communications technology
- Lack of NAS-level system resilience because of the inability to reconfigure network communications in the event of system or facility outages and contingency operations
- Operational inadequacy of the flight data because it is conveyed in the limited legacy formats of the FDAT and IDAT services; this includes flight data that supports new services such as Performance-based Navigation (PBN)-based routing, Wake Vortex Separation categorization, and controller flight data interaction needed for Trajectory-Based Operations

The legacy communications technology used by the ECG is based on antiquated Time-Division Multiplexing (TDM) serial interfaces, which are increasingly unsupportable in a communications industry dominated by switched network IP. The FAA is currently planning to phase out the TDM technology, by a target date of 2020, because the communications vendors may no longer support TDM/serial.

In addition, the formats of the data which are communicated to clients are still limited to the capabilities supported by the terminal clients in the 1970s. The Flight Data Input/Output (FDIO) devices located in the Air Traffic Control Towers (ATCTs) and Terminal Radar Approach Controls (TRACONs) still depend on paper flight strips to convey flight data to controllers and the filed flight plan data, including route of flight and aircraft equipage data. This information does not physically fit onto the paper strips, which are formatted for the en route system rather than specifically to the terminal environment. Full flight plan data requested from an FDIO keyboard is presented in a format which is difficult to use or modify. Flight data sent to the TRACON Standard Terminal Automation Replacement System (STARS) systems is still limited by the processing limitations of the legacy Automated Radar Terminal System (ARTS) systems, requiring encoding of complex flight data into single characters, with no ability for controllers to access full flight data or modify flight plans from ERAM in the STARS system.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$9,000,000 is required to complete the required acquisition milestones of IID and FID in 2016 and to initiate design and software development efforts that will modernize both the communication technology and flight data formats exchanged between ERAM and the Terminal and Oceanic ATC Automations systems.

What Benefits Will Be Provided To The American Public Through This Request?

The October 2014 fire at the Chicago (ZAU) ARTCC demonstrated the vulnerability of legacy TDM/serial network communications limiting ATC operations in the event of facility outage. While adjacent ARTCCs were able to assume airspace and most surveillance processing for ZAU, flight data communications with ZAU Air Traffic Control Towers (ATCTs) and TRACONs, including O'Hare Airport and Chicago TRACON, had to be conducted with verbal coordination. This program, in addition to the other benefits below, will create greater NAS resiliency in response to contingency operations.

Benefits of FIADIM include:

- Reduced probability of flight data outages between facilities due to single facility failures and increased agility during contingency operations, utilizing network reconfigure-ability of network IP resulting in flight efficiency and delay reduction for users and FAA cost avoidance
- Reduced FAA support costs of serial TDM communication hardware in end systems by migrating the interfaces to IP/Ethernet standards

- Extension of Trajectory-Based operations to terminal airspace through improved access to flight data information in ATCTs and TRACONs with resultant decreases in verbal coordination and increases in throughput/capacity utilization resulting in flight efficiency and delay reduction for users
- Reduced maintenance cost through platform elimination or consolidation, including ECG, FDIO-G, and Electronic Flight Strip Transfer System (EFSTS) systems, and FDIO platforms separate from STARS automation in TRACONs resulting in FAA cost savings

Detailed Justification for - 2C01 Aviation Surface Weather Observation System

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Aviation Surface Observing System
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Aviation Surface Weather Observation System (ASWON)	$10,000	$8,000	$8,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Weather Sensor Procurement	---	$500.0
b. Integration Contract	---	3,500.0
c. ASWON Software Upgrade	---	1,000.0
d. Construction, Site Preparation and Installation	---	2,000.0
e. Contractor Support	---	1,000.0
Total	Various	$8,000.0

For FY 2016, $8,000,000 is requested to continue the procurement of commercial-off-the-shelf (COTS) hardware required to upgrade/replace components of legacy FAA surface observation stations. An integration contractor will be funded to continue to produce upgrade kits for ASWON systems. Additionally, the funding will be used to continue the FAA's necessary software upgrades for these systems. Funds will be used for construction, site preparation, and installation activities. The remaining funding is required to fund contractors at FAA Headquarters that provide the necessary engineering support for this project.

What Is This Program And Why Is It Necessary?

Aviation Surface Weather Observation Network (ASWON) is a service portfolio composed of the following primary and backup weather observation systems deployed throughout the NAS:

- Automated Weather Observing System (AWOS)
- Automated Surface Observing System (ASOS)*
- Automated Weather Sensor System (AWSS)
- Stand Alone Weather Sensors (SAWS)
- Digital Altimeter Setting Indicator (DASI)
- Wind Equipment F-Series (WEF) Wind System

*ASOS is maintained by the NOAA National Weather Service (NWS) through an interagency agreement.

ASOS, AWOS and AWSS provide the primary weather observation at airports, while DASI, SAWS and WEF provide secondary weather parameter measurements for backup/augmentation purposes at staffed air traffic facilities. These systems provide wind speed and direction, temperature, dew point, barometric pressure, cloud height and amount, visibility and precipitation information for approximately 1,100 airports in the National Airspace System (NAS).

The ASWON technology refresh program will provide form/fit/function technology upgrades/replacements to five legacy ASWON systems (ASOS, AWOS, AWSS, DASI, F420) experiencing obsolescence, supportability, and maintainability issues. This sustainment effort will extend the service life of these systems and continue their role of providing required weather observations. The investment will result in a cost-avoidance of the continually increasing maintenance costs of these systems.

The following systems, agencies, and users depend on the data provided by ASWON:

- NOAA National Weather Service (NWS)
- Commercial Aviation, General Aviation, and the Flying Public
- Air Traffic Approach and Ground Controllers
- Surveillance Broadcast Services (SBS) - Flight Information Service Broadcast (FIS-B)
- Common Automated Radar Terminal System (ARTS) - ARTS IIIE
- Airport Surveillance Radar 9 (ASR-9) - Weather System Processor (WSP) for Windshear Detection
- Integrated Terminal Weather System (ITWS)
- Weather and Radar Processor (WARP)
- Corridor Integrated Weather System (CIWS)
- Automatic Terminal Information Service (ATIS)

The five systems in the ASWON portfolio require a technology refresh (or equivalent replacement in-kind) effort in order to continue meeting current operational requirements. No new functionality or requirements will be added by this technology refresh effort. No other FAA initiatives address the shortfalls addressed by the ASWON technology refresh program. ASWON technology refresh ensures that the following functions will continue to be met:

- Acquisition of surface weather information
- Surface weather observations used by aircraft operators
- A minimum of two altimeter setting indicators (ASI) at ATC facilities
- Backup wind and altimeter required to maintain Parts 121 and 135 operations

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$8,000,000 is required to continue execution of the technology refresh. The FAA second level engineering support group, Logistics Depot, and Maintenance personnel continue to struggle to find ways to support aging, unsupportable, and obsolete ASWON equipment. The required funding will initiate ASWON technology refresh implementation and will lead to a supportable and cost-effective ASWON, thus eliminating any risk of losing the essential services that ASWON provides to its numerous users.

What Benefits Will Be Provided To The American Public Through This Request?

ASWON Systems are deployed and operational at over 1,100 sites in the CONUS, Alaska, and Hawaii. NextGen programs such as ADS-B use ASWON weather stations in Alaska for use with their surveillance and broadcasting systems. Surface observations provided by ASWON are used continually by Air Traffic Control, Pilots, the general public and several Air Traffic Control Systems.

Detailed Justification for - 2C02 Future Flight Services Program (FFSP)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Future Flight Services Program (FFSP)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Future Flight Services Program (FFSP)	$3,000	$1,000	$3,000	+$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Future Flight Services Program	---	$3,000.0

For FY 2016, $3,000,000 is requested to develop a market survey, request a Proposal/Screening Information Request, and develop acquisition related documentation to achieve a Final Investment Decision (FID). The funding will also provide support for the successful development, implementation, and transition of existing FSS programs. It is anticipated that the new FFSP contract will be awarded in FY 2017.

What Is This Program And Why Is It Necessary?

Currently, a combination of entities and platforms provide Flight Services to the General Aviation (GA) community. These services include but are not limited to: flight planning, advisory, operations, and Search and Rescue (SAR) coordination. These services are provided within the Continental United States, Puerto Rico, Alaska, and Hawaii. Flight Services provide weather briefings and flight planning services to pilots, Visual Flight Rules (VFR) coordination, and orientation support to lost aircraft. Flight Services also help maintain continuous weather broadcasts on selected Navigational Aids (NAVAID), and issue Notices to Airman (NOTAM). General Aviation (GA) pilots may access flight service information directly through web portals, thus eliminating the need for pilots to talk to a flight service specialist.

FFSP will expand the web portion of flight services, and reduce or eliminate human delivery of flight services as much as possible. The timeframe associated with the transformation is dependent on the technologies responsible for enabling the new capabilities, and the availability of the interdependent programs to perform their essential functions. These interdependencies are as follows: Aeronautical Information Management (AIM) Segment 2, Automatic Dependent Surveillance-Broadcast (ADS-B), System Wide Information Management (SWIM), Common Support Services-Weather (CSS-Wx), National Voice System (NVS), Next Generation Very High Frequency Air/ground Communications System (NEXCOM) Segment 2, Time Based Flow Management (TBFM), Traffic Flow Modernization System (TFMS), and Terminal Flight Data Management (TFDM). Flight services will continue to be provided by government personnel in Alaska and by contractor services in the lower 48 states.

The primary objective of FFSP is to realign the Flight Services mission by modernizing services and delivery methodologies. This will be done by discontinuing obsolete services and activities as well as redundant activities provided by other FAA service organizations. FFSP will focus on aligning Core Safety Functions. Some of these functions will remain within Flight Services and FFSP while others will be integrated or reengineered into other service areas of the ATO.

The Core Safety Functions are:

- VFR search and rescue operations
- Emergency services to aircraft in distress
- Management of the NOTAM system
- Clearance relay
- Weather observation entry
- Pilot weather report (PIREP) entry
- Security related toSpecial Flight Rules Area (SFRA)/Air Defense Identification Zone (ADIZ)/Flight Restricted Zone (FRZ)
- Services provided to DoD

The Automated Flight Services Station (AFSS) contract that covers the CONUS currently ends in the last quarter of FY 2015. Presently, there is consideration to extend the AFSS contract to the last quarter of FY 2017.

There are two legacy DUATS contracts that allow pilots to access flight service information directly, both contracts end in March 2015. A new DUATS (DUATS II) contract award is expected in February 2015, and will provide continued delivery of these services until the new FFSP contract is awarded in FY 2017. When the new FFSP contact is awarded in FY 2017, it will include those services provided via the DUATS II contract.

FFSP will focus on defining the services to be performed in 2017 and beyond. These services are considered as Core Safety Functions and include Visual Flight Rules (VFR) search and rescue, management of the Notices to Airmen (NOTAM) system, and emergency services to aircraft in distress.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$3,000,000 is required to fund the community outreach, requirements development and related acquisition activities (business case and screening information request (SIR) development) required to ensure the new FFSP contract is awarded in FY 2017. This contract will ensure attainment of goals, cost reduction, and the successful transition of the DUATS II and FFSP extensions.

What Benefits Will Be Provided To The American Public Through This Request?

The American Public, as well as the GA community, will benefit by the elimination/reduction of services which are redundant, obsolete and/or do not align with Flight Services Core Safety Functions.

FFSP will realize cost savings and achieve efficiencies in the delivery of flight services by modernizing services and delivery methodologies. FFSP will discontinue obsolete services and activities as well as redundant activities provided by other FAA service organizations. FFSP will discontinue all services not determined to be Core Safety Functions and incorporate selected Core Safety Functions into other service areas of the ATO as appropriate. FFSP will focus on innovative, efficient, and cost effective delivery of Core Safety Functions. Some of these functions, such as clearance relay and weather observation entry, may be reengineered to gain further efficiencies and provide additional benefits.

Detailed Justification for - 2C03 Alaska Flight Service Facility Modernization (AFSFM)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Alaska Flight Service Facility Modernization (AFSFM)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Alaska Flight Service Facility Modernization (AFSFM)	$1,500	$2,800	$2,650	-$150

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Alaska Flight Service Facility Modernization (AFSFM)	---	$2,000.0
B. In-Service Engineering	---	650.0
Total	Various	$2,650.0

The FY 2016 $2,000,000 is requested to complete roof replacement at the Fairbanks Automated Flight Service Station (AFSS), upgrade the Heating, Ventilation, and Air Conditioning (HVAC) system at the Juneau Flight Service Station (FSS) and refurbish the equipment rooms, break rooms, pilot briefing rooms, and rest rooms at the Kenai FSS, Fairbanks FSS, and Juneau FSS facilities. Also requested is $650,000 for in service engineering activites.

What Is This Program And Why Is It Necessary?

The Alaska Flight Service Facility Modernization (AFSFM) program modernizes or replaces the 17 Flight Service facilities in Alaska to ensure the security and sustainment of Flight Services, and develop the infrastructure for continuity of operations. Over 33 percent of the Alaska Flight Service facilities were constructed in the 1970's and require extensive renovations to meet current building codes, fire life safety, Architectural Barriers Act Accessibility Standard (ABAAS) and electrical standards. Specifically, Flight Service buildings will be updated to meet Occupational Safety and Health Administration (OSHA) and Americans with Disabilities Act (ADA) requirements, and the electrical and safety systems will be upgraded to ensure they meet standards. The program benefits FAA flight service specialists and technical operations personnel by providing a safe and secure environment for conduct of flight service operations.

The program corrects deficiencies such as substandard lightning, grounding and bonding protection, electrical systems, and/or heating and cooling systems that could disrupt flight service operations by reducing reliability of flight service automation systems.

The AFSFM program conducts on-going analysis of Alaskan Flight Service facilities to identify and prioritize actions required to maintain and sustain each facility. The projects vary each fiscal year depending on priorities and available funding.

In coordination with Alaska Technical Operations and Western Service Center personnel, individual Site project plans and schedules are developed to maintain and sustain Flight Service facilities.

In addition, many of the facilities suffer from environmental, electrical, structural and safety deficiencies and generally do not meet the American's with Disabilities Act accessibility requirements, as defined and imposed by the Uniform Federal Accessibility Standards and the ABAAS. These conditions endanger FAA personnel health and safety and increase the risk of service outages.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The requested funding supports completion of the prioritized projects listed above and provides the expected benefits of this program identified above (i.e. providing a safe and secure working environment for FAA personnel; disruption of flight service operations by reducing reliability of flight service automation systems due to environmental, power or electrical deficiencies).

What Benefits Will Be Provided To The American Public Through This Request?

This program efficiently uses funds to correct deficiencies in older FS facilities to bring them up to date with current building and safety codes. The upgrades provide a reliable infrastructure, safe and secure working environment and reduce the risks of service disruptions for pilots who rely on flight service products. The FAA identifies deficiencies and schedules projects at least two years in advance, which allows opportunities to reduce costs through efficient use of engineering and technical resources. Additionally, this program allows the FAA to avoid hefty expenses and costs associated with unscheduled and emergency upgrades to flight service facilities to resolve critical safety deficiencies. Effectively managing this program to ensure costs for upgrades are within project scope can provide cost savings to the American public.

Detailed Justification for - 2C04 Weather Camera Program

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Weather Camera Program
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Weather Camera Program	$1,200	$200	$1,000	+$800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Replace Aging Camera System Server	1	$1,000.0

For FY 2016, $1,000,000 is requested to expand the Camera Core System Server equipment hardware and software, to establish Disaster Recovery (DR) capability. Additionally, the legacy camera systems that were installed prior to 2007 are aged, outdated, and beginning to fail at many locations. The Weather Camera Program Office will work to replace legacy and failing cameras and routers at five of the legacy camera sites and will work to refurbish or relocate camera facilities at two of the mountain passes.

The Weather Camera Program Office continues to complete, update, and modernize its systems and services. Ongoing efforts with available funding include work to complete the following system needs:

- Upgrade five legacy camera sites
- Upgrade the website to include 3rd Party (non FAA owned) camera images and to add new data and functional capabilities
- Develop and implement a Disaster Recovery (DR) capability

What Is This Program And Why Is It Necessary?

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.

The primary goal of the FAA Weather Camera Program is to improve aviation safety and efficiencies by providing current visual weather information in the form of near real-time video camera images to aviation users in Alaska. The camera images are designated as an FAA supplementary weather product used for enhanced situational awareness and the images are made available free on the public website http://avcams.faa.gov. The camera images provide pilots, dispatchers and Flight Service Station Specialists with up-to-date weather conditions at airports, mountain passes, and strategic Visual Flight Rules (VFR) locations. This new FAA service enables pilots to obtain better informed decisions about whether or not it is safe to fly before becoming airborne and during a given flight via en route briefings. When combined with other available weather information products, such as Meteorological Aerodrome Reports (METARs), weather camera images become a powerful "go or no-go" aeronautical flight decision tool. This new FAA data service is facilitating measurable reductions in weather-related aviation accidents and fatalities in Alaska and is providing measurable reductions in weather-related flight interruptions and aviation fuel consumptions. The weather cameras in Alaska are also very beneficial to the National Weather Service (NWS) Forecast Offices. The NWS uses the images from every camera site in Alaska to assist in formulating current weather reports and forecasts.

DOT Strategic Goal - Safety

- Reduction in transportation related injuries and fatalities.

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

Statistics indicate that weather cameras are contributing to the actual reduction in aircraft accidents in Alaska at a rate that is better than targeted. Funding the camera facility upgrades and disaster recovery system is necessary in order to continue camera services and operations in the case of total system loss.

What Benefits Will Be Provided To The American Public Through This Request?

The Weather Camera Program and its service continue to facilitate measurable reductions in weather-related aviation accidents and fatalities in Alaska and provide measurable reductions in weather-related flight interruptions and aviation fuel consumptions.

Weather cameras contribute to the FAA's aviation safety and efficiency strategic goals and to the American Public by reducing a subset of Alaska accidents per 100,000 operations. The following table depicts the program's OMB 300 baseline target metrics and is compared to the actual results.

Year	Goal	Actual
2007	0.28 accidents per 100,000 operations (Baseline)	
2008	0.24 accidents per 100,000 operations	0.21 accidents per 100,000 operations
2009	0.22 accidents per 100,000 operations	0.21 accidents per 100,000 operations
2010	0.20 accidents per 100,000 operations	0.17 accidents per 100,000 operations
2011	0.18 accidents per 100,000 operations	0.13 accidents per 100,000 operations
2012	0.17 accidents per 100,000 operations	0.17 accidents per 100,000 operations
2013	0.16 accidents per 100,000 operations	0.13 accidents per 100,000 operations
2014	0.15 accidents per 100,000 operations	Results not yet available.

Detailed Justification for - 2D01 VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)

What Is The Request And What Funds Are Curent Spent On The Program?

FY 2016 – VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME) ($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$8,300	$8,300	$4,500	-$3,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. VOR with VORTAC		
a. Procure VOR Dopplerization Equipment	---	$500.0
b. Complete On-Going Project to Dopplerize a Conventional VOR	---	2,000.0
Total	Various	$2,500.0
B. VOR Minimum Operating Network (MON) Implementation Program	---	$2,000.0

A. VOR with VORTAC

For FY 2016, $2,500,000 is requested for engineering and technical services support, procurement of 10 VOR Doppler Antenna Kits, and funding to dopplerize one on-going DVOR project.

B. VOR MON

For FY 2016, $2,000,000 is requested to continue collaborative efforts to complete the investment analysis process and manage the implementation of the VOR Minimum Operational Network (MON).

What Is This Program And Why Is It Necessary?

A. VOR with VORTAC

This program replaces, relocates, or converts VOR and VORTAC facilities to improve NAS efficiency and capacity. The VOR family includes VOR/DME (combination of VOR and Distance Measuring Equipment), and VORTAC (combination VOR and TACAN (Tactical Air Navigation)). The systems provide navigational guidance for civilian and military aircraft in both the en route and terminal areas. The program procures and installs Doppler VOR (DVOR) electronic and hardware antenna kits to dopplerize a conventional VOR.

Dopplerizing a VOR eliminates most restrictions. There are numerous VORs that have restrictions due to encroachment of the VOR sighting criteria caused by natural and manmade obstacles. These restrictions are having a serious impact on both en-route and arrival and departure procedures. The main natural encroachment comes from the growth of vegetation, mostly trees that are located outside the sighting restriction area but are now tall enough to cause electromagnetic interference.

There are many manmade obstacles that cause the same electromagnetic interference. These problems arise from the growth of nearby towns/cities and the construction of tall buildings, new industrial parks with their high concentration of metal buildings, transmission lines, radio/TV/cell towers and most recently, wind farms.

Decisions concerning the VOR Minimum Operational Network (MON) will determine, whether VOR or TACAN systems will remain in service or be shut down. If they are retained, they will serve as a backup to satellite navigation and continue to define VOR routes and procedures for legacy users. Until that transition is complete, VORTACs must remain in service and may be relocated, technologically refreshed, or replaced. Currently 60 percent of the VORTAC systems are beyond their estimated service life. It is projected that within 10 - 15 years all existing VORTAC systems will be beyond their estimated service life.

B. VOR MON

The VOR Minimum Operational Network (MON) implementation program will prepare the analysis, update/create procedures, flight check, relocate any services/equipment collocated with the VORs, develop documentation and implementation plan for downsizing the VOR network to the minimum required as a backup navigation system for VOR equipped aircraft. This program will transition the legacy network of approximately 967 VORs to a MON of approximately 650 VORs with a target date of 2025. Downsizing the VOR network to the minimum required for a backup navigation system provides an opportunity for cost avoidance and savings and supports the right sizing of the NAS Initiative. It would allow aircraft to navigate and/or land safely under Instrument Flight Rules (IFR) in the event of an unplanned Global Positioning System (GPS) localized outage; however, the planned backup capability will be less robust than the current VOR network.

This program is necessary as the FAA is transitioning from current VHF Omni-directional Range (VOR) based route structure to Performance Based Navigation (PBN), which uses Area Navigation (RNAV) and Required Navigation Performance (RNP). The VOR system does not support RNAV and RNP navigation.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. VOR with VORTAC

The VOR/DME program reduces congestion by making air traffic flow more efficiently over land and sea. The replacement, relocation, conversion, or modification of VOR facilities (including VOR/DME) will improve VOR performance and enable the FAA to maintain a highly reliable, safe, and efficient ground based VOR and VOR/DME system until the use of Global Positioning System is widespread. The improved availability of this program provides enhanced aircraft routing and increased airport capacity.

$2,500,000 is required for procurement of 10 VOR/DME VOR Doppler Antenna Kits and completion of a project to dopplerize a conventional VOR.

B. VOR MON

The $2,000,000 is required in order to continue planning, coordination of the safety and engineering analysis. The sustainment cost for VORs continues to increase as the systems continue to age and spare parts become harder or impossible to obtain.

What Benefits Will Be Provided To The American Public Through This Request?

A. VOR with VORTAC

VOR/VORTAC equipment has been deployed and maintained in the NAS for more than 50 years. VOR/VORTAC equipment is the primary source of navigational aid for commercial, private pilots, and military flying within the NAS and also for worldwide aviation.

Converting these flight restricted VOR sites to a Doppler VOR configuration mitigates operational system changes and enhances system performance, therefore ensuring system availability, service reliability and increased airport capacity. When VOR signal transmission deterioration occurs due to site encroachment such as wind farms, tree growth, construction of bridges, buildings, etc., it is necessary to restore these facilities to their full service volume.

B. VOR MON

The FAA is transitioning the NAS to more efficient PBN routes and procedures, so fewer VORs are needed. VORs do not enable Performance Based Navigation (PBN) and few aircraft are actually using the VORs, electing to use their PBN equipment to fly the conventional Victor Airways and Jet Routes.

The benefits of reducing the VOR facilities include opportunities for reduced operations and maintenance cost for facilities, instrument flight procedures, flight inspection, training, and opportunities to avoid recapitalization costs.

This program will result in a more optimized NAS, where the more efficient PBN operations will be primary and a Minimum Operational Network (MON) of VORs will be retained to serve as a back-up in the event of a Global Navigation Satellite System (GNSS) outage or interference.

Detailed Justification for - 2D02 Instrument Landing System (ILS)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Instrument Landing System (ILS)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Instrument Landing System (ILS)	$7,000	$7,000	$7,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Equipment Procurement	---	$2,415.0
b. Complete Two ILS Replacements/Begin Three ILS Replacements	---	4,375.0
c. Logistics/Engineering Support Service	---	210.0
Total	Various	$7,000.0

For FY 2016, $7,000,000 is requested for engineering and technical services support; procurement of five ILS systems, and ancillary equipment, attain service availability for two ILS projects, and initiate three sustain ILS replacement projects.

What Is This Program And Why Is It Necessary?

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 to give lateral guidance to the runway centerline, a glide slope to give vertical guidance and marker beacons. 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 aircraft 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 (DH)) and how far the pilot can see the runway (runway visual range (RVR)).

- Category I: DH 200 feet and 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

The program is necessary, because ILS systems continue to be the primary method used to meet immediate and critical precision approach requirements for the users. The candidate sites must be able to achieve minimums of 200 feet height above touchdown and ½ mile of visibility (200 - ½). Candidate sites with higher minimums are considered on a case-by-case basis. ILS allows benefits to be realized, in addition to meeting the immediate and critical precision approach needs, prior to precision approach services being fully implemented via satellite navigation systems such as WAAS.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

There are approximately 1,200 runway ends that are equipped with an ILS in the U.S. Of these, approximately 125 are more than 25 years old. ILS' that have exceeded their expected service life may suffer from original manufacturers no longer providing 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.

$7,000,000 is required for engineering and technical services support; procurement of five ILS systems, and ancillary equipment, attain service availability for two ILS projects, and initiate three sustain ILS replacement projects.

What Benefits Will Be Provided To The American Public Through This Request?

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, thereby, 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, which reduces the outage rate and the maintenance man-hours.

Detailed Justification for - 2D03 Wide Area Augmentation System (WAAS) for GPS

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Wide Area Augmentation System (WAAS) for GPS
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Wide Area Augmentation System (WAAS) for GPS	$57,800*	$72,100*	$80,600	+$8,500

*FY 2014 and FY 2015 actuals have been adjusted for comparability by reducing 2D03 program costs by the satellite lease costs that have been moved to Activity 6.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Wide Area Augmentation System (WAAS)		
a. Technology Refresh	---	$50,360.0
b. NAS Implementation	---	8,690.0
c. Technology Evolution	---	4,190.0
d. Technical Engineering Program Support	---	17,360.0
Total	Various	$80,600.0

For FY 2016, $80,600,000 is requested for the Wide Area Augmentation System (WAAS) to complete the following:

a. Technology Refresh, $50,360,000

- Continue development of Geostationary (GEO) satellite payload for the 6th GEO and complete integration of Signal Generation Subsystem (SGS) and Radio Frequency Unit (RFU) into a GEO Uplink Subsystem (GUS).
- Initiate integration of the GUS pair with the on-orbit GSP for the 5th GEO. WAAS requires a minimum of three GEO satellites to meet performance requirements. Sustainment of three GEOs requires acquisition of replacement services to include development of a GEO satellite payload and all supporting ground infrastructure.
- WAAS Telecommunications Subsystem (TCS) equipment deployment will be completed.
- The Signal Generator Subsystem (SGS) fielding and deployment will be completed at the 5th GEO GUS sites.
- WAAS processors (software assured to RTCA-DO-178B Level D certified) will be replaced along with upgrading to a current and supportable Operating System and compiler. These changes are necessary as the current processors, Operating System (OS) and compiler are at the end of their support life.
- The next WAAS reference receiver (G-III) will be deployed into WAAS as a functional replacement for the current reference receiver.
- Final production run of new Safety Computers will be completed and will be used to replace the existing Safety Computers that are no longer procurable or repairable.

b. NAS Implementation, $8,690,000 – Supports the following activities: procedure feasibility studies, procedure design, procedure development, flight inspection, and surveys for 120 WAAS procedures. In addition, funds will be used for survey validation, data collection by operators, benefits analysis, avionics integration, and development of WAAS-specific operations within the NAS with a focus on Airport de-confliction and reduced delays in the terminal area operations.

c. Technology Evolution, $4,190,000

- Conduct WAAS threat model assessments for new L5 signal.
- Evaluate system effects of ionospheric storms to WAAS performance.
- Perform hazardously misleading Information (HMI) analyses required for WAAS modifications.
- Evaluate the impacts of Global Navigation Satellite System (GNSS) modernization on future WAAS architectures, and support international coordination to ensure Satellite Based Augmentation Systems (SBAS) interoperability.
- Research future capabilities to extend WAAS and GNSS supported operations with a focus on a global Localizer Performance with Vertical Guidance (LPV) 200 capability.
- Support development of a future SBAS Minimum Operational Performance Standard (MOPS) applicable to a Dual-Frequency Multiple Constellation (DFMC) SBAS.
- Conduct development and validation of standards for Advanced Receiver Autonomous Integrity Monitoring (ARAIM).

d. Technical Engineering/Program Support, $17,360,000

- Provide systems, software, safety, reliability-maintainability-availability (RMA), test and evaluation, human factors, logistics and hardware engineering support.
- Provide specialty engineering support for Hazardously Misleading Information (HMI) analysis efforts, Radio Frequency Interference (RFI) investigation and mitigation, system security assessments, and system performance assessments.
- Provide program management support in areas of finance; quality assurance (QA); Earned Value Management (EVM); project planning, execution, and monitoring.

What Is This Program And Why Is It Necessary?

WAAS is one of four operational SBASs in the world and supports the FAA mission need of providing a satellite navigation capability that provides both horizontal and vertical navigation for precision approach-like operations for all WAAS equipped users at all qualified runway ends in the National Airspace System (NAS). Qualification of an airport/runway is based on FAA advisory circular 150/5300-13A, Table 3-4, 3-5 and Terminal Instrument Procedures Standards (TERPS) 8260.58. WAAS provides both vertical and horizontal guidance during all phases of a flight, regardless of weather conditions, without installing expensive legacy navigation hardware at each runway. WAAS consists of a network of 38 FAA ground reference stations distributed across the continental United States and Alaska that monitor the Global Positioning System (GPS) satellite signals. 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 three 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 across the entire NAS and precision approach take off and landings at 95 percent of the qualifying airports in the 48 contiguous states.

WAAS is not mandatory for ADS-B operations but will allow for ADS-B enhanced operations. WAAS has been used as the ADS-B on-board position sensor in all demonstrations to date, because it meets the requirements to achieve levels of accuracy, integrity, and availability required by an ADS-B position sensor for all enhanced surveillance operations and will enable ADS-B to fully implement all capabilities (reduced separation). 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. WAAS accuracy, integrity and availability have led to the integration of a WAAS capability into most commercial GPS chips and receivers supporting numerous applications (marine, automobile, agriculture, surveying and recreation). Other investments that WAAS interfaces with include Continuously Operating Reference Stations (CORS) operated by the National Geodetic Survey under the National Oceanic and Atmospheric Agency and Mobile E911.

As one of four operational SBASs, WAAS collaborates with both industry and international representatives through participation in the Institute of Navigation (ION), International Civil Aviation Organization (ICAO), RTCA (joint government-industry collaborative body for aviation standards development), Asian Pacific Economic Cooperative (APEC), Indian Space Research Organization (ISRO), Interoperability Working Group (IWG), International Committee on GNSS (ICG), Airports Authority of India (AAI), Japan Civil Aviation Bureau (JCAB), as well as Transport Canada, NAV CANADA, and Servicios a la Navegación en el Espacio Aéreo Mexicano SENEAM, assuring that all SBAS are interoperable and thus support global seamless operations.

WAAS Strategy to Contribute to NextGen, Air Traffic Operations domain:

In Alaska, WAAS enables users to operate under Instrument Flight Rules (IFR) on routes currently classified as uncontrolled airspace. The WAAS enabled routes improve operator efficiency, access and safety, while incrementally reducing dependency on Ground Based navigation, which supports the Separation Management Portfolio and Flexibility in the Terminal Environment.

WAAS will support the near-term demonstrations with vertical flight aircraft, business/regional jets, and air carriers with airspace redesign and WAAS LPV approaches. The business/regional jet portion of these projects will be to develop RNAV/RNP routes from an en route environment using Optimized Profile Descents (OPDs), and WAAS LPV final approach segments that avoid environmentally sensitive areas.

The FAA is required by law to establish, operate, and maintain navigation capability for all phases of flight. Historically, the FAA has invested in ground-based navigation equipment, such as Instrument Landing Systems (ILS), to provide this navigational capability. Many of the aircraft flying in the national airspace system (NAS) lacked a seamless navigation capability, and many runways in the NAS lacked navigation aids that delivered stable vertical guidance in all weather conditions.

FAA determined that WAAS satellite-based GPS navigation capability provided the most efficient and cost-effective means of providing the service moving forward. It leverages modern technology advancements, and NextGen capabilities will build off this capability. A minimum operating network of ground based navigation aids will be retained. WAAS will provide access and LPV procedures at all runway ends allowing for a reduction in Instrument Landing Systems (ILS) and other ground-based navigation aids.

By increasing procedures and expanding WAAS coverage, users will equip with WAAS receivers and increase the total benefit realized by WAAS. The 2009 WAAS Business Case Analysis estimated that WAAS will reach over $300 million in safety benefits and $2.7 billion in efficiency benefits over the program life-cycle. In 2016, the FAA will make a decision to begin the drawdown of Category I ILS. Decisions on the removal of individual ILSs will be directly tied to WAAS LPV availability.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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

The FAA's transition to Performance Based Navigation is heavily dependent on the WAAS program to be fully implemented and sustained. WAAS is a key enabler for NextGen programs (ADS-B, RNAV/Required Navigation Performance (RNP), etc.) and supports the Performance Based Navigation (PBN) and Metroplex Portfolio.

In FY 2016 $80,600,000 is required to execute planned tasks. WAAS will execute the approved baseline, WAAS Phase IV Dual Frequency Operations. The first Segment of Phase IV implements changes to the WAAS necessary to support the development and launch of Dual Frequency Operations and the sustainment and refresh of WAAS reference receivers and processors. In addition, critical development activities for the next two GEO satellites will continue as the current three GEO satellites in use by WAAS are nearing their end of service life and need to be replaced.

What Benefits Will Be Provided To The American Public Through This Request?

In terminal area and approach operations, a Flight Safety Foundation Report found that there is nearly an eight fold reduction in approach accident rates (53 per million for non-precision approaches vs. seven per million for precision approaches) when precision vs. non-precision approaches were used. Specifically, 141 accidents could be prevented over a 20 year period and save over 250 lives when using WAAS for vertically guided approaches at airports where stable vertical guidance is not available or not used today. WAAS provides vertical and horizontal guidance with an aviation safety component enabling pilots to make stable, vertically guided approaches to all qualified runway ends in the continental United States and most of Alaska. Presently precision vertically guided approaches using CAT I ILS are only available at 1,283 of the nation's 19,000 runway ends.

Cargo aircraft have shown increased cargo capacity, reduced fuel loads, reduced divert rates (inability to land at planned destinations), and operational cost savings of approximately $200,000 per year. Regional airlines have shown fuel and time savings by utilizing satellite-based waypoints that facilitate straight-line, shortest-distance routes as compared to legacy (zigzag) routes that fly a series of straight line route segments connecting ground based navigation aids. Commuter airlines have demonstrated cost avoidances attributable to lower minimum descent altitudes at airports through the installation of LPV approach procedures. This savings, along with very short return on investment timelines, has translated into commitments to fully equip airline fleets with WAAS avionics. Business jet operators in FAA Government Industry Partnerships (GIPs) have been able to decrease in-flight conflicts with major airport traffic while on approach at feeder airports. This has allowed increased frequency of operations and reduction of in-flight and ground clearance delays.

EMS helicopter operators have been able to create IFR LPV approaches to medical center helipads, eliminating the requirement to land at distant airports necessitating ground transportation and consequent delays in patient care. WAAS-based helicopter routes have allowed elimination of Air Traffic Control delays by assuring deconfliction with airline traffic at major metroplex airports. WAAS based helicopter routes and LPV approaches have been developed that reduce ground delays for executive transport in extremely complex and congested airspace such as the New York metropolitan area, allowing significant increases in flight operations during poor visibility. In 2010, an independent Post Implementation Review (PIR) found that WAAS was successfully delivering the expected performance and benefits while maintaining the program cost and schedule baseline.

WAAS performance has met or exceeded its performance requirements since commissioning in 2003, and is documented quarterly. Real time data and plots, daily plots, performance videos and performance analysis is available for WAAS at the following website: http://www.nstb.tc.faa.gov/.

Detailed Justification for - **2D04 Runway Visual Range (RVR) and Enhanced Low Visibility Operations (ELVO) Program**

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Runway Visual Range (RVR) and Enhanced Low Visibility Operations (ELVO) Program
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Runway Visual Range (RVR) and Enhanced Low Visibility Operations (ELVO) Program	$6,000	$7,500	$6,000	-$1,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Runway Visual Range (RVR)		
a. Procurement of RVR Systems and Ancillary Equipment	---	$1,750.0
b. Complete/Initiate Establish/Sustain RVR Projects	---	1,750.0
c. Logistics/Engineering Support Services	---	500.0
Total	Various	$4,000.0
B. Enhanced Low Visibility Operation (ELVO)		
a. Procurement of NavAids for ELVO Phase II Projects	---	$1,200.0
b. Complete/Initiate Implementation Activities for ELVO Phase II Projects	---	800.0
Total	Various	$2,000.0

A. RVR

For FY 2016, $4,000,000 is requested for engineering and technical services/support, procurement of 14 RVR systems, and completion of 14 RVR replacement projects.

B. ELVO Phase II

For FY 2016, $2,000,000 is requested to complete/initiate acquisition and implementation activities to increase the operating capability at a minimum of five ELVO locations.

What Is This Program And Why Is It Necessary?

A. RVR

This program replaces older RVR equipment with Personal-Computer (PC) based RVR equipment. The RVR provides air traffic controllers and pilots with vital 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. Consequently, there is an increasing likelihood of loss of service due to life-cycle issues associated with the older RVR systems currently in the

National Airspace System (NAS). Furthermore, some of 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 PC based 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.

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 them during departure or landing.

This program is required per the Code of Federal Regulations §91.175, Takeoff and Landing under Instrument Flight Rules. This program allows airports to conduct takeoff and landing operations during conditions of low visibility.

B. ELVO Phase II

The Enhanced Low Visibility Operations (ELVO) Program Phase II builds on the success of Phase I. Phase I was an initiative by Flight Standards Operations that put into place several additional flight services with lower RVR minimums for approach and departure. These services include lower departure minimums to as low as 500 feet (ft) down from 1,600 ft and approach services including the following:

- Category (CAT) I approach with a 200 ft Decision Height (DH) but RVR minimums of 1,800 ft from 2,400 ft for Standard CAT I
- A new service of Special Authorization (SA) CAT I with a 150 ft DH and 1,400 ft RVR minimums
- SA CAT II with the same 100 ft DH and 1,200 ft RVR as Standard CAT II but with far less lighting requirements

The difference in lighting requirements makes ELVO Phase II a very cost effective way to increase services to the CAT II level of service without the expense of Standard CAT II investments. Phase I put these services into place for runway ends that did not require any infrastructure investment; Phase II identifies certain locations that could also receive the benefit of these services yet requires some infrastructure investment.

There is additional need for CAT II level of service within the NAS. Though SA CAT II is at the same minimums as Standard CAT II service, there is a large cost savings since the overall lighting requirements are less. SA CAT II has overall life-cycle cost savings of $10 - 15 million over Standard CAT II since only a Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) is required vice the High-Intensity ALS with Sequenced Flashers (ALSF-2) required by Standard CAT II. The MALSR is less of an initial investment and maintenance and operational costs are also less. Additionally, SA CAT II has less lighting requirements overall since no Centerline lights or Touchdown lights are required.

Part of the need for additional service to the CAT II level is caused by Single-Thread airports. A single-thread airport is usually one of the hundred busiest, and it has only one Standard CAT II/CAT III capable runway end. If some event occurs, rendering that runway end out of service, then the entire airport is left with downgraded capability. The FAA's Continuity of Service Order stipulates that if an Instrument Landing

System (ILS) experiences too many failures, it must be taken out of service for a minimum of six weeks rendering an area's major airport only capable of downgraded services. ELVO Phase II addresses this by providing such an airport additional runway capability cost-effectively.

Currently, NAS users must select alternate airport sites that are capable of handling that aircraft. For the larger air carriers, these sites are often quite far away geographically from the primary landing location. ELVO allows these alternate sites to be closer to the primary. The aircraft then requires less fuel for dispatch, flies more efficiently, and reduces the carbon footprint for flight operations.

Further, the lower RVR minimums for departures have increased NAS efficiency. If low visibility, often caused by fog, occurs in the morning delaying the first flights out, the rest of the day's schedule is impacted. Getting that first flight to depart is crucial for on time schedule throughout the rest of the day.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. RVR

$4,000,000 is required for the procurement of 14 RVR systems; the engineering, technical services/support, and completion of 14 RVR replacement projects.

B. ELVO Phase II

$2,000,000 is required for ELVO Phase II to address the shortfalls for sites requiring RVR 1800, SA CAT I, and/or SA CAT II or lower departure minimums. ELVO Phase II sites address those sites that require infrastructure investment, and the operational benefits accrue immediately upon completion of this work.

What Benefits Will Be Provided To The American Public Through This Request?

A. RVR

The Federal Aviation Administration (FAA) has been deploying RVR equipment for more than 40 years. The RVR has proven itself as an extremely useful aid for controllers and pilots flying within the NAS, primarily in low visibility conditions. 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.

An additional benefit is the reduction or elimination of fatalities and costs associated with aircraft accidents involving 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.

B. ELVO Phase II

ELVO Phase I is currently operational within the NAS, and there are numerous examples of saved flight operations that are attributable to those efforts. Additionally, post-implementation analysis has proven these operational benefits accruing at several sites, exceeding the projected benefits presented while seeking funding. The return on investment is often within one year. Specific benefits include:

- Increased number of arrivals/departures during low visibility conditions
- Decreased number of flight delays, cancellations, and/or diversions
- Increased flexibility in the terminal environment, with potential decreased congestion and better traffic flow

- Increased ability to utilize closer and more optimally located alternate airports, leading to less fuel requirements for dispatch
- Increased capacity for airlines to schedule flights in marginal weather conditions (since both the primary and alternate routes must be approved within the flight plan)
- Natural incentives to industry to modernize onboard equipment with advanced avionics such as the Head Up Display (HUD)

Detailed Justification for - 2D05 Approach Lighting System Improvement Program (ALSIP)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Approach Lighting System Improvement Program (ALSIP)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Approach Lighting System Improvement Program (ALSIP)	$3,500	$3,000	$3,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Procurement MALSR Systems	---	$1,954.0
b. Installation of One MALSR	---	950.0
c. Logistics/Engineering Support Service	---	96.0
Total	Various	$3,000.0

For FY 2016, $3,000,000 is requested for engineering and technical services/support; procurement of approximately four Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) systems; and to replace a MALSR with Runway Alignment Indicator Lights (RAILs) at one location.

What Is This Program And Why Is It Necessary?

The Approach Lighting System Improvement Program (ALSIP) upgrades approach lighting systems built before 1975. It upgrades the equipment to current standards and reduces the potential severity of take-off and landing accidents by replacing rigid structures with lightweight and low-impact resistant structures that collapse or break apart upon impact. The entire approach lighting system is replaced when rigid structures are replaced. The High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) provides visual information on whether the pilot is aligned with the runway centerline, the aircraft's height above the runway plane, roll guidance, and horizontal reference for Category II and III Precision Approaches. The Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) provides visual information on runway alignment, height perception, roll guidance, horizontal references for Category I Precision, and Special Authorization Category II Approaches.

The program is necessary for the following reasons:

Improved Safety: 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 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.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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

The $3,000,000 is required for engineering and technical services/support; procurement of approximately four MALSR systems and ancillary equipment; replacement of a MALSR at one location. If the program were funded at a lower level the Navigation Program Group would reduce the number of MALSR systems procured and/or reduce the amount of funding provided for the installation of one planned MALSR replacement project.

A reduction in funding would reduce the number of MALSR systems procured.

What Benefits Will Be Provided To The American Public Through This Request?

This program reduces fatality incidents and costs associated with aircraft accidents involving rigid approach lighting structures through the use of low-impact-resistant structures. 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.

Detailed Justification for - 2D06 Distance Measuring Equipment (DME)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Distance Measuring Equipment (DME)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Distance Measuring Equipment (DME)	$4,000	$3,000	$3,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Distance Measuring Equipment (DME) Procurement	---	$1,175.0
b. Complete and Initiate Establish/Replacement DME Projects	---	1,200.0
c. Logistics/Engineering Support Services	---	625.0
Total	Various	$3,000.0

For FY 2016, $3,000,000 is requested for engineering and technical services/support, procuring 25 DME systems, and attaining service availability for 25 establish/sustainment DME projects.

What Is This Program And Why Is It Necessary?

DME is a radio navigation aid that is used by pilots to determine the aircraft's slant distance from the DME location. The program is procuring state-of-the-art DME systems to support Commercial Aviation Safety Team (CAST) requirements, renovation of DMEs that have exceeded their 20 year service life expectancy, replacement of ILS middle markers, critical new DME requirements, and Require Navigation Performance (RNP) requirements.

The current antiquated DME network will not meet the projected 2025 requirements. Without replacement of the current DME systems the network will be unsustainable. The unavailability of a DME network will severely impact general aviation's capability to navigate, commercial aviation FMS performance, airport capacity due to the non-availability of CAT II/III ILS approaches and safety of the flying public in the NAS. Foreign carriers operations in the NAS will also be severely impacted. Delaying the upgrade of the DME network will increase future replacement costs and will prevent realization of the projected cost savings from future NAS improvements.

The program requires the new DME design to incorporate enhanced local and remote diagnostics and repair capability utilizing proven industry best practices and design. While the design of the new DME is more complicated, it has been designed with human engineering factor considerations for ease of troubleshooting and replacement of Line Replaceable Units (LRU) as well as system status indication, high reliability design considerations, ease of future improvements and upgrades, and a 150 percent increase in aircraft interrogation capability. The new system will improve reliability by 300 percent and reduce down time and maintenance cost.

DMEs are replacing ILS marker beacons at existing and newly established Category I ILS locations thus eliminating the need for expensive land lease outside airport property.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The $3,000,000 is required for engineering and technical services/support, procuring 25 DME systems, and attaining availability for 25 establish/sustainment DME projects. The program is needed because in order to maintain the availability of service of these critical systems, the FAA must replace and/or upgrade electronic systems that have reached the end of their lifecycle. This will avoid unacceptable disruptions to airport operations during low visibility conditions. In addition, these benefits will maintain the current level of safety and airport capacity.

What Benefits Will Be Provided To The American Public Through This Request?

The DME program supports airport capacity. Each year the program procures and replaces obsolete DME systems with state-of-the-art DME. This state-of-the-art DME can handle more aircraft simultaneously than the older obsolete DME systems in the NAS. Additionally, the state-of-the-art DME availability exceeds the older obsolete DME systems. Implementation of this state-of-the-art DME ensures reliable, predictable and cost-effective air navigation thus contributing to airport capacity.

Detailed Justification for - 2D07 Visual Navaids – Establish/Expand

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Visual Navaids – Establish/Expand
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Visual Navaids – Establish/Expand	$2,500	$2,000	$2,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Procurement of Precision Approach Path Indicator (PAPI) Equipment and Ancillary Equipment	---	$660.0
b. Complete PAPI Establish Project	---	1,050.0
c. Logistics/Engineering Support Service	---	290.0
Total	Various	$2,000.0

For FY 2016, $2,000,000 is requested for engineering and technical services/support; procurement of approximately seven Precision Approach Path Indicator (PAPI) systems and to complete approximately seven PAPI establishment projects.

What Is This Program And Why Is It Necessary?

This program supports the procurement, installation, and commissioning of PAPI systems and Runway End Identifier Lights (REIL) systems. The PAPI provides visual approach glide slope information to pilots and enables them to make a stabilized descent with a safe margin of approach clearance over obstructions. PAPI consists of four lamp housing assemblies arranged perpendicular to the edge of the runway. PAPI projects a pattern of red and white lights along the desired glide slope so a pilot can tell whether they are on the glide slope and how to correct their glide slope if they are above or below it. A REIL is a visual aid that provides the pilot with a rapid and positive identification of the runway end in use during approach. The REIL system consists of two simultaneously flashing white lights, one on each side of the runway landing threshold.

The program is necessary for the following reasons:

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 navaids equipment.

The program supports a Commercial Aviation Safety Team (CAST) recommendation to implement a visual precision-like vertical approach capability on various airport runways and Land and Hold Short Operations (LAHSO) requirements. The CAST, a group including 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 PAPI equipment to satisfy the CAST requirements.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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

The $2,000,000 is required for the procurement of seven PAPI systems, engineering, technical services/support, and completion of seven CAST PAPI establishment projects on-schedule.

What Benefits Will Be Provided To The American Public Through This Request?

Improved 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. The use of REILs increases safety and capacity during landing by providing a pilot with the location of the approach end of the runway.

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.

Detailed Justification for - 2D08 Instrument Flight Procedures Automation (IFPA)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Instrument Flight Procedures Automation (IFPA)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Instrument Flight Procedures Automation (IFPA)	$4,500	$2,400	$3,371	+$971

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Instrument Procedures Development System (IPDS) Technology Refresh/COTS Software – Phase 2	---	$2,700.0
b. AeroNAV Products Workflow System (APWS) Technology Refresh/COTS Software – Phase 3	---	671.0
Total	Various	$3,371.0

For FY 2016, $3,371,000 is requested to continue IFPA technology refresh activities to include completion of Phase-2 workstation-based commercial off the shelf (COTS) software upgrades to IPDS, and the completion of Phase-3 server-based COTS software upgrades to APWS.

By the fourth quarter of FY 2014, all COTS computer hardware will have been technologically refreshed (installed and operational) Phase-1 of the IPDS technology refresh will reach Initial Operating Capability (IOC). In addition, the startup of IPDS technology refresh Phase-2 will be supported.

What Is This Program And Why Is It Necessary?

IFPA is a suite of advanced Information Technology (IT) tools. These tools create products using fully integrated solutions for visual and instrument flight procedures. IFPA consists of the IPDS, Instrument Flight Procedures (IFP) database application, Airports and Navigations Aids database (AirNav) application, 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.

In FY 2012, the program entered the first segment of its planned technology refreshes for its COTS hardware and software in support of the IPDS and APTS tools. The IPDS tool COTS upgrades are being performed in two phases, with deliveries in FY 2014 and FY 2016. The APTS tool COTS upgrade is being performed in three phases, with deliveries in FY 2015 and FY 2016. The APTS tool provides business process workflow automation for the AeroNav Products organization, and is being renamed AeroNav Products Workflow System (APWS).

IFPA provides the following benefits:

- Increases the airport arrival capacity for eight major metropolitan areas, and at the nation's busiest 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 navigation aids) and performance-based (satellite-based navigation)
- 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 23,000 instrument flight procedures in use at over 4,000 paved airports, accommodating requirements for precision approaches and departures using Global Positioning System/area navigation, Wide Area Augmentation System (WAAS) and Ground-Based Augmentation System (GBAS)
- Efficient response to Air Traffic Obstacle Evaluation (OE) requests, evaluating effects on instrument flight procedures, alleviating manual effort currently required for more than 70,000 OE requests annually. In addition, application of Terminal Instrument Procedures (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 into the future

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

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.

The completion of the Technology Refresh program allows AeroNav Products to maintain efficiency benefits already achieved (see Benefits section below). In accordance with the program's original business case approved by the FAA's Joint Resources Council (JRC) in 2006, the program will be seeking approval during FY 2015 for the second segment of the technology refresh to occur in the FY 2017 to FY 2021 timeframe.

What Benefits Will Be Provided To The American Public Through This Request?

The IFPA tool suite provided productivity gains for all Aeronautical Navigation (AeroNav) Products' major work products, using FY 2006 labor hours as a baseline. For example, the development time required for a new Instrument Flight Procedure was reduced from 132 labor hours in FY 2006 to 104 hours by FY 2011, the amendment time for an existing Instrument Flight Procedure was reduced from 46 labor hours to 27 hours, the procedure NOTAM generation time was reduced from ½ labor hour to ¼ labor hour, and the obstacle evaluation time was reduced from ½ labor hour to 3/8 hour. These efficiency gains are multiplied by the hundreds and thousands of these products produced on an annual basis. A table of these benefits is included in the program's Baseline Case Analysis Report (BCAR) approved by the JRC in September 2006. Also, these gains are included in AeroNav's documented unit cost reductions. The program measures itself annually for its production efficiency.

Detailed Justification for - **2D09 Navigation and Landing Aids – Service Life Extension Program (SLEP)**

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Navigation and Landing Aids – Service Life Extension Program (SLEP)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Navigation and Landing Aids – Service Life Extension Program (SLEP)	$3,000	$3,000	$3,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Equipment Procurement	---	$1,065.0
b. Complete Replacement Projects	---	1,704.0
c. Logistics/Engineering Support Services	---	231.0
Total	Various	$3,000.0

For FY 2016, $3,000,000 is requested for engineering and technical services/support; procurement and installation of three ALSF-2 Replacement Lamp Monitoring System (RLMS) sets and components at non-Focus airports, and completion of Runway End Identifier Lights (REIL) replacement projects at 10 locations.

What Is This Program And Why Is It Necessary?

This program renovates or replaces airport approach lighting systems at sites where there is a high risk for failure of these systems and where failure would result in denying use of the primary precision approach. NAVAIDS include:

- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) for Category I approaches
- High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) at Category II/III approaches
- Runway End Identifier Lights (REIL)

This program also supports Instrument Landing Systems (ILS) sustain and replace efforts at non-Focus Airports where primary precision approach capability outages are most likely. ILS components include electronic devices (i.e., localizers, glide slopes, and distance measuring equipment, etc.). ILS's (Mark 1F) removed from Focus Airports are reinstalled at lower activity airports to replace existing Mark 1D and Mark 1E ILS.

The program maintains the availability of service of these critical systems, the FAA must replace and/or upgrade electronic systems that have reached the end of their lifecycle. This will avoid unacceptable disruptions to airport operations during low visibility conditions. In addition, these benefits will maintain the current level of safety and airport capacity. The installation of RLMS will satisfy the FAA requirement to monitor the status of the ALSF-2s at all brightness steps during conditions of low visibility in CAT II/CAT III operations.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The $3,000,000 is required for engineering and technical services/support; procurement and installation of three ALSF-2 Replacement Lamp Monitoring System (RLMS) sets; and completion of Runway End Identifier Lights (REIL) replacement projects at 10 locations on-schedule.

What Benefits Will Be Provided To The American Public Through This Request?

Replacing and upgrading the ALS equipment will help to maintain the services provided by visual and navigation aids without disruptions to airport operations. Runway downtime is associated with delays, diversions, over-flights, and cancellations which impose economic penalties on both aircraft operators and users.

Detailed Justification for - 2D10 VASI Replacement – Replace with Precision Approach Indicator

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – VASI Replacement – Replace with Precision Approach Indicator
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
VASI Replacement – Replace with Precision Approach Path Indicator	$2,500	$5,000	$5,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Procurement of Precision Approach Path Indicator (PAPI) Equipment	---	$1,697.4
b. Complete Replacement of VASI Systems with PAPI Systems	---	3,002.6
c. Logistics/Engineering Support Services	---	300.0
Total	Various	$5,000.0

For FY 2016, $5,000,000 is requested for engineering and technical services/support; procurement of approximately 18 Precision Approach Path Indicators (PAPI) systems and completion of approximately 18 projects to replace a Visual Approach Slope Indicator (VASI) system with a Precision Approach Path Indicator (PAPI) system.

What Is This Program And Why Is It Necessary?

The International Civil Aviation Organization (ICAO) has recommended that all International airports replace the VASI lights with PAPI lights. This standardizes the equipment to allow pilots to determine visually that they are on the proper glideslope for landing. The program supports the procurement, installation, and commissioning of PAPI systems in order to comply with this ICAO recommendation.

At the inception of this program, there were approximately 1,387 older (pre-1970's) VASIs at international airports and other validated locations requiring replacement. There are now 814 VASI systems remaining in the National Airspace Plan (NAS). Of the 1,387, the first priority of the program is to replace VASI systems at approximately 329 ICAO international runway ends. There are 13 ICAO VASIs remaining of the original 329 prioritized ICAO VASIs. These 13 systems are planned to be replaced by 2018. The replacement of the remaining 801 VASI systems at non-ICAO airports in the NAS is estimated to be completed in 2051.

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 Pilots Association and General Aviation requests for PAPI equipment at validated approaches within federally controlled airspace
- Eliminates the current supply support deficiencies related to lack of uniformity between various VASI configurations

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$5,000,000 is required for engineering and technical services/support; procurement of approximately 18 PAPI systems and ancillary equipment; and funding to attain service availability for approximately 18 new replacement projects to replace VASI systems with PAPI systems.

What Benefits Will Be Provided To The American Public Through This Request?

- Fulfill the ICAO standard to install PAPI systems at all international runways by 2018
- Respond to Airline Pilots Association and General Aviation requests for PAPIs at validated approaches within federally controlled airspace
- Minimizes the current supply support deficiencies related to lack of uniformity between various VASI configurations

Detailed Justification for - 2D11 Global Positioning System (GPS) Civil Requirements

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Global Positioning System (GPS) Civil Requirements
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Global Positioning System (GPS) Civil Requirements	$6,000	$10,000	$27,000	+$17,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. GPS Technical Oversight	---	$1,500.0
b. Operational Control System (OCX) Civil Signal Monitoring (Baseline)	---	3,000.0
c. OCX Civil Signal Monitoring (new requirements, Block 2)	---	22,500.0
Total	Various	$27,000.0

For FY 2016, $27,000,000 is requested to accomplish the following activities:

- GPS Technical oversight; MITRE support, Technical Assistance Support, VOLPE, and National Coordination Office (NCO) support
- OCX for Civil Signal Monitoring baseline activities include:
  - Continued design, procurement, integration, testing and factory acceptance of GPS monitor station and the processing facility equipment. Continued test and evaluation planning, data collection to support prototyping, and logistics support planning for the GPS monitor station and processing facility equipment. Documentation will be developed to establish the operation standards for the GPS Signal Monitoring system
- OCX Civil Signal Monitoring new requirements, Block 2 activities: OCX Block 2 activities are the second phase of the contract and will support upgrades to the monitor, and control capabilities for additional civil and military navigation signals. The OCX activities include:
  - Continued design and prototyping of the civil signal monitoring software algorithms and hardware development

Current accomplishments include:

- Conducted an OCX Civil Signal Monitoring Follow-on Civil Signal Monitoring (CSM) Special Study. February 2014 Study that addressed implementation of two categories in the Civil Monitoring Performance Specification (CMPS) requirements – 1) Fully Successful and 2) High Satisfaction
- Conducted a GPS CSM Trade Study that was initiated in January 2014. Study examined OCX, non-OCX and eight hybrid options to implement CMPS CSM requirements
- Extension of Interagency Agreement between DOT/FAA and United States Air Force Global Positioning System Directorate (GPSD) was completed August 2014

What Is This Program And Why Is It Necessary?

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 two PNT services 1) the Precise Positioning Service (PPS), and 2) the Standard Positioning Service (SPS).

National PNT Policy NSPD-39 (December 2004) directed the Department of Transportation (DOT) to fulfill responsibilities to fund civil unique capabilities. The FAA serves as the implementing agency to fund the civil unique requirements identified in a Memorandum of Agreement (MOA) with the Department of Defense (DoD) and DOT.

The Wide Area Augmentation System (WAAS) currently monitors the performance of the GPS satellites but has limited capability monitoring the constellation of satellites 24/7. CSM will allow users to know the performance of the satellite network around the clock.

The GPS program, which is run by DoD but includes other agencies, supports transitioning from GPS-II to the third generation (GPS III) and the modernized operational control segment (OCX)/Civil Signal Monitoring. The Air Force currently has a contract for OCX deployment, and while the program office identified discrepancies between what was legally required by the contract requirements versus optional deliveries included in a reference document, DOT/FAA and DoD have worked together to remedy those issues. The minimum requirements are now on the contract, but the multiple funding reductions for this program are impacting DoD's ability to fulfill those civilian agency contractual requirements. DOT/FAA has been charged with being the lead civilian agency in requesting the resources and ensuring that the civilian community's needs are met in the OCX contract.

DoD has awarded the OCX contract for the GPS, work jointly funded by DoD and FAA. The United States Air Force (USAF) has also guaranteed a dedicated electronic/network interface to civil users based on an existing OCX interface design. USAF has also agreed to provide signal performance data for the civil users.

The program is necessary to provide civil signal performance to all users, including domestic and international. The civil monitoring capability allows the United States to validate performance against the standards published for GPS signals and provide global leadership for all GNSS service providers, such as GALILEO-Europe, GLONASS – Russia and BEIDOU - China. In addition, civil monitoring allows the US to effectively monitor worldwide GPS and provide civil users such as Department of Agriculture, Commerce, and NASA, with confirmation and assurance of system performance.

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.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

In FY 2016, the work required to implement Civil Signal Monitoring 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.

What Benefits Will Be Provided To The American Public Through This Request?

When implemented, civil users (i.e. FAA, Department of Agriculture, Department of Commerce), will have the ability to observe the performance of the civil signals and be able to validate its performance against the critical requirements identified in the CMPS. The OCX will have the ability to detect and act on GPS signal anomalies in a timely manner resulting in greater signal availability.

Detailed Justification for - 2D12 Runway Safety Areas (RSA) – Navigational Mitigation

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Runway Safety Areas (RSA) – Navigational Mitigation
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Runway Safety Areas (RSA) – Navigational Mitigation	$38,000	$35,000	$30,000	-$5,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Program Management	---	$1,000.0
b. Procurement of NAVAIDs	---	1,317.0
c. Installation of NAVAIDs	---	27,683.0
Total	Various	$30,000.0

For FY 2016, $30,000,000 is requested to conform to RSA standards contained in AC 150/5300-13 Airport Design. RSA compliance provides a measure of safety in the event of an aircraft's excursion from the runway by significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots and veer-offs. The funding being requested will allow the continuation of the NavAids procurement and the completion of the remaining 293 RSA improvements.

What Is This Program And Why Is It Necessary?

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. The 2006 DOT Appropriations (PL-109-115) required Part 139 certificated airports to comply with the current RSA airport design standards prior to December 31, 2015. In accordance with PL-109-115, the FAA must report on the agency's progress toward RSA improvements. This program will benefit commercial aviation and the flying public.

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 Lighting System (ALS)
- Runway Visual Range (RVR)
- Access Roads
- Radar Reflectors
- Power Panels (case by case)
- Individual 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. The FAA is committed to clearing all violations by December 31, 2018.

This program is necessary and 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, FAA found that non-frangible ALSs remain in RSAs and continue to pose a safety risk to aircraft and passengers.

DOT Strategic Goals – Safety

- Reduction in transportation related injuries and fatalities.

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

The funding being requested will allow the continuation of the NavAids procurement and the completion of 75 RSA improvements. 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. $30,000,000 is required to conform to RSA standards contained in AC 150/5300-13 Airport Design. If the program is not funded at the level requested, the FAA will not be able to meet its commitment to the Congress by December 31, 2018.

What Benefits Will Be Provided To The American Public Through This Request?

The benefits provided to the American Public are an increase in safety on the runways at Part 139 airports. The safety is increased by relocating objects outside of the RSA and mounting equipment on frangible bolts. This significantly reduces the extent of personal injury and aircraft damage during overruns, undershoots and veer-offs. Since 2010, the program has relocated and/or modified NAVAIDs at more than 241 RSAs. Forty-five percent of all Part 139 RSAs have been improved to date. The RSA program has exceeded its goals every fiscal year.

Detailed Justification for - 2E01 Fuel Storage Tank Replacement and Management

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Fuel Storage Tank Replacement and Management
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Fuel Storage Tank Replacement and Management	$8,700	$14,500	$18,700	+$3,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Modernize Fuel Systems with Current Generation Supportable Equipment	8	$9,906.6
b. Upgrade Fuel Systems to Meet regulatory Standards	20	3,701.0
c. Replace Fuel Systems in Accordance with Lifecycle Guidelines	26	3,604.4
d. Engineering and Program Support	---	1,488.0
Total	54	$18,700.0

For FY 2016, $18,700,000 is requested to fund 93 tank unit replacements, modernizations, and upgrades at approximately 54 locations across the National Airspace System (NAS). Fuel systems at a given location may include multiple tank units.

Fuel Storage Tank (FST) Replacement and Management funding is utilized to acquire hardware and integration services in support of NAS operational requirements for bulk liquid storage. Tank system replacements are coordinated through engine generator sustainment actions under the Electrical Power Systems Program. The Fuel Storage Tank Replacement and Management program is one of the programs included in FAA's National Airspace System (NAS) Strategic Sustainment Plan (SSP).

What Is This Program And Why Is It Necessary?

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 key NAS facilities. The FST are also deployed to service bulk liquid storage requirements for lubricating oils, building heater and boiler system fuels, service vehicle fuels, liquid wastes, and similar NAS operational requirements. The FAA active tank system inventory includes over 3,800 units that must be continually sustained.

Operation of fuel storage systems is regulated under federal, state and local statutes with Federal Agency compliance mandated by Executive Order and specifically enumerated in federal statutes including the Clean Water Act (CWA), the Oil Pollution Act (OPA), and the Resource Conservation and Recovery Act (RCRA) among others. The FST program received a Final Investment Decision in June 2013.

The FST program operates to attain three primary objectives:

- Sustain NAS operational readiness - The NAS storage tank infrastructure is essential to enable Air Traffic Control (ATC) facilities to sustain capacity. A loss of integrity on any storage tank component can negatively affect the operational capacity of the supported systems and may ultimately result in a total

ATC facility outage. Additionally, the tank inventory must be updated and sustained to meet the changing bulk liquid storage requirements for all NAS services.

- Mitigate environmental damage and regulatory non-compliance associated with tank systems - Tank systems contain materials that may be considered hazardous or dangerous if they are released. Unintentional releases from tank systems failures increase risks to human health and damage the surrounding environment. The approved business case validated funding deficits for the FST program contribute to a growing fuel system related environmental remediation liability for the Agency exceeding $81 million that accrues at a rate of $14 million annually.
- Conduct effective in-service management and lifecycle replacement - Failure to properly manage in-service operation of fuel systems will result in fines, fees, and delivery restrictions for noncompliance. Tank systems that are not in compliance with federal, state, and local environmental authority regulations have both a short term ATC operational impact, fuel tanks servicing ATC facilities being prohibited from being refilled (i.e., "red-tagged") and unable to support the mission, and longer term fiscal impacts including fines on the FAA and unplanned retrofit costs which force emergency re-allocation of funds to attain regulatory compliance. As fuel tanks age beyond their lifecycle, there is an escalating risk of failure and associated leakage with attendant environmental damage.

The FST program interacts with and supports numerous internal and external organizations in sustaining bulk liquids storage requirements.

- The program office coordinates with internal stakeholders on FST systems fielded during integration of new systems (new control tower construction projects, NextGen system integrations)
- The Program acts as the Subject Matter Expert repository for all FAA internal 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

- Reduction in transportation related pollution and impacts on ecosystems.

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

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 preventing regulatory fines of up to $32,500 per day that may be assessed by the Environmental Protection Agency for failing to comply with regulatory standards for tank system installation, configuration, operation, and removal.

The funding request represents a manageable funding escalation to address the active equipment that exceeds service lifecycle or is not compliant with current regulatory standards and industry published best practices. The program office has the contracts and other supporting management tools in force to enable the funding to be obligated in accordance with the ATC Facilities Strategic Sustainment Plan goals. The FST program implementation strategy and planning documents describe the processes and governance that the program office will employ to ensure allocated funding is managed effectively and efficiently.

What Benefits Will Be Provided To The American Public Through This Request?

Monthly tracking confirms fuel systems continually achieve minimum goal of 99.7 percent sustained operational availability. Operating modern, sustainable, and regulatory compliant fuel systems:

- Mitigate damage and associated costs from incidental release of hazardous, toxic, or dangerous materials

- Assure the travelling public and aviation stakeholders experience reliable and safe transit
- Reduce potential for fines, fees, and other penalties levied by the regulator community and born by realignment of funding

Detailed Justification for- 2E02 Unstaffed Infrastructure Sustainment (UIS) Program

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Unstaffed Infrastructure Sustainment
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Unstaffed Infrastructure Sustainment	$20,000	$30,300	$39,640	+$9,340

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Unstaffed Infrastructure Sustainment	---	$37,340.0
B. In-Service Engineering	---	2,300.0
Total	Various	$39,640.0

Unstaffed Infrastructure Sustainment (UIS) is one of the programs included in the FAA's Air Traffic Control (ATC) Facilities Strategic Sustainment Plan. The FY 2016 request includes a substantial increase of funding for this program and shows the FAA's commitment to sustaining the infrastructure for nearly 36,000 structures and reducing the current maintenance backlog. The funding will allow the FAA to convert the program's current reactionary model to a proactive enterprise portfolio management system that prioritizes component sustainment activities against the impact to overall NAS operations.

For FY 2016, $37,340,000 is requested to sustain approximately 150 unstaffed infrastructure projects located in all three service areas for communication, navigation, surveillance, weather, and support services. In addition, $2,300,000 is requested to support in-service engineering activities.

The sustainment projects include upgrades, modernization, refurbishment, and replacement of NAS antenna and equipment towers; heating, ventilating, and air conditioning (HVAC) equipment; buildings; shelters; roofs; electrical panels and distribution wiring; locks and alarm sensors and lighting; access roads; grounds; and fencing. Infrastructure improvements will protect electronic equipment and ensure reliable delivery of air traffic services.

What Is This Program And Why Is It Necessary?

The FAA owns thousands of buildings, broadcast towers, and poles whose sole purpose is to protect and support the NAS communications, surveillance, weather, and navigation aids. These structures are failing. They suffer from leaking roofs, deteriorated foundations, inadequate air conditioning systems and electrical systems, and severely corroded guy wires and anchors. A majority of these 36,000-plus structures were built during the 1940s and 1950s and are beyond their expected service life.

The UIS program sustains infrastructure supporting the NAS to enable the delivery of NAS-systems-required availability. NAS sustainment includes major repairs to and replacement of real property and structures that are normally not staffed. Sustainment of the unstaffed infrastructure includes:

- Major repair, refurbishment, and replacement of NAS antenna and equipment towers, which provide a safe climbing environment for FAA employees.

- Major repair and replacement of buildings, shelters, roofs, HVAC equipment, electrical panels and distribution wiring, locks and alarm sensors and lighting, access roads, grounds, and fencing.

The deferred maintenance backlog for these facilities is currently estimated at $446,400,000. A substantial deferred maintenance backlog increases the risk for operational service failures and premature air traffic control equipment replacement. Additionally, the growing deferred maintenance negatively impacts the agency's ability to use existing infrastructure required to support NextGen initiatives and other deployments.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

Funding the UIS program at the requested level would decrease the level of deferred maintenance and to NAS system outages at core airports. The requested funding and will support critical infrastructure projects that include the following:

- HVAC replacement at airport surveillance radar (ASR) facilities
- NAS equipment shelter replacements at several locations including Charlotte, NC; Dallas Fort Worth, TX; Memphis, TN; Philadelphia, PA; and Tampa, FL.

What Benefits Will Be Provided To The American Public Through This Request?

As a result of the continued sustainment at the unstaffed infrastructure facilities that house the NAS equipment, NAS outages have decreased at core airports.

The UIS program supports greater capacity by providing major repairs/replacements of existing FAA-owned unstaffed facilities and structures serving the NAS. The NAS requires reliable and continuous operation of surveillance, navigation, communication, and weather equipment. In addition, the infrastructure protects the electronic equipment from weather hazards, radio interference, and unauthorized entry. Failure of the infrastructure will result in NAS equipment failures directly reducing capacity of the NAS.

The benefits of increased funding to the UIS program will be:

- Improved availability of air traffic control (ATC) services as a direct result of building improvements (e.g., HVAC replacement and electrical system upgrades) that provide a safe and optimum operating environment for electronic systems
- Extended operational service life of NAS remote facilities that house and protect valuable systems and equipment
- A safe and secure work environment for the Air Traffic Organization (ATO) technical operations personnel that is free from safety hazards
- Identification of opportunities for consolidation, modification, or reuse of existing assets in alignment with NextGen implementation requirements

Detailed Justification for - 2E03 Aircraft Related Equipment Program (ARE)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Aircraft Related Equipment Program (ARE)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Aircraft Related Equipment Program (ARE)	$10,400	$9,000	$9,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Flight Inspection (FI) Flight Program	---	$9,000.0

For FY 2016, $9,000,000 is requested for ongoing modifications/upgrades to FAA's flight inspection (FI) aircraft, avionics, and mission equipment as follows:

- $4,540,000 for the Beechcraft 300 and Challenger aircraft modifications
- $2,210,000 to sustain the current generation Automatic Flight Inspection System (AFIS)
- $2,250,000 to begin implementation of Next Generation AFIS (NAFIS) Phase I and continue development of NAFIS Phase II

What Is This Program And Why Is It Necessary?

The FAA's flight inspection mission ensures FAA navigational systems, facilities, and tools are sound and operating according to specifications. The Agency is also responsible for Department of Defense (DoD) worldwide flight inspection requirements. The mission requires aircraft equipped with specialized test equipment and systems. The program currently operates 32 aircraft (18-Beechcraft 300; six-Learjet 60; six-Challenger 600 series; and two-Cessna C90).

The ARE program, provides for the physical and technical updates to existing aircraft, avionics, and FI mission equipment. The program not only provides for expanded capability across the aircraft fleet, but the useful life of the aircraft, avionics, and mission equipment is extended from 20 years to more than 30 years.

ARE projects fall under one of three categories:

Aircraft Modernization: Projects support avionics technology refresh and new or changing regulatory requirements for operating aircraft in domestic and international airspace.

Flight Inspection System Sustainment: Projects support mission equipment technology refresh and new or changing regulatory requirements necessary to continue flight inspection of legacy NAS systems.

Flight Inspection System Modernization: Projects support new mission equipment requirements and new or changing regulatory requirements necessary to provide flight inspection of Performance Based Navigation (PBN) and implementation of evolving NextGen systems.

Legacy Interdependencies:

- Instrument Landing System (ILS)
- Visual Navigation Aids (NAVAIDS)
- Very High Frequency Omni-Directional Range Station and/or Tactical Air Navigation (VORTAC)
- Distance Measuring Equipment (DME)
- Non-Directional Beacon (NDB)
- Global Positioning System (GPS)

NextGen Interdependencies:

- Standalone Distance Measuring Equipment (DME)
- Performance Based Navigation (PBN)
  - Required Navigation Performance (RNP)
  - Area Navigation (RNAV) Routes
  - RNAV Standard Instrument Departure (SID)
  - RNAV Standard Terminal Arrival Route (STAR)
- Augmentation System Navigation
  - Space Based (SBAS) – Wide Area Augmentation System (WAAS), Lateral Precision with Vertical (LPV) Guidance
  - Ground Based (GBAS) – Local Area Augmentation System (LAAS), GNSS Landing Systems (GLS)
- Surveillance Systems
  - Automatic Dependent Surveillance Broadcast (ADS-B)
  - Wide Area Multilateration (WAM)
  - Airport Surface Detection Equipment Model-X (ASDE-X)

DOT Strategic Goal – Safety
- Reduction in transportation related injuries and fatalities.

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

$9,000,000 is required to continue the program's heavily integrated multi-year, multi-project, and multi-phased project plans. Delays in the aircraft modification schedule could negatively impact Operations' ability to maintain status quo of NAS maintenance requirements or new commissionings. There are modification deadlines that must be met in order for aircraft to operate in the evolving international environment. The requsted level supports NAFIS Phase I implementation and deployment of aircraft that are able to meet the demands of PBN requirements. Flight Inspection ensures the safe operation of over 5,000 NAVAIDS, the periodic re-certification of over 21,000 Instrument Flight Procedures (IFPs), and up to 2,800 new and amended IFPs annually, not to mention FAA's responsibility to DoD overseas.

What Benefits Will Be Provided To The American Public Through This Request?

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 RNP, RNAV, in addition to the GBAS and the SBAS. To meet these safety and greater capacity objectives, the FI aircraft fleet must be updated to continue to certify an expanding number of RNAV RNP, GBAS, and SBAS approaches at the lowest possible cost.

Flight inspection is the FAA's quality assurance program that verifies the NAVAIDS and associated IFPs conform to prescribed standards and provide accurate guidance to all users. As the data below shows, flight inspection identifies discrepancies that are fixed before they cause delays and diversions of aircraft.

In FY 2011 through FY 2012, a total of 31,849 flight inspections were conducted of existing ground based navigational aids and existing IFPs and 1,988 had reportable discrepancies. This equates to 6.2 percent of published IFPs and associated ground based navigational aids requiring further attention. In addition, 7,162

IFPs required flight inspection in order to publish a new or amended flight procedure. The results of those flight inspections required 808 IFPs to be adjusted. Of the new or amended IFPs, 11.3 percent required correction and thereby avoided potentially unsafe IFPs from being published.

Detailed Justification for - 2E04 Airport Cable Loop Systems – Sustained Support

What Is The Request And What Funds Are Current Spent On The Program?

FY 2016 – Airport Cable Loop Systems – Sustained Support
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Airport Cable Loop Systems – Sustained Support	$5,000	$5,000	$12,000	+$7,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Site Engineering and Fiber Optic Installation	---	$11,150.0
b. Program Management	---	750.0
c. Engineering Support/Design/Documentation	---	100.0
Total	Various	$12,000.0

For FY 2016, $12,000,000 is requested for advanced engineering, construction activities, and Fiber Optic Transmission Systems (FOTS) equipment installations for Anchorage (ANC) and Oakland (OAK). This funding will allow for work to continue for projects begun in FY 2014 and FY 2015. Funding will also be utilized to incorporate Aeronautical Mobile Airport Communications System (AeroMACS) as part of the on-going utilization of innovative and modern technology to save cost. Funding will allow completion of reconfiguration and electronics installations at San Francisco (SFO) and Miami (MIA) as well as completion of engineering activities for Ft. Lauderdale airport (FLL). Funding will also enable the program to start engineering, planning and installation activities at two additional CORE airports that will be determined by planning activities in 2014.

What Is This Program And Why Is It Necessary?

The program replaces existing on-airport, copper-based, signal/control cable lines that have deteriorated. The primary focus will be on projects at airports with high traffic counts and enplanements. The obsolete underground telecommunications cable infrastructure systems are vulnerable to failure and have caused flight delays related to these cable outages. These lines feed airport surveillance radar, air/ground communications, and landing systems data and information to the Air Traffic Control Tower (ATCT), and operational and maintenance information to FAA-staffed facilities. Where cost effective, the program will install fiber optic cable in a ring configuration to provide communications diversity. The ring configuration allows information to flow from either side if there is a break in the cable. The program takes advantage of opportunities to save cost by coordinating projects with major construction projects (e.g. tower relocations and runway projects).

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$12,000,000 is required to ensure the ability of the FAA to improve, sustain and/or upgrade the communications infrastructure at airports across the nation. As mentioned above, many critical systems at airports are endangered because of the condition of the underground cable (either copper or aged multimode fiber) supporting these systems. Many of the control/signal cables serving key airport facilities are 25 to 50 years old, exceeding expected service life, and are badly deteriorated. The requested level allows the FAA to invest in infrastructure upgrades at all the required areas. This protects the NAS from becoming vulnerable to potential catastrophic failures due to aging, unsupportable, and obsolete infrastructure. Investing in the infrastructure now will result not only in increased capacity at present but also substantial cost savings in future years.

What Benefits Will Be Provided To The American Public Through This Request?

The cable loop program increases 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 FOTS, the agency will be assured of bandwidth and capacity to serve future requirements.

The program measures the delays associated with cable outages on airports and analyzes them from previous years to determine success in trying to reduce delays by two percent a year, on average. The impact of one project may not be seen immediately as a typical project takes 2.5 - 4 years to complete. FAA is presently reducing cable related outages for Operational Evolution Partnership (OEP) airports by 3.42 percent averaged annually based on the original data record from 1998 of 128 delays

Detailed Justification for - 2E05 Alaskan Satellite Telecommunications Infrastructure (ASTI)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Alaskan Satellite Telecommunications Infrastructure (ASTI)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Alaskan Satellite Telecommunications Infrastructure (ASTI)	$8,500	$11,400	$12,500	+$1,100

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Implementation (Replace/Upgrade Modems, Multiplexers, Switches, Radio Equipment, Install and Test Network Management Hardware and Software)	---	$11,320.5
b. Engineering, Technical and Program Support	---	1,179.5
Total	Various	$12,500.0

For FY 2016, $12,500,000 is requested to complete the Alaskan Satellite Telecommunications Infrastructure (ASTI) Modernization effort. Efforts will continue to execute the implementation phase of the program which started in FY 2014 with the majority of installations scheduled for FY 2016. This funding will allow completion of the modernization efforts and maintain the current implementation schedule with the goal of completing the final site installation and testing activities including engineering and integration work in FY 2016.

What Is This Program And Why Is It Necessary?

The Alaskan Satellite Telecommunications Infrastructure (ASTI) is a FAA-owned satellite based network that provides 90 percent of the inter-facility communications required by the FAA in Alaska to support air traffic control operations. The ASTI network topology consists of hub earth stations, remote earth stations, leased transponder space segment, and a Network Operations Control Center (NOCC). ASTI uses primary and alternate satellites to provide service diversity. The remote earth stations are linked to their respective hubs and the NOCC through leased transponders providing Alaska with critical, essential and routine air traffic control telecommunications services such as:

- Remote Control Air Ground (RCAG) and Remote Communications Outlets (RCOs) for voice communication with pilots
- En Route and Flight Service Station Radio Voice Communications
- En Route 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)
- Wide Area Augmentation System (WAAS) Reference Station
- Automatic Dependent Surveillance-Broadcast (ADS-B)

The ASTI Technology Modernization is an ongoing program that replaces/upgrades system components originally deployed in the 1990s as part of the Alaskan NAS Interfacility Communications System (ANICS).

The ASTI Technology Modernization program will improve system availability, reduce the frequency of system alarms and outages, reduce the level of FAA maintenance, provide satellite bandwidth savings, and improve life cycle support including training, second level engineering support, radome maintenance and depot level supply support.

The ASTI Technology Modernization program provides for the replacement and upgrade of vital system components due to aging and obsolescence and implements improved Support Services. ASTI is needed to address the current system deficiencies:

- Availability has fallen significantly below 0.9999 (for critical services) and 0.999 (for essential and routine services) and continues to decline
- Crucial system components are no longer supportable for required system operations
- Environmental destruction of system components
- Lack of support infrastructure for training, second level engineering support, radome maintenance, and logistics

The ASTI technology modernization effort will increase system availability to required levels. ASTI will improve and sustain the availability of the infrastructure and reduce future operations and maintenance costs. Additional qualitative benefits include:

- Improved training for FAA technicians and other operations personnel
- Improved second level engineering support
- Improved logistics support system
- Improved radome maintenance
- Modern and flexible system to support emerging NAS requirements
- Improved Information Systems Security (ISS)

DOT Strategic Goal - Safety

- Reduction to transportation related injuries and fatalities.

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

$12,500,000 is required to complete the Alaskan Satellite Telecommunication Infrastructure (ASTI) modernization effort and 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 Air Route Traffic Control Center (ARTCC) hub converters fail, 50 of 52 RCAGS at the ARTCC would not be available, leaving the ARTCC without air-to-ground communications.

The program began implementation in FY 2014 and the majority of the implementation work will occur in FY 2015 and FY 2016. The FY 2016 required funding level provides implementation of system-wide upgrades and the completion of the final milestone installation at the 64^{th} site.

What Benefits Will Be Provided To The American Public Through This Request?

The ASTI network is an integral part of the communications infrastructure in Alaska and ensures vital communication operations are available to controllers and pilots. Modernization is critical to continue the availability of a safe and reliable Air Traffic Control System in Alaska. It will sustain and improve the reliability of the network that connects air traffic controllers to the radios and sensors that provide the ability to see and communicate with all aircraft within the Alaska Air Space.

Detailed Justification for - 2E06 Facilities Decommissioning

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Facilities Decommissioning
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Facilities Decommissioning	$6,500	$5,700	$6,000	+$300

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Facility Disposition	51	$6,000.0

For FY 2016, $6,000,000 is requested to fund the final disposition of decommissioned infrastructures and associated property restorations, conducting Environmental Due Diligence Audits (EDDAs), and investigating 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

What Is This Program And Why Is It Necessary?

The June 2005 Government Accounting Office 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 decommissioning of ground-based navigational aids.

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 NextGen program, FAA plans to decommission entire classes of facilities such as Non-Directional Beacons and Remote Communications facilities.

This program is necessary to complete the life-cycle of the decommissioned facilities. The program results in the final disposition of decommissioned buildings, access roads and other real property. This program provides the expertise and oversight to enable all discontinued FAA facilities to be handled in a comprehensive and systematic approach. The future NextGen facilities will require disposition of legacy systems in order to meet the cost benefit analysis derived from facility disposal. The program has the structure in place to provide for those needs.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$6,000,000 is required to fund the final disposition of decommissioned infrastructures and associated property restorations, conducting EDDAs, and to investigate other required work. The work this funding level will support is approximately 51 projects. The current backlog of inventory is projected to increase every year due to the discontinuance of ground based NAS facilities.

What Benefits Will Be Provided To The American Public Through This Request?

This program has experienced great success since FY 2005. Funded work results in the release of decommissioned real property from FAA inventory and associated cost avoidance of: property lease fees, property maintenance fees (e.g., grass cutting, snow removal), utility fees and communications frequency fees. There are also monetary gains for the US government in the sale by GSA of FAA property no longer needed. Between FY 2008 through FY 2013, the Facility Decommissioning Program disposed of 950 sites at a 10 year cost avoidance of $38,400,000.

Detailed Justification for - 2E07 Electrical Power System – Sustain/Support

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Electrical Power System – Sustain/Support
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Electrical Power System – Sustain/Support	$68,075	$82,701	$124,970	+$42,269

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. National Airspace System (NAS) Battery Set Replacement	76	$6,000.0
b. Power Conditioning System (PCS)/Uninterruptible Power Supply (UPS)	21	8,700.0
c. Direct Current Backup Systems (DC BUS)	27	5,600.0
d. Air Route Traffic Control Center (ARTCC) Critical and Essential Power System (ACEPS)	4	30,500.0
e. Lightning Protection, Grounding, Bonding and Shielding (LPGBS) Elements	7	3,100.0
f. Electrical Line Distribution (ELD) Replacements	9	21,500.0
g. Engine Generators Replacements	109	21,000.0
h. Critical Power Distribution System (CPDS) Elements	4	3,000.0
i. Alternative Energy Systems (AES) Elements	9	900.0
j. Environmental Remote Monitoring System (ERMS) Elements	90	1,800.0
k. Program Management and System Engineering	---	22,870.0
Total	Various	$124,970.0

For FY 2016, $124,970,000 is requested to accomplish the following:

- Electrical Power Systems – Sustain/Support (PS3) program will use the requested resources to provide quality electrical power that is reliable and available to meet National Airspace (NAS) requirements. The PS3 program directly impacts all NAS service areas having air traffic control (ATC) equipment and responsibilities.
- The requested resources, will replace, refurbish and renew components of existing prime power equipment, backup power equipment, and electrical power cable infrastructure as identified in the activity tasks above. The power components are located at the 300 top airports, large terminal facilities, and Air Route Traffic Control Centers (ARTCC). Ninety-two percent of NAS services are provided by NAS equipment at these sites. Projects will be prioritized to provide the maximum risk reduction loss of NAS service.
- The requested resources will be used to assure backup power is available to the NAS; wherein, backup power equipment provides an average of 40 hours of uninterrupted operation each year to every system in the NAS. That is, each NAS system would fail to provide any service for a total of 40 hours per year without access to backup power. The backup power equipment also protects sensitive electronic equipment from commercial power surges and fluctuations.
- The requested resources will enable PS3 to reduce the large backlogs of deteriorating power cables and engine generators that have been identified as systemic problems within the NAS by the Strategic Sustainment Plan (SSP). The SSP calls for consistent annual funding to steadily reduce these issues and increase NAS reliability.

- Project unit costs vary each year because of site specific installation costs for the power equipment at the different sites. The various costs may include: additional equipment needed for installation, site configuration or the installation method (FAA engineer or vendor supplied engineer).

The 11 electrical power programs that comprise PS3 are detailed below. The program management and systems engineering element that supports PS3 activity is also detailed.

a. NAS Batteries: Large scale battery complexes serve as backup power sources for key NAS electronic installations at en route, terminal, and General National Airspace System (GNAS) facilities. These batteries provide power for a limited time during major power system disruptions and maintain the function of key systems. The PS3 program sustains ARTCC Critical and Essential Power System (ACEPS) and GNAS battery installations with periodic five to seven year replacements to assure reliability.

b. PCS/UPS: The Power Conditioning System (PCS)/Uninterruptible Power Supply (UPS) is a power quality and backup system that conditions commercial power and provides a short duration power source that prevents power disruptions and surges from adversely affecting electronic system performance and critical NAS infrastructure. The PS3 program currently sustains PCS/UPS systems that have an expected useful life of 20 years. The PCS/UPS inventory requires replacement due to reliability and supportability issues attributable to age. The average age of PCS/UPS is approximately 14 years old.

c. DC BUS: A Direct Current Backup System (DC BUS) stores power in batteries, providing a low cost, short term power source at facilities with a limited amount of equipment. System availability is increased by preventing commercial power outages from disrupting air traffic operations for up to several hours. The PS3 sustains DC BUS systems with a useful life of up to 20 years. DCBUS average approximately 14 years old, but 40 percent of the DC BUS units that are currently in service are obsolete, meaning no new parts can be ordered to service them. PS3 must replace the older units with new, serviceable units.

d. ACEPS: Due to the critical role of the en route and large terminal control centers, they require high quality and reliable power provided by ACEPS. The FAA operates ACEPS at 21 ARTCCs, two Combined Control Facilities (CCF) and three large Terminal Radar Approach Control (TRACON) facilities. ACEPS is comprised of engine generators, switchgear, and UPS systems. PS3 sustains ACEPS where the engine generators have a useful life of 24 years and other components have useful lives that range from seven to 20 years. The average age of the FAA's ARTCC generators is 53 years.

e. LPGBS: The Lightning Protection, Grounding, Bonding and Shielding (LPGBS) replaces, sustains and optimizes elements to minimize electrical hazards to personnel and facilities and electronic equipment caused by lightning, voltage surges, electrostatic discharge (ESD), and power faults. Sites are hardened sufficiently to prevent NAS delay or loss of service, to minimize or preclude outages, and to enhance personnel safety. Lightning protection components at approximately 70 percent of the FAA's facilities have exceeded their useful life of 25 years.

f. ELD: Electrical Line Distribution (ELD) is the infrastructure at airports and ancillary facilities that distributes commercial and backup power to key NAS equipment. The ELD is comprised primarily of distribution cable, transformers, and switchgear. The PS3 program replaces ELD components that have exceeded their useful life of 25 years.

g. Engine Generators: Engine generators provide backup power (and are the primary source of power at some remote locations) for essential NAS electronic systems at GNAS facilities when commercial power is unavailable or becomes unreliable. Engine generators have a 24-year useful life. Over 58 percent of the engine generators in the NAS have exceeded their useful life.

h. CPDS: The Critical Power Distribution System (CPDS) is comprised of components such as electrical distribution equipment, transfer switches, engine-generators, UPS, and batteries. The FAA has a family of standardized CPDS types and each type is optimally matched to the criticality and activity level of the NAS facility it serves.

i. AES: Alternative Energy Systems (AES) activities integrate a broad range of clean energy technologies to meet NAS operational demands. Using AES technologies reduces the Agency's carbon footprint and helps to achieve the goals of Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic

Performance, for reduction of fossil fuel dependencies. Alternative energy generation systems used within the FAA include: solar energy, wind energy, and fuel cell. PS3 sustains AES installations connected to NAS equipment.

j. ERMS: Environmental Remote Monitoring System (ERMS) provides the interface of power systems (EG's, DC Bus, PCS/UPS) to the remote monitoring system to provide power system status to the Operations Control Centers. The information provides the FAA with real time data on the status of the systems which allows a response to system related issues.

k. Program management and system engineering: This activity provides program management and power systems engineering for design and management for sustaining electrical power systems in the NAS. Systems engineering within the Power Services Group (PSG) defines and documents customer requirements for power systems and administers those requirements through the design phase, system validation, quality control, quality assurance, safety improvement, and the useful life. Identifying options for, preparing drawings of, installing, and administering training and test facilities are included in this effort.

What Is This Program And Why Is It Necessary?

PS3 is an 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. 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.

PS3 program funds the purchase and installation of components to sustain the $4.2 billion NAS electrical power infrastructure. The PS3 program is vital to both maintaining and increasing NAS capacity by sustaining the reliability and availability of NAS equipment. Without reliable NAS power systems, electronics cannot deliver their required availability. 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 ATC electronic equipment. These actions avoid system and equipment failures that result in costly delays. For instance, over a four day period during Superstorm Sandy in October/November 2012, commercial power failed or was only intermittently available at four ARTCCs and one large TRACON. An unreliable commercial power condition would have resulted in a loss of service at these NAS facilities if the PS3 program had not provided back-up services.

The ELDs (i.e. power cable and associated components) at the nation's top 300 airports are essential to the operation of air traffic and constitute $1.6 billion of the NAS electrical power infrastructure. Fifty-seven percent of the cable is beyond its useful life resulting in a cable replacement backlog of approximately $900,000,000. PS3 verified the backlog costs by conducting site surveys to determine what facilities are FAA or airport owned, the linear footage of the power cable that PS3 maintains, and the cost per foot. FAA is seeing the results of this aging process through an increasing number of electrical failures or systems in imminent danger of failure, such as the cable failures that occurred at Charlotte Douglas Airport and Philadelphia International Airport. Also, operational risks are increasing for 2,200 NAS buildings and shelters that rely solely on utility power provided by FAA ELD installations. These have no backup electrical generators or batteries; they represent 34 percent of all NAS buildings receiving utility power. The operational risk of the NAS is rising since the number of ELD-related incidents is increasing at a rate of about five percent a year.

Engine generators supply electrical power to about 60 percent of the FAA's GNAS facilities during loss of normal commercial utility-supplied power. When commercial power outages occur, the engine generators keep air traffic operations available and reliable. Engine generators are becoming more important since commercial power failures are increasing according to industry sources. However, engine generator support is at risk. One-quarter of the FAA's total inventory of engine generators is more than 40 years old and over 40 percent are beyond their 24-year useful life. The FAA has an engine generator replacement backlog of $697,000,000. PS3 has conducted an analysis to determine the portfolio of NAS engine generators and used that analysis as the basis for the estimate.

The PSG LPGBS Program replaces existing LPGBS components at NAS facilities. Replacing LPGBS components supports the optimum operation of NAS electronic equipment and augments electrical safety in the NAS work place. As a result of an air traffic controller receiving a shock from NAS electronic equipment in an air traffic control tower (ATCT) from a lightning strike, the LPGBS program is currently surveying and evaluating the quality of the lightning protection installations at more than 60 ATCTs. Annual projects are assigned based on the risk to employee safety and impact to the NAS. The backlog of replacing LPGBS components at the top 300 airports in the NAS is estimated at $222,000,000; however, the PSG is continuing to evaluate the estimate.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The PS3 program is vital 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. The program replaces deteriorating equipment and decreases the rate of FAA operations activity needed to keep the electrical power equipment working. Although the rate of battery replacements will remain about the same, replacements of aging engine generators and power cable (ELD activity) will be increased in FY2016. Work on improving employee safety regarding arc flash and lightning protection is ongoing and replacement of ACEPS equipment continues to ensure continued operations of critical and essential ARTCC systems.

What Benefits Will Be Provided To The American Public Through This Request?

The PS3 program goal is to sustain an adjusted operational availability of 99.7 percent for the reportable facilities that support the nation's busiest airports through FY 2018. PS3 program efficiently and effectively achieves its goal using responsible program management techniques and complies with the Environmental and Occupational Safety and Health (EOSH) requirements by reducing arc flash hazard to employees.

A NAS impact assessment process revealed that the present average dollar impact for a one-hour disruption at the following ARTCCs is $1,700,000. When the commercial power failed at these ARTCCs, NAS operations continued by using PCS/UPS and engine generators.

Commercial Power Outages Affecting FAA NAS Facilities

ARTCC Location	Date of Commercial Power Outage	Duration of Outage (hours)	Avoided Cost ($M)
Memphis	March 3, 2013	4.5	7.65
Indianapolis	January 27, 2014	9.5	16.15
Memphis	February 18, 2014	9.8	16.66
Memphis	February 20, 2014	14.1	23.97
Los Angeles	February 19, 2014	2.1	4.08

Detailed Justification for - **2E08 FAA Employee Housing and Life Safety Shelter System Service**

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – FAA Employee Housing and Life Safety Shelter System
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
FAA Employee Housing and Life Safety Shelter System Service	$2,500	$0	$2,500	+$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Logistics and Contracting	---	$500.0
b. Construction and Materials	---	2,000.0
Total	Various	$2,500.0

For FY 2016, $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, heating, ventilating, and air conditioning (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 in Alaska and at the Grand Canyon. 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.

What Is This Program And Why Is It Necessary?

FAA Employee Housing and Life Safety Shelter Services manage, sustain, and buy/build/lease adequate housing and shelters to accomplish the FAA's mission. Included are 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).

In remote locations or overseas the FAA owns, or in a few cases leases, approximately 150 dwelling units that are used for three purposes

- Provide permanent housing for FAA employees in remote locations
- Provide temporary quarters for FAA employees at remote locations (for example islands in the Bering Sea)
- 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 and/or 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 in these locations 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 vital elements of the Human Resources Management Plan.

Employee Housing and Life Safety Shelter System Services introduces a life-cycle approach for facilities management and sustainment. Establishment of a program with a planned funding path will allow for economy of scale for well-planned management of facilities.

Key principles of facility lifecycle 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.

DOT Strategic Goal – Organizational Excellence

- Diverse and collaborative DOT workforce.

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

FY 2016 funding is required to complete the repair/replacement of the required housing infrastructure. Assessments of all FAA-owned facilities have been completed, deficiencies prioritized, and work aggregated to optimize the funding available. New roofs, heating units, sewer projects, and electrical repairs on multiple housing units have been completed. The FY 2016 funding will complete the repair/replacement of all major work needed on the housing units to bring the units to a condition sustainable by the lines of business.

The estimated 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. The required funding level reduces deferred maintenance.

What Benefits Will Be Provided To The American Public Through This Request?

The location of this housing is in areas where commercial housing is limited or non-existent. Maintenance of the NAS equipment and manning of air traffic facilities in these locations is vital to the safety of the traveling public. Without this investment in the existing housing, the cost of maintaining the air traffic services in the remote areas will be greatly increased due to the increased cost of travel needed to perform the work. In many cases, the technicians will need to travel to the worksite and back each day by aircraft as there is no housing available. Manning of the Flight Service Stations in remote Alaska is highly dependent on having adequate housing available. Air traffic controllers at the Grand Canyon would have a 60 mile commute over a mountain pass to use year-around if the housing at Grand Canyon were not there.

Detailed Justification for - 2E09 Energy Management and Compliance (EMC)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Energy Management and Compliance (EMC)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Energy Management and Compliance (EMC)	$0	$1,000	$2,000	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Energy Management and Compliance (EMC)	---	$2,000.0

For FY 2016, $2,000,000 is requested to achieve cost savings by installing advanced electric meters, monitoring energy and water consumption, and developing cost-effective recommendations to reduce energy and water use, implementing energy and water efficiency projects, and tracking and reporting on energy usage. Requested funding will support the following projects:

- Install four advanced electric meters at select covered facilities
- Perform energy and water improvements at three covered facilities
- Complete the design for energy and water improvements at one covered facility
- Provide required annual reports on progress against legislative and executive order mandates to the Department of Energy (DOE) and the Office of Management and Budget (OMB)

A national energy management program is critical to ensuring that the FAA's Air Traffic Organization (ATO) has a single point of reference for technical expertise and analytical capabilities and is making the best use of the investment dollars by centrally identifying the best opportunities for the greatest return on efficiencies.

What Is This Program And Why Is It Necessary?

The EMC program centrally orchestrates cost-effective reductions of energy and water use at ATO facilities by coordinating policies, technical support, targeted infrastructure investments, and data analysis and reporting. By upgrading older facility infrastructure, such as mechanical and electrical systems, the EMC program will not only reduce operational costs but will also increase reliability of the National Airspace System (NAS) by reducing the likelihood of facility outages and disruptions that can be caused by out-of-service cooling equipment. The EMC program promotes energy and water-use efficiency and the use of off-grid power and non-polluting energy sources for all activities and acquisitions.

The EMC program intends to focus on five specific capability areas:

- Improving monitoring of ATO energy performance, including engineering, designing, planning, and testing a cost-effective approach for installing advanced electric meters to comply with the provisions of 42 U.S. Code, Section 8253
- Implementing energy and water efficiency projects at targeted sites to improve performance, including infrastructure improvements with the greatest cost-to-benefit ratios and shortest payback periods in accordance with the Energy Policy Act of 2005 (EPAct)

- Increasing the number of high-performance sustainable buildings in the FAA portfolio by implementing targeted infrastructure improvements at selected large staffed facilities in compliance with Executive Orders 13423 and 13514
- Improving building operating performance by designating trained energy managers for the highest energy-using facilities to monitor energy and water consumption and develop cost-effective recommendations to reduce energy and water use
- Benchmarking performance and documenting progress by completing quarterly and annual data call reports mandated by executive orders and legislative statutes

The EMC program is necessary to provide a coordinated approach for identifying and implementing cost-effective investments in the FAA infrastructure to reduce ongoing utility expenses. The FAA spends approximately $100 million every year in electricity alone, and for the past 10 years, expenditures in electricity have been increasing by an average of three percent per year. Without proactive investment in energy-efficient infrastructure, the FAA can expect utility costs to continue to climb, thereby impacting the agency's operations budget.

The EMC program also demonstrates a concerted effort toward meeting executive and legislative mandates for federal agencies on energy and water use reductions, greenhouse gas emissions, and sustainability. The FAA faces significant political pressure given that the DOT was in the last place among federal agencies on compliance with these mandates. These requirements are highly visible since the FAA must report quarterly to the DOT and annually to the OMB on progress. The federal mandates include but are not limited to the following:

- Energy use: reduce by 30 percent of the 2003 baseline by 2015
- Greenhouse gas emissions: decrease by 12.3 percent from the 2008 baseline by 2020
- Water use: reduce by 26 percent from the 2007 baseline by 2020
- Renewable energy: increase to 20 percent of the total usage by 2020
- Sustainable buildings: 15 percent of inventory by 2015, eventual goal 100 percent

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

At the required funding level, the EMC program will be able to achieve measurable cost savings by installing advanced electric meters, monitoring energy and water consumption and developing cost-effective recommendations to reduce energy and water use**,** and implementing energy and water efficiency projects. These activities will demonstrate progress against energy and sustainability mandates, including the following:

- The National Energy Conservation Policy Act
- The EPAct
- The Energy Independence and Security Act of 2007 (EISA)
- Executive Orders 13423 and 13514
- Presidential Memorandum, Federal Leadership on Energy Management, December 3, 2013
- The FY 2013 DOT/FAA Strategic Sustainability Performance Plan (SSPP) Goals 1, 2, and 4

The EMC program has identified 622 facilities that comprise 75 percent of the ATO's energy usage. The mandates of EPAct and EISA specify that the agency identify and implement recommended energy and water improvements to reduce utility costs at all of these facilities. The EMC program has already initially identified more than $36,000,000 in recommended improvements to lower energy usage at ATO facilities, many of which would pay back in fewer than 10 years.

What Benefits Will Be Provided To The American Public Through This Request?

The EMC program has the potential to reduce electrical costs annually by approximately 2.5 percent at facilities where advanced meters are installed, 12 – 13 percent at facilities where energy improvements are performed, and 14 percent at facilities where high performance sustainable building (HPSB) upgrades are performed. These estimates are derived from a business case that estimated costs and benefits of executing EMC program improvements, and include results of sample energy and water audits conducted at approximately 16 FAA facilities of various types from 2010 to 2012. To verify achievement of reductions in utility usage and costs, the EMC program will monitor and report on energy and water usage at the facilities where improvements have been implemented.

Detailed Justification for - 2E10 Child Care Center Sustainment

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Child Care Center Sustainment
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Child Care Center Sustainment	$0	$0	$1,600	+$1,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Child Care Center Sustainment	---	$1,600.0

For FY 2016, $1,600,000 is requested to improve the condition of Child Care Centers (Centers) that are located at FAA facilities. FAA will utilize the funding to modernize the facility components at the Child Care Centers that are approaching end of life cycle and in turn reduce the risk to building occupants from the potential failure of critical building components. This funding will be used to modernize the 14 FAA Operated Centers that are in need of major projects and other expenses unique to a child care center (e.g. kitchen, children size restrooms). The fund would not be used to procure daycare supplies (e.g. crayons, paint, toys).

What Is This Program And Why Is It Necessary?

The FAA owned centers are reaching a facility age of 20-25 years; many are in need of roof replacements, HVAC system upgrades, and modernization to meet safety and building code requirements. This program is being established as a multi-year modernization and sustainment program that will address facility requirements for the 14 FAA Operated Child Care Centers. The Child Care Centers were established to provide FAA personnel with priority enrollment and flexibility to meet the unique schedule needs of air traffic personnel. Regardless of how the government facility space is used, as office space or child care, FAA is responsible for maintaining the safety of the buildings.

The program is necessary to ensure that the Centers are properly maintained, up to local building codes and regulations, and are safe and secure. The lack of a consistent sustainment plan for these facilities has increased the risk to building occupants from failure of critical building components such as roofs, fire life safety and plumbing systems. Having a multi-year budget profile will help alleviate the stress of local facility costs and aid in keeping ahead of the sustainment issues at these Centers. Currently, the Centers are maintained if funding is available and repairs are prioritized by level of risk. The current level of risk assessment does not take into account that young children occupy the buildings and many "low" risk repairs are higher because of the ages and sizes of the occupants. A sustainment plan would allow for an emergency repair fund as well as a fund for ensuring that the facilities are evaluated and repairs are addressed to avoid facilities from deteriorating.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The requested funding specifically allocated to these Centers will decrease:

- Deferred maintenance – which is the cost of rebuilding or replacing components whose service life as exceeded their scheduled lifetime
- Backlog in preventive maintenance and other repairs

What Benefits Will Be Provided To The American Public Through This Request?

The availability of on-site child care increases employee retention rate, employee satisfaction, loyalty, and decreases job vacancies (see source). Employee satisfaction leads to more productive employees which in turn benefits American Public by making government more efficient. Additionally, these Centers have a 90 percent accreditation rate compared to only seven percent nationwide rate. As these Centers are also available to the community, they provide a safe and secure child care option for the wider public as well.

(Source: http://www.childrenschoice.com/benefits-of-employer-sponsored-child-care,
http://www.businessweek.com/debateroom/archives/2007/04/day_care_an_office_affair.html)

Detailed Justification for - 2E11 FAA Telecommunications Infrastructure 2 (FTI-2)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 –FAA Telecommunications Infrastructure 2 (FTI-2)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
FAA Telecommunications Infrastructure 2 (FTI-2)	$0	$0	$1,000	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Internal Assessment of FAA Future Service Requirements	---	$250.0
b. Analyze/Document Results of Future Service Requirements Assessment	---	250.0
c. Conduct Market Research of Marketplace Trends	---	250.0
d. Document Initial Market Research/Development of Acquistion Documents	---	250.0
Total	Various	$1,000.0

For FY 2016, $1,000,000 is requested to start the initial analyses to determine the scope of the program and assess the alternative possibilities. The current FAA Telecommunications Infrastructure (FTI) program is providing services today with its contract ending in 2017 and a bridge contract going through 2022. The ability to maintain these services are vital to National Airspace System (NAS) operations and to comply with the FAA mandates. These activities are required to implement the most cost effective solution for critical communication services.

What Is This Program And Why Is It Necessary?

The FAA Telecommunications Infrastructure 2 (FTI-2) program will address the same scope of services as the existing FTI program to ensure no interruption to the NAS and FAA operations. As such, FTI-2 will provide high-availability, low latency telecommunications services for NAS systems and a separate Mission Support network that serves as the FAA's Intranet for secure connectivity to FAA internal administrative applications as well as the public Internet. FTI-2 will also continue to provide the enterprise messaging services required by the System-Wide Information Management (SWIM) program that will play a critical role in support of the NextGen concept of operations for broader, more cost-effective, and more timely sharing of data.

The current FTI program contract will expire in 2017. The FAA has implemented a strategy to put a bridge contract in place for five years to allow NextGen applications to start their implementation before changing the telecommunications infrastructure upon which it requires. This five-year period is believed to also provide for a more robust competitive environment for acquiring these new services. It is expected that FTI-2 will continue the service delivery paradigm utilized for NAS-wide and agency-wide telecommunications leveraging the existing infrastructure of commercial carriers since it is not affordable or practical to build-out a separate FAA-owned and operated network.

The FTI-2 program will replace the existing services provided by the current FTI program and will also address the aging owned telecommunications infrastructure obsolescence. Telecommunications is essential to the operations of the NAS and the FAA. The FTI-2 program will upgrade the existing infrastructure to stay abreast of technological upgrades of the telecommunications infrastructure. It will reduce risk by upgrading to the latest security standards. It will support the new NextGen programs such as NAS Voice System and Data Communications System and their migration to Internet Protocol (IP) technology. One key difference between the existing FTI program and the FTI-2 program is the objective of acquiring telecommunications services as a "commercial commodity" rather than the numerous types of individual services that are tailored to support FAA unique interfaces. As NAS systems continue to modernize, the FAA should be able to meet their needs more uniformly with services like Carrier Ethernet that have a lower cost per unit of bandwidth rather than more costly analog circuits and low-speed serial data links.

The FTI-2 program is necessary to ensure there is no disruption to NAS operations when the FTI contract expires. Under the FTI contract, the FAA obtains the telecommunications services it requires from a network integrator who contracts with hundreds of individual telecommunications carriers to meet the FAA's service requirements at over 4,000 locations. As the provider of the wide area networks (WANs) needed for NAS system and Agency applications, nearly all NAS systems and Agency applications are dependent on the telecommunications services that will be provided by the FTI-2 program.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$1,000,000 is required to fund the necessary resources that will perform market research activities, as well as develop acquisition work products.

What Benefits Will Be Provided To The American Public Through This Request?

FTI-2 will provide the following benefits:

- Highly resilient infrastructure that has the ability to auto-recover during outages so they will be transparent to FAA end user systems and result in a reduction in delays.
- Enhanced security capabilities that benefit all user systems connected to the FTI-2 wide area networks and messaging services.
- Highly reliable services that incur fewer outages and result in enhanced safety for NAS users.

FTI, the predecessor program, has demonstrated efficiency and effectiveness by:

- Consolidating 13 networks into one network resulting in cost savings
- Implementing an optical backbone network and enterprise infrastructure services such as domain name services, enterprise security gateway services, and network timed protocol services
- The FTI program is meeting all its baseline goals as follows:
  - 100 percent of security attacks were detected with the required 60 minutes and reported within the required 15 minutes
  - With respect to the performance of services relative to the required reliability, maintainability and availability RMA levels, the actual performance exceeds the required RMA levels across the most recent 12 months as follows:

	RMA1	RMA2	RMA3	RMA4	RMA5
Required	0.9999971	0.9999719	0.9998478	0.9979452	0.9972603
Actual	0.9999994	0.9999953	0.999878	0.9993758	0.9995057

Note: In the table above, RMA1, RMA2, etc. correspond to different RMA levels that FTI services must meet. RMA1, RMA2, and RMA3 services are are considered to be "high availability" services that have restoration times measured in seconds. As such, the service provider must implement redundant paths and automatic protection switching to meet the availability specification. RMA4 and RMA5 are considered to be "standard availiability" services that have restoration times measured in hours that can generally be met by the standard restoration intervals offered by commercial carriers.

Executive Summary – Facilities and Equipment, Activity 3.

What is the Request and What Funds are Currently Spent on the Program?

The Facilities and Equipment (F&E) Activity 3 program is requesting $171,000,000 for FY 2016, an increase of $12,720,000 (8 percent) above the enacted FY 2015 level. This funding supports modernization of non-air traffic control facilities, business systems, and equipment. The programs support safety, regulation, security, information technology security, and regional and service center building infrastructure and support. A key outcome expected to be achieved in the budget year with the requested resources includes increasing functionality enhancements of existing systems to allow FAA to be proactive in analyzing safety data.

$17.0 million has been requested for a System Safety Management Portfolio. Included within that portfolio is $15 million for Aviation Safety Information Analysis and Sharing (ASIAS), which will provide a national resource for use in discovering common, systemic safety problems that span multiple airlines, fleets and regions of the global air transportation system. ASIAS leverages internal FAA datasets, airline proprietary safety data, publicly available data, manufacturers' data and other data and fuses these data sources in order to identify safety trends in the NAS.

The Aviation Safety Knowledge Management Environment (ASKME) is a suite of information technology (IT) tools designed to support and enable Aircraft Certification (AIR) to more efficiently certify new aircraft and modifications to existing aircraft. In FY 2016, ASKME is requesting $7.5 million to perform technical evaluations, airworthiness directives development, engineering design approval, electronic filing service, and work tracking software activities.

The System Approach for Safety Oversight (SASO) Program will transform the FAA Flight Standards Service to a national standard of system safety based upon Safety Management System (SMS) principals. The primary beneficiaries are the flying public. $18.9 million is requested to support SASO in FY 2016.

The Hazardous Materials Management, Mobile Asset Management Program (MAMP), and Facility Security Risk Management are programs that are included under the Air Traffic Control (ATC) Facilities Strategic Sustainment Plan and are included under Activity 3. In the FY 2016 Budget, funding is requested to address:

- The most serious FAA owned or leased sites that have experienced contamination and FAA has been deemed responsible for remediation.
- The Mobile Asset Management Program provides easily transportable NAS equipment to establish, restore, or augment air traffic control operations. Funding will refurbish or replace 20 year old Mobile ATCT's.
- Implementation of standardized facility protective measures at all FAA staffed facilities.

What Is This Program And Why Is It Necessary?

This Activity contains F&E programs that support modernization of the tools and support infrastructure used to perform Aviation Safety, 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 aviation safety issues.

The FAA's 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.

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: Reduction in transportation related pollution and impacts on ecosystems
- Organizational Excellence: Diverse and collaborative DOT workforce
- Organizational Excellence: Enhance cyber security and privacy and improve governance of IT resources

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

Funding for Activity 3 programs is required for accomplishing our safety, security, and statutory mission effectively and efficiently. This funding will allow FAA to sustain ATC safety and services at levels expected by the public, the military, and our other stakeholders.

What Benefits Will Be Provided To The American Public Through This Request?

Funding for Activity 3 programs has been requested in the budget for almost two decades, and these programs have successfully achieved expected performance measures over time. For example, Recovery Communications (RCOM) has a Continuity of Operations Plan (COOP) that is tested regularly and serves as a major element of FAA training exercises in this area. 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 has allowed the discovery and remediation of multiple system compromises. In addition, the Aviation Safety Information Analysis and Sharing (ASIAS) program that is a component of the System Safety Management Portfolio within NextGen, has discovered potential safety issues in the NAS that were addressed through procedural and airspace design. Coordination efforts have ensured that throughout the NextGen evolution planning process ASIAS results were integrated into the airspace and design process and information design tools.

Detailed Justification for - 3A01 Hazardous Materials Management

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Hazardous Materials Management
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Hazardous Materials Management	$18,500	$22,000	$26,400	+$4,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Superfund Sites Remediation (WJHTC)	---	$7,000.0
b. Investigation and Remediation (Alaska)	---	14,400.0
c. Investigation Other Sites and Program Management	---	5,000.0
Total	Various	$26,400.0

For FY 2016, $26,400,000 is requested to continue the management and remediation of 743 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, the FAA must continue mandated program activities.

The $26,400,000 is requested to:

- Continue remediation activities at the National Priority List (NPL) "Superfund" site at the William J. Hughes Technical Center (WJHTC), Atlantic City, New Jersey.
- The Hazardous Materials (HAZMAT) program works diligently to move the status of sites listed on the Environmental Protection Agency (EPA) Federal Hazardous Waste Compliance Docket (Docket) to No Further Remedial Action Planned (NFRAP) status. The remaining non-NFRAP status sites on the Docket have significant technical challenges to obtaining closure (e.g., long timeframe for site remediation, Superfund site, and ownership liability issues). The four remaining FAA Docket sites include Mike Monroney Aeronautical Center, the Ronald Reagan Washington National Airport, the William J. Hughes Technical Center, and the Alexandria International Airport-Air Route Surveillance Radar.
- 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.

What Is This Program And Why Is It Necessary?

The FAA operates the HAZMAT Management program to clean up approximately 743 contaminated areas of concern at approximately 150 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, and heavy metals.

The FAA has identified 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 WJHTC prompted the EPA to place the site on the EPA 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 the 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, the FAA must continue mandated program activities. The FAA's program activities include investigating sites; remediating site contamination; and obtaining closure of sites.

DOT Strategic Goal - Environmental Sustainability

- Reduction in transportation-related pollution and impacts on ecosystems.

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

$26,400,000 is required to continue the management and remediation of 743 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, the FAA must continue mandated program activities.

Postponing remedial activities at these contaminated areas of concern can lead to noncompliance with the federal, state, and local environmental cleanup statues. Noncompliance with environmental cleanup statues includes maximum penalty amounts that range from $1,000 (Bahamas) to $100,000 (Alaska) for the first day of violation; and ranges from $1,000 (Bahamas and Idaho) to $50,000 (Hawaii, New Hampshire, and New Jersey) each day after the first day of violation.

What Benefits Will Be Provided To The American Public Through This Request?

The HAZMAT management target is to annually remove five percent of the total sites listed in the HAZMAT Management program's published Environmental Site Cleanup Report (ESCR). The FAA continues to exceed its goal of closing five percent of the total sites. From FY 2000 to the third quarter of FY 2014, the HAZMAT Management program has closed 357 sites.

The direct outcome of closing these sites leads to overall decreased environmental remediation (ER) liability to the FAA. 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. In FY 2013, the agency's reported ER liability was reduced by 12 percent ($62 million) from the ER liability reported in FY 2012. Additionally, the FAA is currently analyzing alternate remedial technology that optimizes remediation and cost efficiency. An example is Area D at the WJHTC NPL site which is expected to yield at least a 100 percent return on investment (ROI), and Area 20A is expected to yield 69 percent ROI

Investigating, remediating, and obtaining site closure at FAA's contaminated areas of concern also increase public safety by minimizing exposure to toxic and hazardous substances at these sites.

Detailed Justification for - 3A02 Aviation Safety Analysis System (ASAS)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Aviation Safety Analysis System (ASAS)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Aviation Safety Analysis System (ASAS)	$12,700	$11,900	$20,200	+$8,300

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Hardware/Software System/Services	---	$20,200.0

For FY 2016, $20,200,000 is requested to support the Aviation Safety Analysis System (ASAS) Registration and Certification Infrastructure for System Safety (RCISS). ASAS RCISS will provide technology refresh of equipment for the existing infrastructure as it continues to develop and implement Information Technology (IT) services. The ASAS RCISS program will continue to deploy these IT services in the following areas:

- Mobile Technologies
- Remote Connectivity Telecommunications
- Consolidated Server/Storage Area Network (SAN) systems
- Enterprise Software
- Disaster Recovery

These services ensure continuity of operations for critical and non-critical safety systems. Additionally, these services ensure that critical safety data are safeguarded against loss by providing a secure, reliable and timely back up of data. These new services support the coming integration of AVS's disparate safety data, where individual stove-piped applications own specific data sets, into an enterprise level data store that isolates the data from the application. 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.

What Is This Program And Why Is It Necessary?

This program consolidated all previous IT infrastructure programs that supported the Associate Administrator for the AVS safety workforce. It also enhances the current AVS infrastructure while leveraging components across the AVS services. ASAS RCISS provides all IT infrastructure components to the AVS safety workforce, ensuring standard and reliable accessibility to safety data. The program is continuing to enhance and maintain the AVS IT infrastructure to meet evolving AVS business needs by addressing its mobile safety workforce requirements and changes in the aviation industry. The program focuses on providing safety data to the AVS workforce while they are mobile (off-site) and conducting safety inspections and investigations of airlines, manufacturers, pilots, accidents, etc. ASAS RCISS' enterprise infrastructure provides the access methods to all AVS national safety applications developed by System Approach for Safety Oversight (SASO) or Aviation Safety Knowledge Management Environment (ASKME), and all other national safety programs deployed within AVS. The ASAS RCISS infrastructure directly contributes to the success of AVS in meeting its mission goals as it is developed, implemented and administered as an integrated IT solution.

During Segment 2, RCISS will be performing a technology refresh and enhancements on the enterprise infrastructure that was established during RCISS Segment 1.

RCISS encompasses the following six key components:

- Devices for AVS' 7,000+ Safety Workforce (including mobile devices) - Activities include lifecycle replacement of existing devices to meet operational demands and replace outdated or malfunctioning devices
- Telecommunications - Activities include lifecycle replacement of existing devices and procurement of additional equipment and services where telecommunications bandwidth is deficient.
  - Improves accessibility and speed in utilizing national safety systems and supports centralized server infrastructure
  - Provides enhanced services for the transmission of safety data
  - Replaces outdated or malfunctioning equipment
  - Provides enhanced communication infrastructure for Disaster Recovery environment
  - Coordinates communication infrastructure enhancements in line with FAA Administrative Voice Enterprise Services (FAVES) objectives
- Enterprise Services (Hardware and Software which allow components of the infrastructure to work together) - Activities include lifecycle replacement of existing devices and software.
  - Improves management and operation of the infrastructure through enhanced monitoring, consolidation of equipment and data collection
  - Improves infrastructure reliability
  - Maintains Service Oriented Architecture (SOA) infrastructure and services that lower development costs for AVS national safety applications
- Application Data Servers (Hosting of national AVS safety applications) - Activities include lifecycle replacement of existing servers and storage devices as well supporting FAA migration to cloud based services
  - Continues implementation of application servers supporting national AVS safety applications
  - Replaces outdated or malfunctioning servers by reducing the number of physical servers through virtualization, resulting in reduced costs
  - Provides additional processing power and data storage for the AVS Data Center required to support new (SASO and ASKME) and legacy AVS safety applications
  - Provides enhanced data center environmental upgrades to increase reliability, maintainability and availability (RMA)
- COTS Software (Operating System Software, Database Software) - Activities include maintenance of enterprise software licenses
  - Ensures continued vendor support for software
  - Evaluate future software to support safety workforce, enterprise management services and all other aspects of the infrastructure
- Contractor Support - Activities include assistance in refining and streamlining the ASAS RCISS enterprise infrastructure
  - Provides specialized technical expertise in the enhancement of select component areas, e.g., mobile technologies and data center optimization

The ASAS RCISS program addresses AVS' need to design and implement its enterprise IT infrastructure to support AVS personnel responsible for promoting aviation safety through regulation and oversight of the civil aviation industry. ASAS RCISS addresses the need for enhancing and evolving 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 ASAS RCISS IT infrastructure supports the AVS safety workforce in their effort to reduce aviation accidents by making real-time safety data immediately accessible to and from all involved, e.g., inspectors, engineers, investigators, and medical examiners.

Additionally, work load capacity, performance, and reliability of the workforce is increased and enhanced by the ASAS RCISS IT Infrastructure. It also enables AVS to modify its IT infrastructure to respond to changing business processes without additional staffing requirements, such as allowing for a more mobile workforce and the creation of virtual workplaces.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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

The required funding level supports the technology refresh of infrastructure components and end user devices that have reached the end of their lifecycle. Devices in service beyond their intended lifecycle have higher component failure rates resulting in reduced overall reliability of IT infrastructure. To avoid these failures, RCISS is completing necessary infrastructure enhancements needed to accommodate new capabilities resulting from evolving business needs. It is critical that RCISS address these business needs in order to contribute to the DOT and FAA strategic goals to increase aviation safety.

ASAS RCISS enables the safety benefits promised by the SASO and ASKME programs by providing the IT infrastructure required by those programs. The data developed, manipulated, analyzed, and reported on by the SASO and ASKME programs will reside on the ASAS RCISS IT infrastructure. The realization of full capabilities for SASO and ASKME is dependent on ASAS RCISS will not be able to realize their full capabilities.

What Benefits Will Be Provided To The American Public Through This Request?

The ASAS RCISS program provides detailed reports about IT investments and their progress over time to senior FAA executives and makes reports publicly available on the Federal IT Dashboard. The ASAS RCISS program assesses actual program results against baseline expectations determining if performance and benefit targets as well as customer needs are being met. The program management team continues to conduct surveys and data calls to monitor actual investment costs, schedules, benefits, performance, and mission outcomes.

RCISS program management team periodically surveys end users to measure effectiveness of mobile safety devices deployed. Results are used to validate solutions meet end user requirements and to identify lessons learned for future deployments. Surveys conducted to date have successfully demonstrated user satisfaction and validated benefit projections.

The following program performance measures have consistently been met:

- Availability of end user telecom devices to the AVS safety workforce
- Technology refresh of end user devices to assure an acceptable level of system reliability, maintainability, and availability
- Develop standard aviation safety data sets to ensure enterprise conformity to increase efficiency and effectiveness of data analysis

Detailed Justification for - 3A03 Logistics Support System and Facilities (LSSF)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Logistics Support System and Facilities (LSSF)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Logistics Support System and Facilities (LSSF)	$10,000	$8,000	$4,000	-$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Full Operational Capability (FOC)	---	$1,000.0
b. System OperationsMaintenance/Interface Development/Integration	---	2,000.0
c. Program Support Contracts	---	1,000.0
Total	Various	$4,000.0

For FY 2016, $4,000,000 is requested for system maintenance, interface development, integration, program support contracts, and delivery of Full Operational Capability (FOC) of the Logistics Center Support System (LCSS) in April 2016.

What Is This Program And Why Is It Necessary?

LCSS is a mission support IT procurement to re-engineer and automate the FAA's logistics management processes. The program modernizes the FAA's supply chain management and replaces the 20-year old Logistics Inventory System (LIS).

The FAA Logistics Center (FAALC) at the FAA Mike Monroney Aeronautical Center (MMAC) in Oklahoma City manages the central National Airspace (NAS) inventory warehouses and distribution facilities for the FAA. It provides routine and emergency logistics products and services to FAA customers at facilities nationwide, as well as to the Department of Defense (Air Force, Navy, and Army), state agencies, and foreign countries. It provides logistics support to systems nationwide, by providing parts, services, supplies and emergency restoration services. The current system that is used to manage these functions is the LIS.

LCSS is replacing LIS, which 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 is built using Natural and COBOL languages and was deployed in 1990. Its archaic architecture lacks the scalability to support the increased performance requirements projected by the NAS architecture.

Anticipated FY 2016 Accomplishments:

- Complete Operational Evaluation/Field Familiarization in December 2015
- Achieve Full Operational Capability (FOC) in April 2016

DOT Strategic Goal - Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

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

The LCSS program supports the strategic priority to deliver benefits through technology and infrastructure with enhanced capability to accurately manage NAS spares and repair requirements in centralized and automated manner.

Funding at the requested level is needed to complete the final segment of the currently baselined program. Based on the April 2014 program Baseline Change Decision (BCD) for Segment 2 (Implementation), the funds are needed to meet its baseline and contract obligations for FY 2016. The program is scheduled to achieve Initial Operational capability (IOC) in FY 2015 and Full Operational Capability (FOC) in FY 2016.

The program has been planned with comprehensive analysis, which has been vetted by entities within the FAA, but external to the program. These entities include the Office of the Chief Financial Officer, Office of the Chief Information Officer, and various offices within the Air Traffic Organization.

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 practice 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.

What Benefits Will Be Provided To The American Public Through This Request?

The current LIS system fails to meet the current agency business needs. Performance gaps (as noted below) will continue to impact supply support to the NAS. These mission gaps include:

- An expensive legacy system that does not meet business requirements – LIS was implemented in 1990 and contains undocumented modules dating back to the 1960s. Over 39,000 patches/revisions have been made to LIS degrading system performance and increasing operational costs. The system requires specialized knowledge to maintain because of obsolete technology and tacit understanding of its database structure. The workforce to maintain this system continues to retire, which puts the FAA at a risk of being unable to sufficiently maintain the system. Additionally, the use of old technology has made it tedious and error-prone to interface with new systems. If the system fails, logistics support of the NAS will be disrupted.
- Limited shop floor automation – Minimum visibility of assets in repair at the Logistics Center, comprising 30,000 assets valued at $241 million annually, or 50 percent of all repairs to the NAS.
- Limited monitoring of part quality and limited vendor performance monitoring and metrics to identify poorly performing parts and suppliers. Serial number tracking is not currently possible. Incomplete data makes it impossible to analyze part failures and adjust inventories.
- Parts obsolescence – Legacy system does not provide information to support continued repair, condemnation, or re-engineering of parts. Some parts are not procurable and have to be re-fabricated at agency cost. Without a picture of the agency's repairable asset population, purchases for economies of scale cannot be realized. We need a timely connection to be proactive rather than reactive.
- Warranty – The agency incurs the cost of Logistics Center or commercial repair when the manufacturer should bear the cost.
- Spares planning - current agency cost of initial spares for new programs is unknown

Detailed Justification for - 3A04 National Air Space Recovery Communications (RCOM)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – National Air Space Recovery Communications (RCOM)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
National Air Space Recovery Communication (RCOM)	$12,000	$12,000	$12,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. VHF/FM and HF Radio Equipment	---	$2,500.0
b. Emergency Operations Network (EON)	---	3,600.0
c. Emergency Operations Facility	---	2,000.0
d. Communications Support Team (CST)	---	250.0
e. Secure Communications (COMSEC)	---	800.0
f. Information Technology Support	---	2,150.0
g. Satellite Telephone Emergency Network (STEN)	---	700.0
Total	Various	$12,000.0

For FY 2016, $12,000,000 is requested for NAS RCOM. For this amount the Command and Control Communications (C3) program will provide the FAA 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 capabilities for Continuity of Operations (COOP) for the FAA. Funding is spent on the following activities:

- $2,500,000 to continue funding of the Very High Frequency (VHF)/Frequency Modulated (FM) and national High Frequency (HF) radio network modernization efforts. 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 in accordance with the National Telecommunications and Information Administration (NTIA)
- $3,600,000 to continue funding the Emergency Operations Network (EON). Support includes the continued development of Google Earth layers, EON Dashboard, EON Collaborative Communication platform, and the EON Data Discovery platform
- $2,000,000 to continue funding the Emergency Operations Facilities activities which includes, the development of audio/video display systems, national situational awareness view, Domestic Event Network (DEN), incident monitor, emergency notification system, conference bridge, and help desk support
- $250,000 for support of the Communications Support Team (CST) emergency response activities and related communication equipment
- $800,000 for continued funding of Secure Communications (COMSEC) activities and exercises to ensure continued system viability related to all secure telephone, secure facsimile, and secure classified communication equipment
- $2,150,000 for continued funding of C3 Information Technology (IT) activities used to maintain the IT infrastructure for COOP sites and the Emergency Operations Network
- $700,000 for continued support and refresh of the Satellite Telephone Emergency Network (STEN)

What Is This Program And Why Is It Necessary?

In FY 2016, $12,000,000 is required to meet the minimum support necessary to maintain the infrastructure mandated by Federal continuity directives; Executive Order 13618, National Security Presidential Directive 51 (NSPD-51)/Homeland Security Presidential Directive 20 (HSPD-20), Federal Continuity Directive 1 (FCD-1), Federal Continuity Directive 2 (FCD-2), and the National Communications System Directive 3-10 (NCSD 3-10). The infrastructure includes the Washington Operations Center Complex (WOCC), the Emergency Operations Facility (EOF), and the Primary Alternate Facility (PAF), as well as, the minimum requirements for Continuity Communications Capabilities.

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 SAFECOM 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's C3 program has 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 Emergency Operations Network (EON) 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.

The C3 program office also 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 revolve around National Security. 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.

DOT Strategic Goal - Organizational Excellence

- Enhance cyber security and privacy and improve governance of IT resources.

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

At the requested funding level, the C3 program will be able to meet the minimum continuity and communications requirements defined above to ensure FAA can conduct its mission essential functions under all conditions. These include enabling the FAA to exchange and collaborate with other agencies on both classified and unclassified information to promote national security and aviation safety, sustain the EON infrastructure for effective collaborative communications, continuity of operations, and adaptive situational awareness for enhancing decision support, and implementing the VHF/FM radio replacement program to ensure that the Agency's VHF/FM radios comply with the NTIA mandate. The requested funding level will also continue support for the CST and facilitate the team's ability to provide emergency communication capabilities that support FAA's mission essential functions in operating the NAS under all conditions.

What Benefits Will Be Provided To The American Public Through This Request?

The American public benefits from the NAS RCOM program by ensuring that the FAA can reliably and continuously communicate and exchange information, enabling operations and decision-making at all times, especially during times of crisis and natural disaster.

Detailed Justification for - 3A05 Facility Security Risk Management

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Facility Security Risk Management
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Facility Security Risk Management	$15,000	$14,300	$15,000	+$700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Personal Identification Verification (PIV) Retrofit	---	$3,800.0
b. Homeland Security Persidental Directive (HSPD) – 12 Security Level (SL) 1/2	---	3,700.0
c. HSPD – 12 Upgrades Security Level (SL) 3	---	6,000.0
d. X-Ray Machine Implementation	---	1,500.0
Total	Various	$15,000.0

For FY 2016, $15,000,000 is requested to support the continuing effort for the following upgrades:

- Construction/Installation for security upgrades
- Engineering design and equipment installation Eastern and Western Pacific Regional Offices
- Security PIV upgrades at SL 2 and SL 3 facilities
- Technical refresh of security systems at SL 3 facilities to replace outdated security equipment
- Installation and upgrade of X-Ray Machines at staffed facilities

These security upgrades will result in increased security at FAA Staffed facilities.

What Is This Program And Why Is It Necessary?

In 1999, the FAA established the 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 the 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 services to 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 National Airspace System (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 Air Traffic Organization 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 to identify the security needs and vulnerabilities of NextGen facilities to ensure that the safety and security of FAA assets and personnel are maintained as the FAA prepares for the future of flight.

The FSRM program is necessary because aviation assets are attractive targets for those who would seek to harm and terrorize the American Public. FAA facilities are vulnerable to outside intruders if not properly protected. Security vulnerabilities jeopardize air traffic services to the NAS. Threats to aviation safety are ever-increasing and ever-adapting. FSRM, in conjunction with FAA Security and Hazardous Materials (ASH), ensures that the FAA has an operational and administrative environment that provides reasonable safeguards against disruptions that could occur if FAA facilities were to be attacked. HSPD-7, Crucial Infrastructure Identification, Prioritization, and Protection, mandates that agencies identify, prioritize, and coordinate the protection of 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.

Support is also provided to other FAA programs by the FSRM program. Through the use of the Security System Design and Integration Contract, facilities under construction receive security systems that meet security requirements while maintaining standard security configurations.

DOT Strategic Goal - Organizational Excellence

- Diverse and collaborative DOT workforce.

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

$15,000,000 is required in order to sustain the work of securing FAA facilities. Securing the facilities requires funding to continue the activities described above.

What Benefits Will Be Provided To The American Public Through This Request?

FSRM has contributed to obtaining security accreditation at over 980 FAA facilities. This was accomplished by the program's management of national contracts through which security measures such as X-ray machines, cameras, card readers, gates, vehicle barriers, etc., were installed. The installation of the measures led to security accreditation of the facility as required by FAA Order 1600.69.

The impact of those upgrades has been to reduce the risk of the facility to intrusion and unauthorized entry. This in turn provides increased safety to the American Public.

Additionally, the installation and standardization of security equipment across the NAS has led to cost savings to the American Public.

Detailed Justification for - 3A06 Information Security

What Is The Request And What Funds Are Currently Spent On The Program

FY 2016 – Information Security
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Information Security	$13,000	$12,000	$12,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Information Systems Security (ISS)	---	$12,000.0

For FY 2016, $12,000,000 is requested to provide funds for Information Security Services and includes the following:

- Security Operations Center (SOC), previously Cyber Security management Center (CSMC)
- Enterprise Architecture and Interoperability
- William J. Hughes Technical center (WJHTC) Cyber Prototyping Laboratory
- Advanced Concept Technology Demonstrations
- Wireless Intrusion Detection System (WIDS)
- Vulnerability Code Scanning
- Data Loss Prevention (DLP)
- NAS/NextGen Information System Security Capability

These projects and services allow FAA to meet the following outcomes:

- Implement solutions and services to achieve continuous diagnostics and mitigation (CDM) endpoint integrity goals of managing: hardware, software, configuration settings and known vulnerabilities
- Implement Security dashboard technologies to provide near real-time visualization of FAA's hardware, software, and vulnerabilities
- Evaluate and deploy, if appropriate, a new technology to combat Advanced Persistent Threat (APT)
- Deploy full packet capture capability through Flexible Analysis System (FAS) at two new strategic network points
- Integrate advanced and evolved vulnerability and United States Government Configuration Baseline (USGCB) scanning within the FAA's IP based networks
- Evaluate new technologies to address complex and rapidly changing cyber threats and vulnerabilities
- Conduct software code vulnerability security analysis on 100 legacy and developmental agency systems
- Deploy wireless intrusion detection/wireless application protocol (WID/WAP) to 145 FAA facilities
- Develop architecture and engineering efforts for alternative solutions to secure new FAA systems

What Is This Program And Why Is It Necessary?

The FAA ISS program spans governance, operations and compliance and is comprised of the following areas: SOC/CSMC; IT and ISS awareness and training; IT development; policy, standards, and requirements; program evaluations; system certification and compliance; Data Loss Prevention and applied technology and enterprise architecture. The SOC/CSMC is the operational organization of the FAA ISS Program. It is comprised of facilities, technologies, as well as FAA and contract personnel. The SOC/CSMC is a 24x7x365 day operation and represents the entire DOT as the single source provider of the cyber "big picture" when reporting to the Department of Homeland Security (DHS). At the Federal reporting level, the CSMC holds two seats on the National Cyber Response Coordination Group (NCRCG), a DHS-sponsored emergency action team and advisory council reporting directly to the White House on cyber issues affecting, or potentially affecting, national security.

This program funds Information Security Services including the SOC/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 facilities and equipment required to maintain a high level of vigilance is essential to the overall success of the SOC/CSMC's cyber security mission, including the detections of alerts/attacks generated against DOT infrastructure, mitigations of cyber and privacy breach incidents for DOT infrastructure including the FAA and the reporting of special threat events.

DOT Strategic Goal – Organizational Excellence

- Enhance cyber security and privacy and improve governance of IT resources.

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

Under the FISMA of 2002, FAA must ensure all information systems identify and provide information security protection equal to the risk and magnitude of the harm resulting from unauthorized access, use, disclosure, disruption, modification, or destruction of information that support the agency, aviation safety and security, and the NAS.

State Sponsored Threat events are targeted attacks on federal government systems, which pose a serious and imminent threat to those systems. These are events specific in nature, objective, and patterned, and dictates that they be detected and prevented to the maximum extent to which the FAA is capable.

Information systems security enhances the National Airspace System (NAS) architecture including cyber security; hardening individual NAS systems and network elements by completing remediation for the discovered vulnerabilities; enhancing boundary protection to NAS facilities; improved recovery rate during times of cyber-attacks through information sharing; conducting systemic monitoring and addressing the challenge of providing cyber protection while maintaining reliability, availability and high system integrity through applied research and development initiatives. The safety-essential 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 requested level funds FAA's data loss prevention from increasing threats and attacks on our mission networks and applications.

NAS Information Systems Security Transformation: FAA will complete concept of operation and implement strategy for automated recovery, which involves isolating those systems that have been affected by a virus, instituting the fix, and making sure that affected systems get back online as soon as possible. Architecture and engineering efforts for alternative solutions to secure new NAS systems will be developed (NSure concept). The NAS information technology systems will be monitored and all necessary actions will be taken to ensure the systems are not interrupted and are available at all times. FAA will acquire and implement enhanced tools to be used by the SOC/CSMC to address complex and rapidly changing cyber threats and vulnerabilities. These include analysis of NAS Netflow data, modeling and simulation of attack vectors into the NAS, data clustering and early indications and warning. As a result, FAA will gain the capability to do predictive analysis of events that could cause a service outage to the NAS. Funds are also required to begin to examine the ISS requirements of a space based NAS.

Enterprise Architecture (EA) and Interoperability: OMB Circular A-130 and OMB Circular A-11 mandate an annual baseline of the EA by the Investment Decision Authorities. The FAA Acquisition Management System (AMS) enforces compliance with these federal mandates. The FAA EA has been approved by the Joint Resource Council and the Architecture Review Board for the last several years. OMB recommends the FAA EA as a model to other federal agencies in IT investment management practices.

F&E funding supports the current state "as is", transition, and target "to be" architecture compliance, governance, and planning. In FY 2016, FAA will continue to enhance its enterprise architecture including the target architecture to ensure that Administrative, NAS-Support and the NAS architecture, defined by the Next Generation Transportation System (NextGen) program, target architecture states are compatible and meet the agency's future requirements. FAA will pursue opportunities to leverage architectural products to reduce costs and improve efficiencies, including the development and enhancement of investment roadmaps.

Data and Information Architecture: Continue to develop and maintain the necessary information architecture to seamlessly share information between the agencies participating in the NextGen architecture, formalize agreements and develop policies to foster the transfer of necessary information between Government agencies and commercial entities. Continue to support the System Wide Information Management (SWIM) program and other NAS program's data architecture efforts.

What Benefits Will Be Provided To The American Public Through This Request?

The overall benefit to the public is improved Safety by making aviation safer and smarter. Specifically this program will:

- Protect, detect and respond to cyber-attacks to ensure sustained reliability and integrity of NAS systems and networks
- Trusted Internet Connections (TIC) improve FAA cyber security posture
- Maintain the Federal Data Registry (FDR) in support of NAS shared data
- Complete mapping of FAA network configurations
- Ensure that external facing websites and routers are IPv6 compliant
- Reduce risks to Personally Identifiable Information (PII) and Sensitive information, including that of the flying public for data-at-rest, data-in-use and data-in-motion

Information Security has allowed for the discovery and remediation of multiple system compromises, including:

- The immediate discovery of the exfiltration of FAA employee data in 2009 allowed the FAA to mitigate the severity by providing Identity Theft Protection to those affected in a timely manner
- By the detection of hacker activity, we were able to remediate systems and prevent valuable information from being stolen

Information Security has been responsible for FAA system vulnerability scanning and assessment to provide a proactive approach to protecting the FAA network.

Detailed Justification for - 3A07 System Approach for Safety Oversight (SASO)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – System Approach for Safety Oversight (SASO)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
System Approach for Safety Oversight (SASO)	$12,500	$22,500	$18,900	-$3,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. System Approach for Safety Oversight, Phase 2a		
a. Solution Implementation	---	$2,835.0
b. Second Level Engineering	---	4,565.0
Total	Various	$7,400.0
B. System Approach for Safety Oversight, Phase 2b		
a. Prime Mission Product	---	$4,500.0
b. Program Management	---	3,080.8
c. System Engineering	---	3,287.9
d. Test and Evaluation	---	183.8
e. Integrated Logistics Support	---	447.5
Total	Various	$11,500.0

For FY 2016, $18,900,000 is requested to continue the Safety Assurance System (SAS) Phase 2a development and implementation, and to continue Phase 2b development for SASO.

A. System Approach for Safety Oversight Phase 2a

The key product of Phase 2a, the Safety Assurance System (SAS), is being fielded to approximately 100 sites across the National Airspace System. The deployment started in FY 2014 and is planned to complete the second quarter of FY 2016. The identified funding for Phase 2a supports completion of on-site implementation activities and initial activities required for in-service management of the SAS. Completion of Phase 2a will support the "Safety Assurance" component of the FAA's Flight Standards Service (AFS) Safety Management System (SMS) for Title 14 CFR Parts 121 (air carriers), 135 (commuter and on-demand operators) and 145 (repair stations). Phase 2a completion is planned for January 2016.

B. System Approach for Safety Oversight Phase 2b

Phase 2b is the second phase of SAS development and implementation and covers FY 2015 thru FY 2020. During this phase, the remaining SAS functionality will be developed and implemented for all remaining Title 14 CFR Parts regulated by AFS. During FY 2016 this includes activities to further develop the SAS software product to address additional automation requirements. Funding also supports a robust business process reengineering effort to identify the "as is" and "to be" for the development and implementation of the three remaining components of the AFS SMS: Safety Risk Management, Safety Policy, and Safety Promotion.

FY 2016 funding supports a systems engineering effort to tie the reengineered business rules with software automation. Additionally, Phase 2b will result in the business/process consolidation effort including the possible consolidation and decommissioning of several AFS Information Technology applications. Funding in FY 2016 supports an analysis of the existing AFS infrastructure and development of the requirements for the potential consolidation. The program plans to return to the Joint Resources Council (JRC) in FY 2017 to refine its estimate to fund this consolidation effort. Results of this analysis will better define the future state of AFS business processes and systems and establish a defensible plan for out-year funding.

What Is This Program And Why Is It Necessary?

The SASO program is one of several FAA initiatives to increase safety and control cost by adopting the International Civil Aviation Organization (ICAO) mandate to revise Safety Programs to incorporate SMS principles. To accomplish the above, the SASO Program is reengineering AFS business processes and developing an 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 AFS to an SMS-based national safety system standard.

As the regulator of a major segment of the U.S. aviation industry, AFS must continually strive to improve aviation safety. AFS is responsible for oversight of nearly the entire civil aviation industry that uses the National Airspace System (NAS). Today's safety oversight system is stove piped, reactive in nature, and "regulatory compliance-based." While many technical and human factors problems contributing to accident rates have been resolved, more complex organizational factors requiring additional systems-based, data-supported analysis and assessment for their resolution remain.

Increases in technical and operational complexity of aviation operations and introduction of new technologies further stress today's oversight system. SASO will implement a more structured data-supported risk-based oversight system alowing inspectors to directly enter information into the SAS tool. FAA will use SAS as a hazard identification and risk assessment tool to formulate surveillance plans and target FAA resources. The scope of the investment includes reengineering AFS business processes and consolidating AFS applications into the appropriate number of enterprise systems that serve: 4,800 FAA Aviation Safety employees, in eight regions, at headquarters and approximately 100 field offices, and more than 25,000 aviation industry professionals managing aviation safety throughout the United States.

By implementing SASO via the SAS, AFS expects to contribute to reducing the commercial air carrier fatalities per 100 million persons on board by 24 percent over the nine-year period (2010 - 2018), no more than 6.2 in 2018. The flying public is the primary beneficiary of the safety oversight system that is rooted in safety management principles.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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 2020 to achieve and sustain full benefits. The requested funding supports further SAS automation development, policy updates, training, and implementation to achieve the full oversight capabilities and benefits as envisioned during thebusiness process reengineering analysis and design phase of the program.

What Benefits Will Be Provided To The American Public Through This Request?

The primary benefit of the SASO program to the American public is its contribution to the reduction of aviation accidents and fatalities. By implementing the SMS principles, AFS oversight of the aviation industry will result in fewer accidents being attributable to gaps or failures of FAA oversight. Standardization and consolidation of business processes and associated systems will lower maintenance costs as well as increase efficiency of the AFS workforce while maintaining rather than increasing the current number of aviation safety inspectors.

Detailed Justification for - 3A08 Aviation Safety Knowledge Management Environment (ASKME) – Segment 2

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Aviation Safety Knowledge Management Environment (ASKME)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Aviation Safety Knowledge Management Environment (ASKME)	$12,200	$10,200	$7,500	-$2,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Program Management	---	$2,900.0
b. Application/Solution Design and Development	---	3,300.0
c. Application/Solution Testing	---	500.0
d. Transition to Production	---	800.0
Total	Various	$7,500.0

For FY 2016, $7,500,000 is requested to fund the continued Design, Development, Integration and Testing, and Implementation phases for Airworthiness Directives Development (ADD), Airworthiness Certifications (AC), Compliance and Enforcement Actions (CEA), and Budget Management (BMGMT).

ASKME Sub-functions status of ongoing work:

- ADD – Started FY2013. Will complete design FY 2014. Will complete development, integration and testing, and implementation FY 2016.
- AC - Started FY 2013. Completed requirements FY 2014. Will complete design FY 2015. Will complete development, integration and testing, and implementation FY 2016.
- CEA – Started FY 2014. Will complete requirements FY 2014. Will complete design FY 2015. Will complete development, integration and testing, and implementation FY 2016.
- BMGMT – Started FY 2013. Completed requirements FY 2014. Will complete design, development, integration and testing, and implementation FY 2015.

What Is This Program And Why Is It Necessary?

The ASKME is a suite of IT tools designed to support and enable the FAA Aircraft Certification Services (AIR) to automate its business processes resulting in more efficient processes that enhance safety benefits.

The program was established to provide a comprehensive automation environment for critical safety business processes for Aviation Safety (AVS) through deployment of 18 integrated business solutions/projects between FY 2008 and FY 2017. Phase 1 covered FY 2008 - FY 2012, and Phase 2 covers FY 2013 to FY 2017. ASKME Segment 2 was approved by FAA Joint Resource Council on September 23, 2011. Segment 2 projects started as planned during the first and second quarters of FY 2013.

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: rationale for design and production certification decisions, interpretations of rules and policies, and audits of aircraft industry manufacturers. ASKME will provide tools to improve the ability to identify potential unsafe conditions by analyzing this documentation along with safety information such as Service Difficulty Reports, National Transportation Safety Board safety recommendations and reports, accident reports, and Maintenance Difficulty Reports. ASKME will also provide electronic tools for capturing key safety related data resulting from its standard business activities for rulemaking and policy development, airworthiness directives, design certification, production/manufacturing certification, airworthiness certification, designee management, evaluation and audit, external inquiries, enforcement, continued operational safety management, and international coordination.

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. This better enables 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.

Within the FAA AVS organization, AIR is responsible for ensuring that civil aircraft are designed and built to operate safely within the NAS. In carrying out their responsibilities, FAA personnel perform numerous business activities that generate massive amounts of data and information used in making strategic aviation safety decisions. The data is also used throughout AIR to ensure standardized regulatory compliance, workforce education, trend analysis, and program reporting. As the aviation industry has grown in size and complexity, so has the requirement for additional resources to perform AIR services. Additionally, within AIR, new security requirements related to terrorist countermeasures have surfaced as a result of September 11, 2001.

ASKME will provide current and accessible information, designee program effectiveness will be improved, designees better utilized, and AIR designee oversight and evaluation will be enhanced.

ASKME 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 AIR a Web-based knowledge management portal. The integrated tools will be designed to store valuable knowledge assets, making the safety related assets accessible to facilitate management and workforce decision making while providing a proactive approach to systems safety.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The requested funding allows FAA to complete the baselined ASKME Segment 2 program on-schedule by September 2017.

What Benefits Will Be Provided To The American Public Through This Request?

AIR is gaining the desired benefits of the ASKME program with the successful deployment of the ASKME systems to include:

- Electronic Filing System (EFS) Application
- Monitor Safety Related Data - Monitor Safety Analyze Data (MSAD)
- Work Tracking Software - Risk Based Resource Targeting (WTS-RBRT)
- Monitor Safety and Analyze Data – Oversee System Performance Internal (OSPi)
- Monitor Safety and Analyze Data – Oversee System Performance External (OSPe)
- Assimilate Lessons Learned (ALL)
- Work Tracking Software – Work Activity Tracking (WTS_WAT)

The measurement criteria for increasing the percentage of safety trends (i.e. identified and tracked by Monitor Safety Related Data (MSRD)-Monitoring and Analyze Data (MSAD)) and expanding accessibility to current and historical safety documents are the number of successfully executed and completed software tests, User Acceptance tests (UATs), and safety documents made available to safety workforce.

Currently, the AIR Regional Guidance Letter (RGL) provides access to 14 safety document types (FARs, SFARs, NPRMs, Final Rules, Make/Model Information, Type Certificate datasheets, Special TCs, Airworthiness Directives, Advisory Circulars, Orders and Notices, TSOs, Special Conditions, Exemptions, and Equivalent Levels of Safety).

ASKME will provide tools and technologies to enable expansion of Work Tracking Software-Risk Based Resource Targeting (WTS-RBRT) for all Aviation Safe Inspectors (ASIs) and Aviation Safety Engineer (ASE) activities.

The current ASKME performance baseline funding is projected to the end of FY 2017.

Detailed Justification for - 3A09 Aerospace Medical Equipment Needs (AMEN)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Aerospace Medical Equipment Needs
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Aerospace Medical Equipment Needs	$5,000	$0	$2,500	+$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aeromedical and Human Factors Research Laboratory Equipment	---	$2,500.0

For FY 2016, $2,500,000 is requested to continue the replacement of the Aerospace Medical Research Division's laboratory assets at the Civil Aerospace Medical Institute (CAMI). Phase 2 of the AMEN program includes the replacement of CAMI Human Factors Research Division old and obsolete research laboratory assets. AMEN Phase 2 will replace 11 equipment items, 10 of which are Commercial-Off-The-Shelf (COTS) products. The equipment is summarized as follows:

- Three Flight Operations and Air Traffic Control Simulators
- Two Biochemistry/Forensic Toxicology Testing Systems
- Two Specialized Cameras
- One Anthropometric Test Device
- One Engineering Calibration Device
- Two Data Acquisition and Processing Systems

Currently funded activities include the replacement of aeromedical research laboratory items under the AMEN Phase 1 technology refresh program. The equipment to be replaced includes forensic toxicology laboratory fume hoods, Altitude Research Chamber environmental control system, and analytical biochemistry equipment.

What Is This Program And Why Is It Necessary?

The Federal Aviation Administration (FAA) Office of Aviation Safety (AVS) is responsible for promoting aerospace safety by regulating and overseeing the civil aviation industry. To fulfill this mission, AVS establishes aviation safety and certification standards; monitors safety performance; conducts aviation safety education and research; and issues and maintains aviation certificates and licenses. The Civil Aerospace Medical Institute (CAMI), located at the FAA Mike Monroney Aeronautical Center (MMAC) in Oklahoma City, OK, supports the AVS mission as the medical certification, education, research, and occupational medicine wing of the Office of Aerospace Medicine (AAM). The AMEN investment supports CAMI research activities that will address several aerospace human safety and performance research areas, summarized as follows:

- **Aerospace Medical Systems Analysis:** Assessment of very large datasets concerning aircrew, their medical certification, and their involvement in aviation accidents and incidents.

- **Accident Prevention and Investigation:** Development of procedures to detect aeromedically unsafe conditions and trends. The forensic toxicology laboratory serves as the primary national site for toxicology testing relative to accident investigation fatalities.
- **Crash Survival:** Assessment of crash environments including head impact, seat deformation, occupant restraint performance, and safety device effectiveness; all key issues in aircraft certification processes and protection of human life.
- **Aerospace Physiology:** Assessment of human performance at altitude, adequacy of protective breathing equipment, aircraft environmental control systems/cabin air quality, and methods of detection/protection from chemical, biological, and radiological threats. This research will lead to a better understanding of disease and environmental stress factors (alcohol, fatigue, hypoxia, g-forces) that concern medical certification decision-making processes, aeromedical education programs for aviation medical examiners, pilots, and flight attendants; accident investigation practices; certification of aircraft equipment and protective devices; and harmonization of standards.
- **Advanced General Aviation Systems:** Human factors evaluations of performance changes associated with advanced multifunction displays and controls in general aviation and air traffic control.
- **Operator Performance:** Development and assessment of measures of performance in ATCs and technical operations specialists. Research addresses managing advanced cockpit displays, advanced weather displays, and digital air to ground communication of traffic and navigation information. This research includes assessments of human performance under various conditions of impairment, human error analysis and remediation, agency workforce optimization, assessing the impact of advanced automated systems on personnel requirements and performance, and the psychophysiological effects of workload and shift work on job proficiency and safety in aviation-related human-machine systems.

CAMI research personnel discover methods and recommend strategies to enhance the safety, security, health, and optimum performance of the most important aspect of the National Airspace System (NAS), the human operator and the public which she/he serves. CAMI is the only federal entity that performs this work on behalf of the U.S. Personnel work in numerous research laboratories and testing facilities that require complex and technically advanced scientific, engineering, simulation, and medical systems. CAMI research scientists use this equipment to enhance the interface of the NAS with the human system (e.g., pilots, air traffic controllers, cabin crew, maintenance personnel, and passengers).

Phase 2 of the program is a continuation of the AMEN technology refresh approved in May 2010 and initiated in 2012. AMEN 2 was established to provide urgent upgrades to research laboratory equipment of the two CAMI research divisions. By FY 2016, the equipment that will be replaced by the AMEN Phase 2 program will include 6 – 31 years old legacy equipment with an average life of 13 years that has exceeded its useful life. The advanced age of the equipment will result in a serious shortfall in system capability and efficiency. The technology supporting CAMI research activities is highly specialized and is ever changing. Future research requirements driven by changes in the NAS, aircraft, life support equipment, and the physical and/or mental demands on the operators and the flying public will need to be addressed in a proactive fashion so that the FAA/CAMI remains the leader in safety assurance related to aerospace medicine and human factors. Pharmaceutical companies are continuously introducing new products into the market and several breakthroughs in cockpit technology and advanced man-machine interfaces are expected in the future. As a result, CAMI must have state-of-the-art equipment for testing the effects of these advances in human physiology and performance. The safety of the flying public, the NAS, and its operators is contingent on the FAA's ability to remain ahead of such advances and thus maintain human safety as the number one mission.

More modern equipment will support human safety and performance research areas that are associated with reducing aviation accidents and fatalities.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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

To perform their research missions, CAMI's aerospace medical and human factors research personnel require sophisticated, highly technical, and specialized equipment. Much of the laboratory equipment used by CAMI's scientists, physicians, and engineers is old and becoming obsolete. As the single provider of key medical and human factors research, CAMI research laboratories must keep up with new scientific and technical advances in technology that aid the discovery of methods to improve human health, performance, and safety.

The aging and obsolete laboratory research equipment is no longer supportable and jeopardizes mission accomplishment. Not only is this equipment outdated from a technology standpoint, but is also becoming more difficult to maintain at a level that is sufficient to serve CAMI's needs. The majority of the equipment sought is highly sophisticated and protected by proprietary data; third party vendor options are usually not available or their service may nullify warranty agreements. Vendors for some of the current laboratory equipment have notified CAMI that further support of critical systems cannot be guaranteed and in some cases both hardware support and the associated software is no longer available. Parts' obsolescence will increasingly cause higher costs for replacement parts when they can be found or fabricated.

What Benefits Will Be Provided To The American Public Through This Request?

The AMEN investment will allow for the continued performance of aerospace medical and human factors 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.

The AMEN program has demonstrated its success since it was approved in May 2010. Its schedule and budget remain within the constraints assigned to the program.

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.

Detailed Justification for - 3A10 NextGen – System Safety Management Portfolio

What Is The Request And What Funds Are Currently Spent On The Program?

**FY 2016 – System Safety Management Portfolio
($000)**

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
System Safety Management Portfolio	$22,555*	$18,700	$17,000	-$1,700

*indicates a comparability adjustment to prior budget structure

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Aviation Safety Information Analysis Sharing (ASIAS)	---	$15,000.0
B. System Safety Management Transformation (SSMT)	---	2,000.0
Total	Various	$17,000.0

For FY 2016, $17,000,000 is requested to continue development of both the ASIAS and SSMT programs by expanding their capabilities to better manage, integrate and process aviation safety performance data. This request will enable the development of tools to convert both text and numeric data into safety information. It will also support the development of visualization capabilities to enable causal/contributing factor analyses and risk assessment. In addition, tools and methods will be developed to integrate safety data from a number of disparate sources into a suite of system level models. The models will deliver products that allow users to evaluate system performance in near-real-time. Models and tools are based upon ASIAS data inputs and modeling. This supports a federally required Safety Management System (SMS) process managed by the FAA's Aviation Safety Organization (AVS). Risk mitigation strategies to address potential system safety risks are evaluated by the emergent risk forecasting activities in this portfolio to ensure that NAS sustainment and NextGen implementation does not introduce hazards into the NAS, while supporting the Administrator's Strategic Initiative – Risk Based Decision Making (RBDM).

A. Aviation Safety Information Analysis and Sharing (ASIAS)

- Establish an initial data sharing agreement with at least one Rotorcraft operator
- Draft and execute a governance model and Concept of Operations CONOPS in support of Unmanned Aircraft Systems (UAS) ASIAS pilot program to introduce UAS into ASIAS
- Deploy capability to automatically ingest ATC voice data into the ASIAS data sets
- Develop standards for Rotorcraft flight data sharing and develop requirements for tools to analyze Rotorcraft data
- Increase routine processing of Surveillance Broadcast Services data
- Mature the ASIAS architecture to support an expanded set of NextGen data as it becomes available for data ingest
- Deploy architectural enhancements to support the collection of small aircraft General Aviation (GA) data
- Establish architecture to support the Rotorcraft community using the existing ASIAS fixed wing community as a model
- Deploy Trend/Anomaly Detection Capabilities to find high risk safety events focusing on commercial operations (Part 121)
- Mature and deploy automated voice-to-text data classification models/algorithms for use in ASIAS safety topics and metrics

- Refine and develop new safety metrics using ASIAS Flight Story data fusion capability (e.g., Controller Workload, Separation Metrics, Overshoots during parallel operations, En Route Altitude Deviations)
- Develop tools and methodologies to automatically mine hard-to-find (not pre-defined) subgroups of flights with higher rates of safety precursor events
- Develop and implement a process to investigate known risks and safety issues that are specific for corporate/business GA communities
- Conduct a Directed Study of safety issues associated with DoD and civilian aviation operations, for example joint use airfields and/or operations in and around Military Operations Areas (MOA), or as directed by the ASIAS Executive Board (AEB)
- Process and derive an expanded set of safety data products (e.g., data fusion) required to support development and analysis of existing and/or emerging NextGen operational capabilities
- Incorporate non-US North American carrier data for US locations into ASIAS Benchmarks, Known-Risk Monitoring and Directed Studies
- Establish process for sharing of applicable ASIAS results and metrics with the FAA's Certificate Management Offices (CMOs) as approved by the AEB
- Initiate international region-to-region data sharing opportunities via ASIAS (e.g., ASIAS-to-European Safety Information Sharing Programs) as approved by the AEB

B. Systems Safety Management Transformation (SSMT)

- Provide a limited web-based portal that can provide access to the baseline risk analysis and the forecast or 'predicted' accident/incident risks based upon local operational data sources (such as radar, ADS-B and ASDE-X) and environmental conditions.
- Develop and publish an Annual NextGen portfolio assessment document of near-, mid-, and far-term enhancements and include the impact of other safety actions such as Rulemaking and the Commercial Aviation Safety Team (CAST) safety plan.
- Integrate hazard data and taxonomy into Event Sequence Diagrams/fault tree databases to link hazard risk management tracking software to the Integrated Safety Assessment Model (ISAM), creating a relational database that links hazards to historical accident/incident/occurrence rates. Provide reports that quantify the potential risk associated with SME identified hazards.

What Is This Program And Why Is It Necessary?

The System Safety Management Portfolio contains an information safety analysis and data sharing collaboration program for industry and government to proactively analyze broad and extensive data to advance aviation safety. It also contains research to develop a comprehensive and proactive approach to aviation safety especially as it relates to the implementation of NextGen.

A. Aviation Safety Information Analysis and Sharing (ASIAS)

The primary objective of ASIAS is to provide a national resource for use in discovering common, systemic safety problems that span multiple airlines, fleets and regions of the global air transportation system. ASIAS leverages internal FAA datasets, airline proprietary safety data, publicly available data, manufacturers' data and other data. ASIAS fuses these data sources in order to identify safety trends in the NAS, leading to a comprehensive and proactive approach to aviation safety in conjunction with implementation of NextGen capacity and efficiency capabilities. Safety insights from ASIAS analyses are communicated to the FAA and ASIAS participants and to others in the aviation community and are applicable to a broad range of aviation communities (e.g., commercial, general aviation, helicopters, Unmanned Aircraft Systems (UAS) airport operators, airport authorities) and other government agencies such as NTSB, DoD, and NASA.

B. Systems Safety Management Transformation (SSMT)

Systems Safety Management Transformation (SSMT) enables safety assessments of proposed NextGen concepts, algorithms, and technologies and provides system knowledge to understand economic, implementation, operational and performance impacts (with respect to safety) of NextGen system alternatives. This project supports the development and implementation of integrated safety management systems across the air transportation system to ensure that safety risk throughout the system is managed to an acceptable level. The activities in the SSMT Program include an Airport and Terminal Risk Baseline and Forecast models for all 35 major airports, an Integrated Safety Assessment Baseline and Forecasting Model that includes baseline event trees, fault trees and hazard data. This tool is used to provide annual safety metrics featuring the potential effect of NextGen initiatives, and to establish the requirements for safety mitigations in the system acquisition process. It also supports subject matter experts (SME) evaluation protocols for NextGen initiatives by providing linkages from SME estimates to actual historical accident and incident data. It also links these data to precursors that can be observed and tracked by ASIAS and a Hazard Risk Tracking system that supports the monitoring of safety baselines and forecasts for use by all FAA offices.

This development activity includes the expansion of information sharing and data analysis to identify and mitigate risks before they lead to accidents. New automated processes and models are required to facilitate advanced analysis of comprehensive data and will unlock new insight about potential safety risks.

The ASIAS program provides a unique capability to detect impacts of system performance anomalies around the NAS. Without the ASIAS program, manual processes would be required for detection of safety-significant events. Many of these events would grow in severity before they are detected, because some of the data that ASIAS collects cannot be manually processed, such as FOQA and surveillance data from radars.

Systems Safety Management Transformation (SSMT) provides the development required to improve system safety as air traffic grows to achieve the nation-wide goal of continuous safety improvement through implementation of an integrated safety management approach. This approach provides a proactive means for building safety into the air transportation system. By developing new analytical methodologies and leveraging state-of-the-art information technology, the FAA and its industry partners are able to monitor the effectiveness of implemented safety enhancements, establish baselines and trending capability for safety metrics, and identify emerging risks.

Safety information discovered through this portfolio will be used across the FAA and industry to drive improvements and support Safety Management Systems (SMS). Stakeholders will leverage insight to identify risk-reducing alternatives or changes to operations or processes as NextGen capabilities are deployed.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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

$17,000,000 is required to continue work in System Safety Management Portfolio in FY 2016 for the ASIAS and Systems Safety Management Transformation (SSMT) tasks.

Achievement of the ASIAS mission of a proactive data-driven approach to aviation safety will require development of capabilities to acquire access to existing and previously unattainable information sources, enhanced analytical methodologies and technical advancements to support the monitoring and identification of system level safety risks. Safety insights from ASIAS analyses are communicated to the ASIAS participants and, as authorized by the ASIAS Executive Board (AEB), to others in the aviation community. Participants will leverage insight to identify risk-reducing alternatives or changes to operations or processes. Implemented changes will reduce the risk of would-be accidents. ASIAS supports promotion and expansion of safety information efforts, particularly as a FAA-industry partnership and data-driven safety program to identify, prioritize and address risks and/or vulnerabilities before they lead to accidents, and it enables risk based decision making, a core element of the Administrator's Strategic Initiative to make Aviation safer and smarter.

This activity ensures that current NAS-wide operational safety is maintained and improved, and that the safety risk analysis and safety assurance functions required by SMS for future NAS implementation are delivered. Without this activity, data collection and analysis, and NAS-wide risk modeling, the definition of risk baselines and impacts of NextGen systems on risk could not be evaluated. Due to the complexity of the NAS and the number and diversity of NextGen improvements, traditional operational safety assessments are inadequate to ensure that safety goals will be met. NextGen concepts often transfer responsibility among domains within the system (from ATC to aircraft or other operators) and include the introduction of significantly new concepts and roles for all of the operators and stakeholders in the system. The ISAM capability provides an integration platform capable of reflecting the complexity of the new NextGen operating environment. The system can capture traditional accident and data and establish historical baseline information. The SSMT activities enable a systematic integration process from primary data sources such as local sensor data derived from radar and flight performance via FOQA. The SSMT programs also enable integration of SME inputs with simulations that have been based upon these primary data sources. SSMT provides a range of risk-analysis outputs at varying levels of detail to support multiple FAA stakeholders. These include supporting documentation for operational safety assessments of NextGen performance, inputs for validation exercises including human-in-the-loop (HITL) simulations, as well as high-level risk assessment results which measure overall system safety performance.

SSMT integrates the data from a number of disparate sources into system level models and provides products that will allow users to evaluate system performance in near-real-time. SSMT links the hazard assessments to occurrence models and ASIAS data in a standard model that is available to the entire FAA safety community. These program efforts support the federally mandated Safety Management System (SMS) process, managed by AVS. Risk mitigation strategies to address potential system safety risks are evaluated by the emergent risk forecasting activities in this portfolio to ensure safety in the NAS and the safety of NextGen implementation.

What Benefits Will Be Provided To The American Public Through This Request?

A. Aviation Safety Information Analysis and Sharing (ASIAS)

The primary benefit of the ASIAS program to the American Public is it contributions to the reduction of the aviation accidents and fatalities across a broad range of aviation communities (e.g., commercial, general aviation, rotorcraft, UAS). ASIAS has already discovered potential safety issues in the NAS that are being addressed in the near-term through procedural and airspace redesign. These issues have been used to assist in prioritization of NextGen systems to mitigate risk by the Optimization of Airspace and Procedures in the Metroplex (OAPM) program, Performance Based Navigation (PBN) program, and by the Commercial Aviation Safety Team (CAST) for the development of Safety Enhancements (SEs).

B. Systems Safety Management Transformation (SSMT)

SSMT has developed and deployed a standardized methodology to use Airport Surface Detection Equipment, Model X (ASDE-X) radar data to detect anomalous surface movement on airports and is currently being used by the ATO, Safety and Technical Training to identify and investigate runway surface safety issues. This methodology is now in use to verify the risk baseline for all airport surface operations in the NAS and to validate changes in the procedures required to implement NextGen changes for the ATO Safety organization. The ISAM is now the FAA official methodology for AVS and ATO's Safety and Technical Training Organization (AJI) to coordinate on risk assessment of NextGen. SME assessments with representatives of ATO, AVS, and industry have produced individual assessments of risk based upon the ISAM model environment.

This program has also successfully developed the requirements for integrated Hazard Risk Tracking Management System (HRTMS) within AVS and will publish requirements for integration across FAA lines of business within the next fiscal year. The results of the program are being used to identify and track hazard occurrences, link incident and accident data to hazard definition and identify precursor data monitoring requirements for risk management.

The SSMT program delivers detailed simulation models of NAS-wide operations, and each can be narrowed to address specific operations by facility type. These individual simulations of airport, terminal area and en route operations support the Integrated Safety Assement Modelling process that identifies risk precursors and creates an aggregate risk estimate. Many of the operational anomalies that are indicators of future risk can be now be detected and tracked due to the availability of new data via ASIAS and SSMT primary data source monitoring. The analyses enabled with these new data sources often demonstrate that conclusions reached by subject matter experts alone are at variance with real life. The improvements enabled by the SSMT programs in risk analysis provide a more accurate risk picture and better guidance for safety risk management to NextGen program implementation. The simulation models constructed using these improved data sources can provide superior operational and analytical support capabilities. These simulations are able to replay the historical events of interest and allow users to insert simulated events into the replay and generate new outcomes or consequences based upon the NextGen concept. These simulation capabilities lead to more effective and efficient risk management decisions.

The objective of the SSMT program is to provide "decision quality" analyses that support NextGen and other mission deployment decisions. Without this integration process, elaborate data collection efforts and operational safety assessments would still be isolated within individual lines-of-business and segregated from other potentially significant sources of information. Without integration, the consequences of the implementation decisions would suffer from a lack of system-wide data and review. This could result in delays resulting in increased design and implementation costs, and most importantly, degradation of safety. Integration of the analysis of these impacts of NextGen changes on safety likewise would not be facilitated using FAA's current Operational Safety Assessment methodology alone. The safety process is a stove-piped organizational level process and not historically designed to be cross-cutting.

The ISAM model is currently supporting the ANG office in concept readiness decision assessment process for the NextGen portfolio, and AVS is in the process of defining an acceptable NAS-wide risk baseline. The ISAM model also serves as a key organizational asset of the FAA and DOT in risk-based rulemaking activity.

SSMT provides support to all elements of the NextGen implementation program, including these specific requirements:

- Provide an efficient manner to identify track and mitigate localized risks (at the airport surface and terminal area) as NextGen operational improvements are integrated into the NAS
- Provide a system-wide integrated safety assessment capability to support the identification of safety and risk mitigation requirements for NextGen improvements during development and implementation
- Provide the environment and requirements for establishment of a FAA enterprise-wide hazard risk tracking system linked to operational performance data with common taxonomy and interoperability among lines of business

Detailed Justification for - 3A11 National Test Equipment Program (NTEP)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – National Test Equipment Program (NTEP)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
National Test Equipment Program (NTEP)	$3,000	$2,000	$4,000	+$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Hardware and Software Engineering Program Support	---	$3,000.0
b. Corrective Maintenance	---	500.0
c. Program Planning and Control	---	500.0
Total	Various	$4,000.0

For FY 2016, $4,000,000 is requested to replace obsolete test equipment. The funding provided will be used for engineering support required to evaluate new products, to procure replacement test equipment used to accomplish corrective maintenance/installation, contractor support to administer the program, and disposing of obsolete test equipment.

What Is This Program And Why Is It Necessary?

The National Test Equipment Program (NTEP) manages the modernization, distribution, calibration, and inventory of test equipment required to perform preventive and corrective maintenance, equipment installations and modifications, and service certifications in support of numerous National Airspace System (NAS) systems.

The NTEP is charged with procuring and maintaining the test equipment that ensures the NAS are operating to set standards by troubleshooting, repairing, and re-certifying both new and legacy systems. These systems include communication, automation, surveillance, power, navigation, and weather platforms whose sensitivity must be maintained within specific tolerances. Failure to achieve certification of critical NAS systems at an FAA facility as the result of poorly performing test equipment will result in the restriction of air traffic in the facility's air space and potentially cause major flight delays. The NTEP supports test equipment used in nearly 27,000 facilities throughout the NAS. However, a large portion of the equipment is either damaged or rife with supportability and maintenance issues which affect Mean-time-to-restore (MTTR), safety, maintenance cost, and inventory management for practically every system within the NAS. No other FAA program office or initiative currently addresses this problem.

DOT Strategic Goals – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The level of required funding will allow the FAA to incrementally replace obsolete test equipment and continue to support the FAA's mission.

What Benefits Will Be Provided To The American Public Through This Request?

The National Test Equipment Program's mission is to support the restoration of Air Traffic services by provided functioning test equipment throughout the NAS in order to provide reliable measurement data to the thousands of technicians using the equipment on a daily basis. Failure to provide these services will have a dangerously negative effect on the NAS as it poses a major safety risk to the technician as well as delaying the restoration of critical Air Traffic systems crucial for the protection of the flying public.

Detailed Justification for – 3A12 Mobile Assets Management Program

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Mobile Asset Management Program
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Mobile Assets Management Program	$3,000	$4,000	$4,800	+$800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Acquire Two Deployable Air Traffic Control Facilities (DATCF)	2	$3,750.0
b. Continue Upgrade/Perform Technology Refresh to Existing Mobile Assets	---	850.0
c. Decommission Assets That Are Beyond Their Useful Life	---	200.0
Total	Various	$4,800.0

For FY 2016, $4,800,000 is requested to ensure that a sufficient number of the FAA's mobile assets are available to maintain and restore continuity of aviation operations, such as:

- Acquire two DATCFs
- Replace or supplement facilities damaged or destroyed by natural or man-made disasters
- Support emergency or special event requirements
- Support scheduled maintenance and modernization programs

What Is This Program And Why Is It Necessary?

The MAMP provides for the continuity, restoration, or augmentation of NAS operations at the FAA operational facilities, such as air traffic control towers (ATCT), terminal radar approach control facilities (TRACON), remote transmitter/receiver sites, remote communications air/ground sites, and other sites that experience unexpected or planned system outages. The program will acquire new, operational mobile facilities to replace existing assets that have exceeded their useful life and to fill capability gaps in the existing inventory. The program will provide life-cycle support that will consist of equipment repairs and needed upgrades to ensure conformance to the FAA operational standards. Additionally, mobile assets provide temporary facilities to support air traffic operations when a fixed facility must be taken down during modernization projects and major equipment outages.

The MAMP was established in response to a visible inability to support the continuity of NAS operations in the event of natural or man-made disasters. The FAA established the MAMP because there was no centralized, national program to manage mobile assets and provide for their life-cycle support. As a result, the FAA's mobile assets, specifically the Mobile Air Traffic Control Towers (MATCTs), have deteriorated to the point where many are not operational as a result of inconsistent preventative, pre-deployment, or post-deployment maintenance, and insufficient funding and management oversight. This lack of oversight has resulted in the MATCTs containing systems that are no longer supported by the FAA logistics center. Procedures that are currently followed for life-cycle support and management are not standardized across the FAA's service areas, leading to varying degrees of readiness and availability between the three Service Areas. This funding will help to ensure that mobile assets with current NAS systems will be available and ready to meet emergency or special events requirements when they occur.

The inventory of significant mobile assets currently stands at 45 assets. Of these 45, 32 (71 percent) are fully operational and capable of performing their mission. Of the MATCTs, which are the most critical, most costly, and the largest of the mobile assets, three (33 percent) are currently inoperable and in a crisis could not be deployed immediately to perform the mission for which they were designed. Additionally, eight out of these nine critical large MATCTs are at or beyond the end of their life cycle and are populated with equipment that is no longer supportable.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$4,800,000 is required to ensure that a sufficient number of the FAA's mobile assets are available to maintain and restore continuity of aviation operations, such as:

- Under FAA Order 6000.15, the agency is required to procure and maintain mobile assets that are capable of providing and supporting tactical ATC services that include communication, navigation, surveillance, infrastructure support, and mission support (e.g., command centers)
- Meet emergency or special event requirements
- Temporarily replace facilities destroyed by natural or man-made disasters
- Augment or establish air traffic control to reduce safety risk

What Benefits Will Be Provided To The American Public Through This Request

The American public will benefit by proficient restoration of air traffic control operations within hours of arriving on-site. The program will be working when it is able to ensure the availability and readiness of mobile assets to maintain or re-establish continuity of air traffic operations in response to emergencies and natural disasters. The FAA's mobile assets have been deployed to support relief efforts during natural disasters like the earthquake in Haiti or the hurricanes that hit the Gulf Coast each year. These assets have played a significant role during disasters such as the recovery efforts following the space shuttle Columbia tragedy and forest fires in Colorado and on the West Coast. Mobile assets are currently deployed to support several tower renovation projects including Isla Grande, PR, Paducah, KY, and Montgomery Field in San Diego, CA.

Detailed Justification for - 3A13 Aerospace Medicine Safety Information System (AMSIS) Program

What Is The Request And What Funds Are Currrently Spent On The Program?

FY 2016 – Aerospace Medicine Safety Information System (AMSIS) Program ($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Aerospace Medicine Safety Information System (AMSIS)	$3,900	$3,000	$3,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Prime Mission Product Development	---	$2,718.0
b. Program Management	---	132.0
c. System Engineering	---	150.0
Total	Various	$3,000.0

For FY 2016, $3,000,000 is requested to fund AMSIS solution implementation. The AMSIS Final Investment Decision (FID) is planned for the first quarter of FY 2016. Award of a prime contract will immediately follow the FID. FY 2014 and FY 2015 funding will support investment analysis, requirements definition and development, system engineering, and program management support contracts.

What Is This Program And Why Is It Necessary?

The Office of Aerospace Medicine (AAM) is responsible for medical certification of airmen; the medical clearance of air traffic control specialists; oversight of aviation industry drug and alcohol testing programs; designation, training and oversight of aviation medical examiners; FAA employee substance abuse testing; airmen aviation physiology and survival training and education; the FAA Employee Health Awareness Program; and aerospace medicine and human factors research. These programs are carried out by AAM at FAA Headquarters, the Civil Aerospace Medical Institute, in the regional Aerospace Medicine divisions and at the three Industry Drug Abatement Compliance and Enforcement Centers. AAM has designed, developed and implemented information systems to efficiently process and manage safety, health and research information collected by FAA's regulatory programs. However, to ensure that these systems are maintained and kept up-to-date and/or replaced as necessary, lifecycle funding is needed.

AAM requires future funding to meet the AAM medical safety regulatory mission; new information systems architecture; and to design, procure and deploy next generation medical information systems. To support existing services AMSIS must deploy a technical refresh strategy. AAM proposes to establish the Aerospace Medicine Safety Information System (AMSIS) for all AAM Divisions, designees, and others to easily and quickly access data from virtually any location, make knowledge-based data easily accessible, facilitate management and workforce decision making.

The legacy systems have the following performance gaps (as cited below) and mission shortfalls, which must be remedied for the continued support of the regulatory programs that support aviation safety, employee health programs, and research programs:

- Data and Information Accessibility/Knowledge Management: Lack of ability to easily access all information sources for current and historical safety-related data and workforce knowledge
- Collaboration between AVS, Designees, and Applicants: Geographically dispersed personnel, designees, and applicants unable to work effectively together based on standard business processes
- Collaboration with International Aviation Community: No capability to interact with peers in the international community in real-time
- Data Analysis: Lack of automated analysis tools to manipulate data; identify trends, and problem areas
- Information Quality and Standards: Lack of record/audit tracking as required by medical or security record keeping demands
- Strategic Resource Optimization: Limited, inconsistent, cumbersome, and time consuming methods to track and allocate resources
- Technical Knowledge Transfer: Vast amount of information only available on paper or in local computer systems

AMSIS will address the following Mission Shortfalls within the current AAM subsystems:

- Electronic Medical Records: The Federal Government and private medical entities are moving towards electronic medical records. The AAM Subsystems are not architecturally equipped to be part of this network
- Social Security Matching: Ability to cross-reference AAM data with other government agencies, such as the SSA, Veterans Administration (VA), and the Department of Labor (DOL)
- Outdated Pathology Coding Methodology: AAM is using a non-standard pathology coding methodology. To be consistent with the rest of the international medical community, AAM needs to update its current pathology coding method to match the International Statistical Classification of Diseases and Related Health Problems (ICD) standard
- AMSIS future system must be aligned with OMB/DOT/FAA architecture policy and security standards

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities

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

The information systems currently in use today were developed in the 1990's. These information systems are becoming obsolete. The information technology must be aligned with OMB/DOT/FAA information systems architecture and security standards. AAM must also align these systems with the national health information technology standards and security requirements for medical information systems developed by the Federal government, private sector and voluntary standards organizations, including the International Organization for Standardization (ISO). The systems must successfully and securely interface with approximately 4,500 health care providers designated by the FAA, known as Aviation Medical Examiners, who perform pilot and ATCS medical examinations. AMSIS proposes to implement these changes in a "Phased" approach.

What Benefits Will Be Provided To The American Public Through This Request?

The information technology will be aligned with OMB/DOT/FAA information systems architecture and security standards.

Because these are medical information systems AAM must also align these systems with the national health information technology standards and security requirements for medical information systems developed by the Federal government, private sector and voluntary standards organizations, including the International Organization for Standardization (ISO).

Detailed Justification for - 3A14 Tower Simulation System (TSS) Technology Refresh

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Tower Simulation System (TSS) Technology Refresh
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Tower Simulation System (TSS) Technology Refresh	$0	$3,000	$7,000	+$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Variable Quantity/TSS Hardware and Software	17	$7,000.0

For FY 2016, $7,000,000 is requested to continue procurement and replacement of obsolete technology within the current Tower Simulation Systems (TSS) system to decrease ongoing support demands and costs.

The TSS program will provide technology refresh of obsolete tower simulation equipment. The current system is over five years old and is becoming more expensive to operate and maintain. The project screens will be replaced with updated visual technology and video processors with current graphics and image processors to increase fidelity, processing power, and potentially decrease footprint size and reduce maintenance costs. FY 2015 funding will support initial procurement and installation for 10 locations. TSS provides support for controller qualification and skill enhancement training and can be used as an aid in site surveys for proposed new construction on or near the airfield as well as assisting in the planning of new runways or changes in local arrival and departure procedures in an accurate and safe simulated environment.

What Is This Program And Why Is It Necessary?

The FAA developed a plan, "A Plan for the Future: The FAA's 10 - Year Strategy for the Air Traffic Control Workforce," which is released each year on March 31. It calls for greater efficiency in training procedures and identified a need to speed the training process while maintaining the high established standards. It is the goal of the TSS technology refresh program to address these needs and continue to provide exceptional training while reducing time-to-certification. These goals depend on creating a more efficient training program.

According to the "Controller Staffing Plan", the agency aims to reduce the overall cost of training to Certified Professional Controller (CPC) status by 33 percent. This program results in a more efficient training process, which accounts for producing CPCs in less time and the Agency's fulfillment of its goals.

The TSS system provides an essential role within the NAS as well as satisfies the simulation training requirement identified in Joint Order 3120.4M. The TSS system is currently deployed at 27 sites and supports 135 tower facilities. These facilities provide support to both local and district Air Traffic qualification, contingency and skill enhancement training.

TSS provides realistic training for Tower Air Traffic Controllers in a non-operational environment. The Tower Simulator System is a full-scale ATCT simulator providing an interactive, highly realistic environment for controller training. The Tower Simulator System can support up to four simultaneous positions including local, ground and flight data/clearance delivery and coordinator. Trainees can prove initial proficiency at one of the four tower cab roles in the simulator and then work in that role as a developmental in the tower under the supervision of an on the job instructor (OJTI) and Front Line Manager (FLM) in preparation for certification. Realistic scenarios are generated, at the direction of an instructor. The simulator provides synthetic voice response and voice recognition to allow the student to talk to the simulator. The voice recognition system interprets the student's commands and translates them into actual aircraft movement depicted on the screen. The Tower Simulator acknowledges students' instructions using synthetic voice. Under certain complex traffic scenarios pseudo pilots respond directly to the student overriding the voice response capability. A recorded playback feature allows instructors to review and evaluate performance with the student after the training session.

The TSS is capable of displaying airport visual representations. For example, a simulator in Los Angeles can, within minutes, display and simulate operations at any airport for which a database has been created. The TSS is deployed in a hub and spoke methodology. Satellite facility within commuting distance of the hub can have a database on file at the TSS location. This allows one simulator to train developmental controllers from several nearby airports.

The impact to training operations is significant. Training no longer depends on the density or complexity of actual air traffic operations. Preemptive intervention on the part of an instructor to avoid a possible hazardous situation is eliminated. The student "works through" the scenario to an eventual successful, marginal or unsuccessful outcome. Scenarios can be repeated to build habits and reactions to potential operational errors with the ultimate goals improve safety and efficiency.

The TSS does not interact with live air traffic control operational systems and poses no threat to service interruption. The system creates an entirely new environment that operates away from and independently of ongoing air traffic operations. It realistically replicates operations that enable training in a safe environment. In addition to initial training, the TSS provides for refresher training to heighten awareness of controllers from repeated exposure to seldom seen operations and airport conditions. Before departing on a change of assignment, transferring certified controllers may prepare for and actually train on the operations they will encounter at their new assignment thereby greatly reducing the training time required when they arrive.

The TSS is also used in non-training applications. It aids in site surveys for proposed new construction on or near the airfield as well as assisting in the planning of new runways or changes in local arrival or departure procedures in an accurate and safe simulated environment.

DOT Strategic Goal – Organizational Excellence

- Diverse and collaborative DOT workforce.

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

The TSS technology is an integral component of Air Traffic Controller training providing a higher level of training quality and effectiveness, while decreasing training times and costs at specific locations. Components need to be replaced as the demand of our controller workforce and ability to meet shifting geographical demand increases.

This ongoing demand requires an investment in training systems technology and infrastructure to deploy and maintain a higher quality of systems to meet training demands. The current technology deployed for TSS is becoming obsolete and support costs are increasing. FAA is evaluating how to make the current hub and spoke model more efficient and effective.

The TSS Program office will procure hardware for approximately 10 locations that includes transitioning the large rear/front projection screens to newer technology to decrease escalating maintenance costs on obsolete equipment. Additional funds will be required in subsequent years to replace obsolete equipment at the remaining 17 locations.

What Benefits Will Be Provided To The American Public Through This Request?

TSS has been deployed at 30 operational locations in the NAS today. Initial data analysis indicates a decrease in On the Job training times ranging between 15 - 40 percent at specific locations.

Surveys conducted by the program offices reflect qualitative benefits in training that are not logged through a data collection program. The benefits are familiarization of operations, phraseology and best practices for procedures. Facilities have also indicated the value of evaluating new procedure and communication with airports and airlines on the impacts of construction and new procedures.

TSS provides the following benefits:

- Reducing the time required to attain CPC status and achieving increasing levels of certification will reduce training costs
- Reducing the time to achieve CPC status by providing developmentals the opportunity to practice seldom-used skills and to take advantage of low traffic levels by practicing complex scenarios in the simulator
- Tower simulation training will provide increased flexibility in scheduling, more rapid response to facility staffing needs, and reduced stress on training resources, such as OJT instructors
- Enhanced simulation and inherent simulation capabilities also provide for more standardized instruction, unbiased assessment of performance, mitigation of weaknesses, and useful remedial and proficiency training
- Provide a functionally compatible and realistic simulation environment that closely duplicates traffic situations/conditions to teach and test required operational skills and procedures
- Provide the controller with the opportunity to experience and practice important skills, some of which are seldom used under normal air traffic conditions simulation training will take advantage of a broad variety of training scenarios in a constant and consistent manner
- Through enhanced voice recognition technology, a potential reduction in remote pilot/pseudo pilot costs can be achieved
- Systems are used to re-create procedures that may require recurrent training or communication of best practices in all facilities
- Systems used for safety studies to identify risk and mitigate hazards associated with new airport construction and development of new air traffic procedures
- Development of airport models can be utilized for technical operations ground program by providing airport familiarity of new airport changes

Detailed Justification for: 3B01 Aeronautical Center Infrastructure Modernization

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Aeronautical Center Infrastructure Modernization
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Aeronautical Center Infrastructure Modernization	$9,000	$13,180	$15,200	+$2,020

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Major Building System Replacement (Seismic and Wind Bracing, Roof Replacement, Boiler Replacement, Fire Suppression)	1	$10,370.0
b. Telecommunications Technology Refresh (routers, switches, fiber, security)	---	2,480.0
c. National Airspace Systems (NAS) Integration and Technical Support Services	---	2,350.0
Total	Various	$15,200.0

For FY 2016, $15,200,000 is requested for the following:

- $10,370,000 is requested for major building system replacement in the Multi-Purpose Building (Bldg 24); a 211,203 square foot building constructed in 1972 that has not had major renovation in 41 years. The funding requested is for the addition of fire detection/suppression systems, the addition of seismic and wind bracing to support the building structure, and replacement of roof and boilers.
- $2,480,000 is requested to provide technology replacement of telecommunications at the Aeronautical Center. Over a six year phased cycle, funding will replace the telecommunications network switches, routers, internet filtering hardware for redundancy, reliability, security and availability in a total of 78 buildings. Replacements in 61 of the buildings will be complete in FY 2016. Included among the tasks are security assessments, upgrades, disaster recovery testing, installation of fiber/copper cable for network diversity and availability.
- $2,350,000 is requested to provide NAS Integration Support Services and Technical Support Services Construction inspectors for construction renovation.

Major tasks anticipated for completion by end of FY 2015:

- Award renovation construction contracts for the Environmental Systems Support Building (Bldg 152) to replace mechanical systems, upgrade electrical wiring, plumbing, and provide energy efficiencies in lighting and insulation.
- Award phased relocation construction of the Airport Surveillance Radar (ASR-8), ASR-9/Secondary surveillance and communication system (Mode S), and Common Air Route Surveillance Radar (CARSR) radars.
- Complete Phase 2 (of 4) renovation construction of the Systems Training Building (Bldg 23) to add seismic and wind bracing to the building, replace mechanical systems, (Heating, ventilation, air conditioning (HVAC), also boilers, chillers), replace electrical systems, plumbing, and provide energy efficiency in lighting and insulation.
- Complete installation of building system replacements from contracts awarded in prior year.

- Complete telecommunications network design, test, reconfiguration, security assessments, firewall upgrades, disaster recovery testing and duct banks/fiber installation for approximately one quarter of the campus.

What Is This Program And Why Is It Necessary?

The Aeronautical Center Infrastructure Modernization program funds renovation and restoration of leased and owned facilities at the Aeronautical Center in Oklahoma City to ensure they remain viable for the mission of present and future FAA employees, students, and contractors. Funding from this program allows renovation of facility space used by Air Operations, Engineering Training (Radar/Navigational Aids (Navaids)), NAS Logistics, Airmen/Aircraft registration, Safety, and Business Services. Program funding will be used for facility renovation, building system and telecommunications infrastructure replacement.

The Aeronautical Center is the FAA's centralized location that supports the FAA NAS and comprises 1,100 acres of leased land with approximately 3.4 million square feet of space under roof, supporting the work of 7,300 FAA employees, students, and contractors on a daily basis; and approximately 11,000 visitors annually; the largest concentration of FAA personnel outside of Washington D.C. Many buildings are approximately 50 years old and in need of renovation and building system replacement.

This program extends the service life of Aeronautical Center buildings through renovation and major building system replacement where FAA missions are performed: Eighty percent of the space at the Center directly supports the Air Traffic Organization (ATO). Thirteen percent of the Center space supports DOT and FAA Business Services and includes DELPHI/Prism, Castle Data Center Operations, Accounting Operations, Acquisition, the ATO Data Center, and Aviation Safety/Research.

Some NAS support functions are conducted in outdated structures and in buildings that do not meet current building codes. Delays to renovation and replacement of building systems have consequences that include leaking roofs, deteriorating plumbing, malfunctioning heating, ventilation, air conditioning, and non-compliance with life safety codes that can disrupt work, cause NAS automation and technology failures, risk occupant health and safety, require emergency repairs, and loss of productivity.

The aging infrastructure, in combination with growth and improvements to the NAS and business services, affects Aeronautical Center personnel and facility requirements in which they work. This program extends the useful life of facilities at the Center for 25 - 30 years, for current and future generations of the FAA work force.

DOT Strategic Goal – Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

There is a significant backlog of facility improvements that need to be addressed to prevent further deterioration of buildings. The backlog can be addressed with systematic funding to improve facility conditions and assure the aging infrastructure remains viable in future years. The required funding supports these improvements.

What Benefits Will Be Provided To The American Public Through This Request?

Renovating aging facilities at the Aeronautical Center allows space efficiencies for additional functionality, personnel, and systems. Center facilities are cost effective and lower in cost than comparable General Services Administration (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 to 30 years, ensuring a viable future for FAA at these facilities. 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, in combination with the lease, benefits the NAS and avoided $14.8 million in FAA costs during FY 2013 through the following:

- Lower lease and operating cost (includes utilities (gas, water, electric), janitorial, cleaning, security) costs in FY 2013 than other alternates: $17.26 per net square footage (nsf) at the Mike Monroney Aeronautical Center (MMAC), when compared with Oklahoma City GSA leased facilities at $25.04 per nsf
- Allowing flexibility and growth to support National Airspace (NAS) requirements. The Aeronautical Center has one or two of every legacy and new systems in the NAS that are used for Air Operations flight checks, engineering, system testing, training, NAS logistics, aviation regulation, registration, certification, aviation and transportation safety research
- Supporting NAS operations/maintenance, current and future ATO initiatives
- Decreasing energy and repair operations costs

Detailed Justification for - 3B02 Distance Learning

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Distance Learning
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Distance Learning	$1,000	$1,500	$1,500	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Services to Support Distance Learning Platforms (DLP) Procurement	---	$600.0
b. Purchase and Install DLPs	---	900.0
Total	Various	$1,500.0

For FY 2016, $1,500,000 is requested to fund contract services and DLP hardware procurement to modernize 420 facilities with 565 DLP's.

Major Components:

- Administrate contract services to develop, maintain configuration control, and deploy DLP hardware to field sites.
- Procure, configure, and deploy 565 Distance Learning Platforms to Air Traffic learning center field facilities. This action provides for the delivery of some or most of the initial, refresher, operator, and maintenance training for various FAA Capital Investment Programs such as En Route Automation Modernization (ERAM), Standard Terminal Automation Replacement (STARS), Airport Surface Detection Equipment – Model X (ASDE-X), and Airport Surface Surveillance Capability (ASSC).

What Is This Program And Why Is It Necessary?

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.

The Distance Learning program will provide for technology refresh of Distance Learning Platforms (DLP) (previously-CBI Delivery Platforms) at all DLP Learning Centers, increase connectivity, and upgrade network multimedia support and services. The system consists of about 1,100 Learning Centers located at virtually every FAA facility around the world. The FAA is providing the technology refresh of the DLP's for two reasons:

- To support high-performance media and simulations required in many lessons
- To replace hard to obtain, obsolete parts for current platforms

The technology refresh is accomplished in a phased, multi-year approach.

This program reduces the cost of training to maintain and operate the National Airspace System (NAS) and to perform Air Traffic operations. This program provides the infrastructure to deliver simulations and training to all FAA employees via DLP and FAA Academy Aviation Training Network (ATN). The largest groups of DLP users are Technical Operations technicians and Air Traffic controllers. This program provides productivity improvements for Air Traffic Organization (ATO) employees by shortening the time to achieve full performance and certified employees and to maintain performance and certification. The time reduction for training is based on reduced time for training and by delivery of training at the job site thus avoiding travel time to the Academy or factory schools.

All Air Traffic Controllers accomplish refresher/initial training on the DLP's. For example, at the En-Route facilities, the DLP systems provided for approximately 300,000 course completions in FY 2012. Many facilities require a monthly refresher for specific local issues that are accomplished on the DLP systems. Most of the ATO Technical Operations Technical Training Resident courses offered at Mike Monroney Aeronautical Center (MMAC) require DLP courses as prerequisites. Additionally, the DLP, 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 is for the scheduled technology refresh cycle to replace DLP's at the Air Traffic Terminal field sites and Federal Contract Tower field sites.

The Distance Learning program supports the FY 2013 Destination 2025 Plan. Distance Learning supports the "Next Level of Safety" because it will strengthen and improve technology, infrastructure, and training, to reduce the risk of accidents from all causes in all phases of operation.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The requested funding is needed to replace DLP equipment for the scheduled life cycle technology refresh to replace unsupportable equipment used for the DLP Training field sites. 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, DLP's would not be replaced and system degradation and/or Platform inoperability 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.

DLP's must be replaced when warranties expire for the following reasons:

- To decrease the risk of extended training platform downtime at field sites (75 percent of field sites are single platform sites)
- Less overall maintenance support cost vs. maintaining a stock of spare parts

What Benefits Will Be Provided To The American Public Through This Request?

This program reduces the cost of training required to maintain and operate the NAS and to perform Air Traffic operations. This program provides the infrastructure to deliver simulations and training to all FAA employees. The Distance Learning Program through the Distance Learning Platforms is currently providing well over $10 million per year in savings. The Aviation Training Network (ATN) is providing an additional $8 million in cost avoidance per year. The $8 million ATN figure was derived by averaging the last 12 years of savings in student travel costs.

Executive Summary – Facilities and Equipment, Activity 4.

What is the Request and What Funds are Currently Spent on the Program?

The Facilities and Equipment (F&E) Activity 4 program is requesting $225,700,000 for FY 2016, a decrease of $100,000 (less than .01 percent) below the enacted FY 2015 level. Of this funding, $5,000,000 is requested to continue to transform current digital aeronautical information in conformance with international standards and NextGen objectives. This transformation will enable the near real-time processing of such data to improve mapping and flight planning, as well as the accuracy and timeliness of ATC instructions.

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

- Program Leases – Funds over 2,800 facility and land leases in support of essential National Airspace (NAS) requirements.
- Mike Monroney Aeronautical Center Leases – Funds warehouse, administrative office space, and training facilities that support the mission of 7,300 employees, contractors, and students.

Activity 4 funding provides mission support services for the modernization of air traffic control, safety, regulation, and information security requirements. The funding for Activity 4 programs support:

- Major support contracts that cross programmatic, functional, and organizational lines
- System-engineering, logistics, requirements analysis, and systems management for the overall NAS, and safety, security functions throughout the FAA.

What Is This Program And Why Is It Necessary?

This Activity provides mission support services that cross FAA organization and functional lines. 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. In addition, this funding provides technical and installation support to assist the FAA's technical workforce in handling a surge in demand for short-term programs/projects that are vital to managing the volume of diverse systems and equipment associated with NAS modernization.

FAA requests 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 funds many of the mission support activities that FAA must perform to effectively operate and maintain its Air Traffic Control operation. FAA will use the funding to procure the additional systems engineering skills and lease facilities and equipment required to complete mission. Activity 4 can be viewed as an overhead account for the overall F&E budget.

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

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

Funds are requested for a variety of purposes under Activity 4 including equipment installation; research, development and demonstration of new technologies; facility leases; systems engineering support; and program management services. In many cases, it is more efficient for FAA to contract for a portion of support services and lease facilities to obtain the personnel and infrastructure needed to meet current requirements than to hire additional permanent staff and procure land and buildings. Activity 4 funding enables the agency to flexibly procure the additional resources needed to meet current demand while not substantially increasing fixed operating costs.

What Benefits Will Be Provided To The American Public Through This Request?

This program has been successfully implemented for over 15 years. FAA has demonstrated that this is an effective way to allocate program costs across functional and organizational lines. Under this approach, FAA has achieved management efficiencies while obtaining the expertise needed to augment in-house resources.

FAA revalidates support contract requirements annually. Funding on various initiatives changes based on FAA priorities and requirements. These FAA resources have demonstrated the ability to quickly reallocate resources to support FAA needs to support the overall mission of Air Traffic Control operation.

Detailed Justification for - 4A01 System Engineering (SE2020) and Development Support

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – System Engineering (SE2020) and Development Support
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
System Engineering and Development Support	$34,315	$34,504	$35,000	+$496

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. System Engineering (SE2020) Contract	---	$30,000.0
b. Program Evaluation	---	400.0
c. Computer Services	---	1,600.0
d. ATC/ANF Systems Support	---	3,000.0
Total	Various	$35,000.0

For FY 2016, $35,000,000 is requested to provide technical contract support services which will ensure sound systems engineering practices and business case development processes, instrumental to the safety, efficiency, and security of the NAS.

The System Engineering and Development Support program 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 while reducing overall operating costs.

a. System Engineering (SE2020) Contract
   - Provides critical support activities which complement NextGen Air Transportation System programs, which includesConfiguration Management, Infrastructure Roadmaps, Operation Planning, Requiements Engineering, System Engineering Services, Enterprise Integration Services, Forecast Analysis, and Investment Planning and Analysis
   - Support for critical programs such as NAS Enterprise Architecture (integrate and align the Enterprise Architecture portal), Segment Implementation Plan, and Safety Process Improvement are procured through this budget line item.

b. Program Evaluation
   - Provides cost estimating, operations research and business case analysis in support of investment analyses for NextGen

c. Computer Services
   - Supports application and upgrades to program management financial tools

d. ATC/ANF Systems Support
   - Supports technical analysis and oversight of acquisition programs goals and performance reporting

What Is This Program And Why Is It Necessary?

The creative and innovative workforce will develop and enhance software, engineering, and safety tools to help improve the efficiency of the agency's NAS. The research of emerging procedures and technologies will help to determine the best way to develop and deploy critical NextGen initiatives. These activities include demonstrating that NextGen procedures and operational changes will work on a large scale within the current and evolving air traffic system.

The required engineering support consists of disciplines ranging from systems requirements and system modeling to transition and human resource planning. In addition, automated data processing and information resource support is required to support 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 are 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.

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

The System Engineering and Development support budget line item provides future enhancement of the Air Traffic System by establishing and documenting the FAA's Enterprise Architecture (EA) requirements. The EA is the blue print for the future air transportation system and must be documented clearly and accurately. This program assists in developing, delivering, and implementing guidance to move forward the engineering and prototyping effort for NextGen and the transition to NextGen.

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.

What Benefits Will Be Provided To The American Public Through This Request?

This request will support the agency's goals of improving aviation safety, security, and efficiency while increasing capacity and productivity by providing technical assistance through contracts for various programs. The technical assistance will provide support for enhancing software tools, integrating and aligning the Enterprise Architecture portal, along with updating infrastructure roadmaps annually.

Detailed Justification for - 4A02 Program Support Leases

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Program Support Leases
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Program Support Leases	$42,100	$43,200	$46,700	+$3,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Operational Leases	---	$46,700.0

For FY 2016, $46,700,000 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 2,900 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
- Funding for leased access roads and easements providing ingress and egress to and from leased facilities to include perpetual easements
- 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, land surveys, and other costs associated with the acquisition and management of real property assets
- Funds for costs to relocate offices, facilities, personnel, and equipment
- Funds to downsize, consolidate, or combine multiple offices when technically feasible and economically advantageous
- Funding for the development of business tools to enhance real estate acquisition and management activities and for implementing program efficiency practices
- Funding for costs associated with real property lease terminations and equipment disposals
- Funding for testing and studies (environmental, suitability, sustainability, cost-effectiveness, etc.) in connection with the leasing, purchasing, usage, management, and disposal of real property

What Is This Program And Why Is It Necessary?

To operate the NAS, FAA utilizes more than 2,900 rentable real estate leases since the majority of its facilities reside either on leased land or in leased building space. The Program Support Lease program requests funds to meet contractual obligations including rental payments or other requirements to provide the necessary real property rights for land, tower space, aerial easements, and technical operational space for these leases. Without these property rights FAA could not operate the NAS.

Leases for building space include those for planned, constructed, and newly finished Air Traffic Control Towers. The FAA must also obtain restrictive aerial easements or 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, rent escalation clauses written into leases, and market value adjustments of expired leases through renewal negotiations.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$46,700,000 is required to fund rent payments for the projected total real estate lease portfolio, pending judgments for fee condemnation court awards, and costs associated with real property lease terminations and equipment disposals. This program also pays costs for the reconfiguration of a space facility if a reduction in space reduces the footprint for better space utilization and cost savings. Many of the leases being renewed after 20 years are in areas targeted for development with escalating lease costs since the original lease was executed. Some of these increases for lease and purchase costs are the results of wind turbine development, sophisticated bankers and financial lessors, and commercial development in the area. Maintaining the status quo for lease costs is difficult. In some cases rental payments must continue even after decommissioning of the facility because the requirements for environmental reporting and site restoration have not been completed in accordance with the terms of the lease. Costs associated with real estate acquisition and disposal such as surveys, appraisals, appraisal reviews, environmental reports, and title work continue to rise. Large investors are moving into many areas and buying properties occupied by the FAA and are demanding higher rents.

According to the Acquisition Management System (AMS), purchase is the last option if a negotiation impasse exists. If this option is removed due to lack of funding, the Government will incur greater risk and expense through inverse condemnation or be forced to negotiate rates far above market values including possible legal actions. Funds required for this Program are budgeted to include rental costs, associated lease costs (appraisals and surveys), environmental costs, restoration costs, and purchases. These are all essential to continue with our contractual obligations.

What Benefits Will Be Provided To The American Public Through This Request?

Sufficient funding is available to make rent payments for all the real estate leases for NAS operational facilities. Funding for the implementation of co-location, consolidation, and oversight measures are an integral part of this program in order to achieve long-term savings.

Detailed Justification for - 4A03 Logistics Support Services (LSS)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Logistics Support Services (LSS)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Logistics Support Services (LSS)	$11,500	$11,500	$11,000	-$500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Logistics Support Services (LSS)	---	$8,580.0
b. Acquistion Support Services	---	2,420.0
Total	Various	$11,000.0

For FY 2016, $11,000,000 is requested to fund contractor-supplied logistics and acquisition support services.

What Is This Program And Why Is It Necessary?

Through the LSS program, the agency utilizes contractor-supplied services to perform real property acquisition and leases, materiel management, contracting activities in support of FAA Capital Investment Plan (CIP) projects, and to 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 the FAA regions and centers. The LSS program provides critical support personnel involved in the acquisition of new or upgraded facilities, including air traffic control towers and Terminal Radar Approach Control Facilities (TRACONs), throughout the National Airspace System (NAS). 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 directly supports improved financial management while delivering quality customer service. Specifically, the program provides key support functions which enable the FAA to manage real property assets, maintain a clean audit opinion, and plan the execution of acquisition activities supporting the NAS. These functions are performed throughout the three Service Areas (Eastern, Central, and Western), the FAA Technical Center, and the FAA Aeronautical Center.

The FAA has a serious shortage of government logistics and acquisition personnel at regions and centers to manage real estate, acquisitions, and materiel for NAS modernization and to capitalize agency assets as required by the agency's strategic plan. Without adequate logistics and acquisition 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, the FAA will not be able to adequately document the capital cost of FAA facilities, or comply with accounting standards set by the Government Accountability Office (GAO) that could put the achievement of a clean audit opinion at risk.

Related project management goals include:

- Complete 80 percent of the annual real property inventory validation effort
- Designate 75 percent of the disposed real property assets as "retired" within 30 days of the date the disposal forms are received from the Air Traffic Organization (ATO)
- Capitalize 92 percent of all personal and real property capital assets within 65 days of date placed in service
- Capitalize 90 percent of all purchase orders within 45 days and award 90 percent of all contracts (over $100,000) in less than 180 calendar days from the time a purchase request is received from the requiring organization

DOT Strategic Goal – Organizational Excellence

- Diverse and collaborative DOT workforce.

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 materiel management, significantly reducing or even eliminating the improvement gains made over the last several years.

What Benefits Will Be Provided To The American Public Through This Request?

The effectiveness of the LSS contract is best demonstrated through the success of the clean audit opinions achieved by FAA from 2010 through 2013. During this time period, LSS resources were utilized across the three service areas, including the nine regional offices located within the three service areas, the FAA Aeronautical Center, the FAA Technical 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. As a direct result of the LSS staffing support, these FAA assets were processed in a timely and accurate manner. Without such support, FAA might have missed the specified processing metric of 80 percent of the assets within 65 days potentially impacting the overall audit opinion rendered by the DOT Inspector General (IG).

Detailed Justification for - 4A04 Mike Monroney Aeronautical Center Leases

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Mike Monroney Aeronautical Center Leases
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Mike Monroney Aeronautical Center Leases	$17,900	$18,350	$18,800	+$450

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Annual Rent for Leased Land/Buildings/Sustainment/Insurance	1	$13,900.0
b. Replace Hangars 8/9 Lighting/Electrical Distribution Controls/Thermostats	2	2,000.0
c. Replace Building 15 HVAC and Electrical Systems	1	2,400.0
d. Leased Engineering Assessment/Building 2 Energy System Assessment	---	500.0
Total	Various	$18,800.0

For FY 2016, $18,800,000 is requested to continue the Aeronautical Center Leases and to replace major building systems sustainment in leased facilities that require replacement based on age and condition to prevent further deterioration. Deferred sustainment includes the replacement of heating, ventilation, air conditioning systems, boilers/chillers, electrical system replacement, plumbing systems, interior finishes, seismic remediation, and other building systems that include exterior enclosures, roofs, interior construction, stairs, fire protection, and site improvement replacement. Funding for this program assures continuity of the Aeronautical Center facility and that it remains viable for current and future generations of FAA employees.

What Is This Program And Why Is It Necessary?

The Aeronautical Center is the FAA's centralized location that supports FAA National Airspace Systems (NAS) Air Operations/flight checks, engineering, system testing, training (Radar/Navigational Aids (Navaids)), NAS logistics, aviation regulation, registration, certification, aviation and transportation safety research, and Business Services in Oklahoma City.

The Center provides facilities that support the work of 7,100 employees, students, and contractors on a daily basis and is the largest concentration of FAA personnel outside of Washington D.C. In addition, approximately 11,000 visitors come to the Aeronautical Center annually.

The Aeronautical Center leases provide leased land/building rent and insurance that comprise approximately 80 percent of Aeronautical Center space: 2.8 million square feet of leased space and 1,100 acres of land, having a leased facility replacement value of $696 million.

The lease is comprised of:

- Master Lease land/building rent, replacement of major building systems and insurance
- Thomas Road warehouse lease
- Tower space for Terminal Doppler Weather Radar (TDWR) target generators

- Grounds Maintenance Building

The Aeronautical Center requires large parcels of land as NAS test sites for surveillance radar, communications, weather, and navigation/landing systems, as well as warehouse, administrative office space, and training facilities. It is a Level IV security site based on numbers of employees, facility square footage, sensitivity of records, volume of public contact, and mission essential facilities whose loss, damage, or destruction may have serious or catastrophic impact on the NAS.

DOT Strategic Goal – Economic Competitiveness
- Maximum economic returns on transportation policies and investments.

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

Funding at the required level is necessary to pay rent under the long-term lease agreement and to correct a backlog of deferred sustainment needs in leased buildings to prevent deterioration of facility conditions that affects the missions of FAA organizations.

Leased Aeronautical Center facilities support FAA missions that include:

- Aviation training for 90,000 FAA and international students per year in resident and distance learning, including approximately 1,000,000 hours of distance learning delivered annually
- Logistics services and supply support to the operational NAS to all FAA Airway Facility locations, Air Traffic, and approximately 70 Department of Defense (DoD) and international organizations
- Engineering services for NAS systems modification and repair
- Aviation research of medical and human factors impacting aviation personnel
- Standards and flight inspection services
- Regulation certification of safety related positions and equipment, airmen and aircraft records and registration
- Business services that include DOT/DELPHI/Prism/Castle Data Center Operations, Accounting Operations, Acquisition Services, Air Traffic Organization (ATO) Data Center, Aviation Safety/Research

What Benefits Will Be Provided To The American Public Through This Request?

This program, in combination with the Aeronautical Center Infrastructure Modernization, benefits the NAS and avoided $14.8 million in FAA costs during FY 2013 through the following:

- Lower lease and operating cost (includes utilities (gas, water, electric), janitorial, cleaning, security) costs in FY 2013 than other alternates: $17.26 per net square footage (nsf) at MMAC, when compared with Oklahoma City General Services Administration (GSA) leased facilities at $25.04 per net square footage (nsf)
- Allowing flexibility and growth to support National Airspace requirements. The Aeronautical Center has one or two of every legacy and new systems in the NAS that are used for Air Operations flight checks, engineering, system testing, training, NAS logistics, aviation regulation, registration, certification, aviation and transportation safety research
- Supporting NAS operations/maintenance, current and future ATO initiatives
- Decreasing energy and repair operations costs
- Enables Air Traffic Organization initiatives by providing infrastructure that supports new NAS facilities funded from other sources that include ATO Technical Operations, Precision Runway Monitor (PRM), Power Services Center and Lab (PSC/PSL), and others

No work stoppages have been identified due to unsafe/unusable facilities even though the average age of leased facilities at the Center is almost 50 years.

Detailed Justification for - 4A05 Transition Engineering Support

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Transition Engineering Support
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Transition Engineering Support	$16,500	$16,596	$19,200	+$2,604

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. NAS Integration Support Contract (NISC)		
a. NISC Program Support	---	$2,500.0
b. NISC Contract Management	---	12,500.0
Total	Various	$15,000.0
B. Configuration Automation Management (CMA)	---	$4,200.0

For FY 2016, $19,200,000 is requested for the following:

A. NISC: $15,000,000 is requested to support the modernization schedules for NAS programs. This budget level is necessary to provide continual NISC contract management and infrastructure support for the prime contractor for the NISC III contract valued at $1.4 billion. In addition, these funds will be used for program acquisition management, financial management, administrative support services, continued operation and IT support services for the NISC contract tracking system and reporting system, other indirect contractor costs, and other program management support.

B. CMA: $4,200,000 is requested to continue implementing the CMA system. CMA consists of a commercial-off-the-shelf tool that, when integrated with legacy systems, will support configuration management (CM) assets and investments for both NAS and non-NAS programs.

What Is This Program And Why Is It Necessary?

A. NISC provides engineering and technical resources to the 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.

This program provides technical support to assist the FAA's technical workforce in handling a surge in demand for short-term programs/projects that are vital to managing the volume of diverse systems and equipment associated with NAS modernization. As a result, the FAA will experience significant NAS modernization scheduling delays if additional support services are not available to complete these projects.

B. CMA is a vital component of the FAA's lifecycle management effort to manage the complexity of today's physical and virtual IT environments. The FAA CMA system will allow for flexible, robust capabilities to incorporate necessary changes in preparation for the agency to transition to the Next Generation Air Transportation System (NextGen). CMA will support Configuration Management (CM) planning and management, configuration identification, configuration control, configuration status accounting, and configuration audits. It will interface with other FAA systems to create a closed-loop process that provides the appropriate structure and toolsets. This will allow the FAA to fundamentally change and move from a CM process that relies heavily on CM practitioners' institutional knowledge to a scalable, network-centric architecture that ensures effective CM of NAS and non-NAS IT assets. CMA will create the infrastructure necessary to leverage process-to-process integration, minimizing redundancy and clustering processes around a single integration point. Also the lack of a closed-loop CM system and the fact that information is not integrated into a single system require multiple manual processes that lead to duplication of effort, time-consuming activities, and potentially inaccurate results.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

A. $15,000,000 is required for Transition Engineering Services to support the modernization schedules for NAS programs by providing a cost-effective contractual vehicle for meeting capital investment plan (CIP) projects and the FAA organizational technical requirements.

B. Fully funding CMA allows the program to acquire an enterprise tool to meet Configuration Management requirements. These requirements not only provide capability of an engineering change process through the capture, documentation, and approval of proposed changes to FAA processes and systems, but to manage data that can be used by various FAA groups. Accounting for the performance of equipment, systems, and processes will support planning for the requirements far-future systems, facilitate implementation of near-future systems, and help to scrutinize the need for current systems toward the path of efficiency.

What Benefits Will Be Provided To The American Public Through This Request?

A. NISC affords the FAA flexibility in obtaining the technical expertise required to meet demand surges with minimal lead time and without the need for long-term commitments. The NISC program provides FAA with rapid access to highly qualified and experienced professional engineering and technical support where and when determined necessary by the incumbent federal workforce. The NISC program facilitates other national programs in defining, securing and administering the utilization of hard to capture professional labor categories once deemed necessary by those program offices. All work is based on documented FAA requirements.

B. CMA will enable the FAA to evolve from CM processes that rely on CM practitioners' institutional knowledge to a scalable, network-centric architecture that ensures effective CM. The CMA solution will use commercial systems and industry standards to reduce developmental and upgrade costs, while simplifying maintenance activities. CMA will help the FAA reduce CM-related errors and delays while providing up-to-date CM information to support enterprise-level decision making. CMA will allow the FAA to move from disconnected and incompatible CM information systems to a system that will allow all users simultaneous access to the same standardized information. CMA will facilitate development of loosely coupled processes and data integration across the FAA to plan, manage, and support the agency's transition to NextGen.

While the FAA is mandated to look at enterprise-wide systems, without the enterprise CM capability, each line of business will be forced to expend resources to create its own stovepipe CM capability. This will further negatively affect the already strained agency budget and continue interface issues. Finally, efforts to improve CM automation capabilities and to reduce the risk associated with legacy CM automation will cease. By fully funding CMA, an avoidance of $2,000,000 in operational money can be realized within a two-year period, thus saving maintenance costs.

Detailed Justification for - 4A06 Technical Support Services Contract (TSSC)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Technical Support Services Contract (TSSC)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Technical Support Services Contract (TSSC)	$23,000	$23,000	$23,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Contractor Program Management	---	$12,000.0
b. Planning, Quality Control, Security, Safety	---	4,900.0
c. Award Fee	---	4,000.0
d. Program Management Support Contract	---	1,100.0
e. Defense Contract Audit Agency	---	500.0
f. Management Systems Support	---	500.0
Total	Various	$23,000.0

For FY 2016, $23,000,000 is requested to continue the TSSC infrastructure. This will enable other programs to use its services to accomplish more than $100 million of project work each year.

Funding the TSSC infrastructure, referred to as infrastructure costs, sustains the FAA's national capability to supplement and leverage federal skills during site-specific National Airspace System (NAS) implementation efforts. TSSC is the Agency's primary installation support service vehicle and is used by a myriad of capital budget improvement program customers to achieve timely and cost-effective NAS modernization. Through TSSC, implementation of capacity and safety enhancements are achieved via approved and funded NAS capital projects that would otherwise be delayed.

What Is This Program And Why Is It Necessary?

The TSSC program is the agency's vehicle to provide a workforce multiplier that installs equipment and supports the capital budget improvements to the NAS in a timely, cost-effective manner. These activities include work planning, quality control, subcontracting, the contractor safety program, and award fee paid under the contract, as well as the usual rent, telecommunications 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 the FAA government employee workforce does not have or which exist in insufficient numbers. The TSSC program allows the FAA to avoid hiring additional employees for a limited duration to handle a surge in demand, such as when new equipment is installed at multiple locations and during compressed schedule periods.

TSSC infrastructure activities include program-specific and site-specific work planning, quality control and assurance, legal compliance with subcontracting law, contractor safety programs, and invariable costs such as office space rent, and supporting telecommunication and utilities. The TSSC program funds Defense

Contract Audit Agency (DCAA) audits of contractor accounting systems, corporate indirect rates, and other processes to ensure technical and legal compliance.

TSSC infrastructure funding pays for the following:

- Project implementation safety, security, and quality control efforts, which help avoid worker's compensation claims and increased insurance costs, and to avoid costs to the FAA for rework that would be required to correct defects that occur when quality control efforts fail due to a lack of adequate funding
- The prime contractor's costs for the effort to award and administer subcontracts to accomplish $35,000,000 of annual public works efforts on behalf of the FAA
- Contractor management of its personnel, office rent, communications and utilities
- DCAA audits of contractor costs

DOT Strategic Goal – Organizational Excellence

- Diverse and collaborative DOT workforce.

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

$23,000,000 is required to fund continuing contract operations. These operations, referred to as infrastructure costs, sustain the FAA's national capability to supplement and leverage federal skills during site-specific NAS implementation efforts. TSSC is the agency's primary installation support service vehicle, and it is used by a myriad of capital budget improvement program customers to achieve timely and cost-effective NAS modernization. Through TSSC, the implementation of capacity and safety enhancements are achieved via approved and funded NAS capital projects that would otherwise be delayed.

The requested funding will support the FAA by:

- Providing program management support, which is used to assist the program office in its cost, schedule, and scope oversight on the national TSSC

- Significantly improve the number of projects that are completed, and the timeliness of their completion, decreasing costs, promoting safety and quality assurance capabilities.

What Benefits Will Be Provided To The American Public Through This Request?

The TSSC program has an award fee, performance-based acquisition contract vehicle to promote efficiency and FAA customer satisfaction. The TSSC customer award fee evaluation survey participation return rate is typically greater than 90 percent. Direct FAA customer award fee feedback rated contractor performance greater than 90 percent in the excellent and good range across several hundred individual contractor performance evaluations in the past years of TSSC performance.

In a typical year, the TSSC vehicle is used to purchase more than $65,000,000 in labor and accomplish more than $35,000,000 in non-labor cost activities, such as site preparation and other public works construction that would not otherwise be accomplished.

Detailed Justification for - 4A07 Resource Tracking Program (RTP)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Resource Tracking Program (RTP)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Resource Tracking Program (RTP)	$4,000	$4,000	$4,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Program/Project Management	---	$4,000.0

For FY 2016, $4,000,000 is requested to continue to keep hardware and software licenses current, program/project management support in the National Airspace System (NAS), maintain Technical Support Services Contract (TSSC) and NAS Implementation Support Contract (NISC), upgrade training documentation, and continue to provide training to users and data administrators.

What Is This Program And Why Is It Necessary?

The RTP is a computer management system (including hardware, software, development, training, and support) used by the FAA Service Centers, the William J. Hughes Technical Center, and the Mike Monroney Aeronautical Center for identifying requirements, internal budget preparation, implementation planning, resource estimating, project tracking, and measuring performance of projects. The Corporate Work Plan (CWP) process is the Air Traffic Organization's (ATO) method to implement approved projects and to standardize National Processes in support of the NAS. The CWP system, which falls under the RTP program, enables users to share FAA's project data during the various stages of implementation (i.e., planning, scheduling, budgeting, execution, and closeout). The CWP toolset and its supporting data are continuously used for reporting project metrics to project managers, responsible engineers, program offices, and various other customers.

The hardware and software for the CWP TOOLSET, which is the key tool that makes up the CWP, must be constantly maintained and upgraded, to support FAA and the processes that will be impacted as it continues to evolve into the ATO. The CWP TOOLSET is used to track all ATO Capital projects from cradle to grave. This system is also used to develop the CWP and work releases for the TSSC.

This system interfaces with DELPHI and Fund Control Module (FCM) and various other systems. The CWP TOOLSET is a centralized system with load-balanced servers residing in Oklahoma City, OK.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$4,000,000 is required to keep current the CWP TOOLSET software and hardware. NAS Implementation Support Contract (NISC) and the Technical Support Services Contract (TSSC) will be maintained for contractor support, software development efforts, and technical support. Also, hardware and software licenses will be maintained to keep the cost of upgrades to a minimum. This maintenance will cover the Headquarters, Atlantic City and Oklahoma City sites. Documentation that is used to provide training to users and administrators of the system will also be maintained.

What Benefits Will Be Provided To The American Public Through This Request?

The CWP TOOLSET contributes to improving the efficiency of the FAA and enhances program management of FAA Capital Programs.

On-going achievements for FY 2016 are:

- Continue 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
- Continue cost and schedule assistance for major acquisition programs by providing enhanced program/project management capabilities with reliable data on cost accounting of capital expenses for FAA Managers and engineers through the CWP TOOLSET
- Continue to improve productivity (on time completion of projects in the field) when a standardized project management process is supported by the toolset and emulates current operating procedures
- Provide on-going earned value management capability

Detailed Justification for - 4A08 Center for Advanced Aviation System Development (CAASD)

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Center for Advanced Aviation System Development (CAASD)
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Center for Advanced Aviation System Development (CAASD)	$60,000	$60,000	$60,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Center for Advanced Aviation System Development (CAASD)	---	$60,000.0

As the FAA's only Federally Funded Research and Development Center (FFRDC), the support provided by CAASD is critical for the development of policy and investment decisions for the future of the NAS Systems and NAS Enterprise Architecture.

For FY 2016, $60,000,000 is requested to fund technical, engineering, as well as research and development support for the CAASD program. The FY 2016 funding will support approximately 184.4 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.

What Is This Program And Why Is It Necessary?

The CAASD is an FAA-sponsored FFRDC operated under a Sponsoring Agreement with the MITRE Corporation. In June 2010, a new FFRDC contract was awarded to MITRE Corporation for program efforts starting in FY 2010 with a base period through FY 2015. The contract includes an option for five years of continuing coverage through FY 2020. CAASD's high quality research, systems engineering, and analytical capabilities help FAA meet the technically complex challenges in the National Air Space (NAS). CAASD provides independent advanced research and development required by the FAA to obtain technical analyses, prototypes and operational concepts needed to fulfill the agency's Strategic Initiatives, Capital Investment Plan (CIP), enterprise aspects of the NextGen Implementation Plan, NAS Enterprise Architecture, and the Principles of the National Aviation Research Plan (NARP).

The CAASD Product Based Work Plan (PBWP) defines an outcome-based program of technically complex research, development, and system engineering activities. The Work Plan is categorized in the following areas:

NAS Concept of Operations, Architecture and Integration: Develop the NAS Concept of Operations; Architecture and Next Generation Air Transport System (NextGen) integration; Improve understanding of the future environment, including anticipated demand at airports and for airspace; Anticipate the impact of planned improvements on future capacity; Develop and integrate the NextGen Enterprise Architecture (EA), operational concepts, capability action plans, and roadmaps to ensure an integrated evolution that aligns with the agencies enterprise architectures; and Analyze NAS-wide strategic issues (operational and technical) and the impact on the evolving NextGen architecture.

Air Traffic Management (ATM) Operational Evolution: Provide analysis of the NAS mission needs, system requirements and proposed system design to identify critical enhancement needs and to ensure that system enhancements will meet operational needs in a cost-effective manner. Provide an understanding of the benefits associated with capability enhancements. Provide assessments of concept maturity, operational feasibility and implementation risks, including identification of cross-domain dependencies. Advance the maturity of emerging ATM improvement concepts, and conducting Human-in-the-Loop (HITL) evaluations. Develop and evaluate new metrics to measure overall NAS operational performance. Develop and validate cross domain operational evolution plans.

Airspace and Performance-Based Navigation: Leverage the precision, reliability, predictably, and efficiencies of improved navigation and procedures through Area Navigation (RNAV). FAA will research new concepts for achieving a performance-based NAS, including the closely spaced Paired Approach concept. Model and simulate operational improvements to address mid-term and far-term Performance-Based Navigation (PBN) requirements. Perform system-wide optimization analyses of airspace and procedures for NextGen. Design and execute technical analyses on airspace security incidents on the NAS. Perform airspace security concept development for mitigating airspace security incidents.

Safety and Training: Develop safety assurance processes as an integral part of normal operations. Perform technical analyses of NAS-wide accident and runway incursion risks to identify airports or specific types of operations with the highest risk. Develop metrics and processes that allow FAA to proactively identify potential safety issues. Identify and assess the feasibility of new or advanced capabilities and standards that mitigate safety issues in the NAS. Enhance the quality and efficiency of Terminal Radar Approach Control (TRACON) and En Route controller training.

Communications, Navigation, Surveillance, and Cyber-Security Infrastructure: Establish the Communications, Navigation, and Surveillance (CNS) foundation for FAAs mid-term and far-term evolution strategies. Develop and evaluate advanced NAS CNS system concepts and requirements, and assess alternative technological approaches to meeting requirements. Perform research, modeling, simulation, and demonstration of prototypes of technical and operational enhancements to the NAS CNS and cyber security systems. Conduct spectrum analysis focusing on strategic issues related to the availability of adequate spectrum resources. Participate in the development of international standards and harmonization. Develop transition strategies for the FAAs NextGen Voice Communications System (NVS).

Unmanned Aircraft Systems: Provide technical analyses supporting strategic solutions for coordinated UAS integration into the NAS and NextGen. Partner with other Government Agencies' FFRDCs in actively researching improved access for public UASs and facilitating cross-agency joint solutions. Implement standards for safe operation of UASs without compromising the safety or efficiency of the NAS.

Special Studies, Laboratory and Data Enhancements: Provide an integrated research environment that ensures individual research activities, prototypes, and capabilities can be brought together with the appropriate mixture of fidelity and flexibility to facilitate integrated investigations, compressed spiraling of operational concepts and procedure development. Develop and sustain the Aviation Integrated Demonstration and Experimentation for Aeronautics (IDEA) laboratory infrastructure. Provide a data repository system that allows efficient access to aviation data and associated tools.

Mission Oriented Investigation and Experimentation (MOIE): Develop tools and techniques for studying NAS capacity, throughput, performance, system dynamics and adaptation to technology and policy-driven change. Identify opportunities for innovative solutions to NAS problems and enhancements to NAS capabilities and procedures. Explore new regimens including complexity theory, agent-based modeling, and productivity modeling.

FAA relies on CAASDs integrated knowledge of the National Airspace System (NAS) and long-term experience with FAA's enterprise level efforts developing the NAS infrastructure. The challenges the FAA faces in meeting established goals and charting an achievable course for the development of the NAS are extensive and technically complex. CAASD assists FAA in addressing NAS complexity challenges effectively. CAASD provides a unique system-wide integrated understanding, tools, labs, and other capabilities that are fundamental to FAAs ability to address these challenges. The required development of system architecture and comprehensive research, development, and system engineering services can only be provided by an FFRDC whose charter permits special access to sensitive Agency and Aviation Industry information and data, not normally available to support contractors. Numerous elements of the CAASD work program are highly specialized research and systems engineering activities that require extensive knowledge of the present and planned NAS systems. These capabilities are fundamental to the FAA's ability to meet its AOA Strategic Priorities under the NAS.

Today CAASD Outcomes produce critical products that directly impact the successful development of the NAS as it matures in Mid-term and on to Far-term. CAASD research products directly contribute to the FAA's National Aviation Research Plan (NARP) Principles and their Goals. The work executed by CAASD supports a multitude of programs across all lines of business. The support provided by CAASD is essential for major FAA programs to continue activities to satisfy operational requirements, and area short-comings. A detailed mapping of individual CAASD Outcomes to each NARP Principle and its Goals and the FAA R&D program supported is provided in Appendix 2 of the CAASD Long Range Plan. The Qualitative Benefits of CAASD work are detailed in the CAASD Long Range Plan's (LRP), Section VI, for each Outcome in the Outcome Profile's annual "Accomplishments" and "Key Activities and Benefits" sections.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

The FAA, as sponsor of the CAASD FFRDC, entered into a new five year Sponsoring Agreement in December 2010 and a new contract with the MITRE Corp. in January 2011 to run the CAASD for the FAA through 2020. The new Sponsoring Agreement states that: "The FAA needs to provide sufficient physical and financial resources for CAASD to maintain and develop its personnel's technical skills and laboratory infrastructure, as well as sufficient financial resources to maintain a reasonably stable and effective staffing level". The requested funding continues a stable source of funding, along with a long-term contractual relationship, which is in the best interest of the public and the FAA.

What Benefits Will Be Provided To The American Public Through This Request?

CAASD's high quality research, systems engineering, and analytical capabilities are key to FAA in meeting technically complex challenges in the NAS. CAASD provides independent advanced research and development required by the FAA in technical analyses, prototypes, and operational concepts needed to fulfill FAA's mission and vision. CAASD plays a key role in meeting FAA's near-term and long-term mission objectives and in maturing the NAS to meet the nation's public air transport needs. Its expertise is critical to FAA's efforts in transforming the nation's air transportation system in an effective and timely manner.

CAASD's quick response capability is essential to the FAA. CAASD has a broad and deep knowledge of FAA, the NAS, ATM, and air transportation stakeholders through its 50 year relationship with the FAA. These qualities that are unique and cannot easily be duplicated.

CAASD has successfully controlled its costs over the past five years. CAASD has reduced the average cost per staff year by 4.5 percent since 2009, after adjustment for inflation, while consistently delivering high value results to the FAA.

Detailed Justification for - 4A09 Aeronautical Information Management Program

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Aeronautical Information Management Program
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Aeronautical Information Management Program	$9,050	$12,650	$5,000	-$7,650

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Prime Mission Product	---	$2,780.0
b. Program Management	---	660.0
c. System Engineering	---	800.0
d. Test and Evaluation	---	360.0
e. Integrated Logistic Support	---	100.0
f. Site Implementation	---	200.0
g. Information System Security	---	100.0
Total	Various	$5,000.0

For FY 2016, $5,000,000 is requested to continue procurement of the AIMM S2 Aeronautical Common Service and aeronautical information infrastructure enhancements. Specifically, the funding is requested to continue design, development and implementation of the Aeronautical Information Management Modernization Segment 2 (AIMM S2) program. AIMM S2 will provide Aeronautical Information Management (AIM) technologies and tools for Aeronautical Information exchange via the Aeronautical Common Services (ACS) infrastructure. ACS will support accuracy and timeliness of special activity airspace (SAA) and airport data and will deliver information across the National Airspace System (NAS) using standard System Wide Information Management (SWIM) compliant protocols. AIMM S2 will deliver release 1 of the ACS in the fourth quarter of CY 2015 and continue development and implementation of release 2 scheduled for deployment in third quarter CY 2016.

What Is This Program And Why Is It Necessary?

The AIM Modernization program is an infrastructure enhancement program modernizing services delivering aviation users with digital aeronautical information that conforms to international standards and supports NextGen objectives and meets the needs of AIM's customers, both in the short term, and in the future. Digital aeronautical data enables the processing of data to improve mapping, flight planning, and the timeliness and accuracy of air traffic control instructions. The program will re-engineer and automate information management business processes and develop an information platform called aeronautical common service for the provision of key aeronautical information using digital technology that is consistent with FAA and international architecture standards. AIMM S2 will implement a Cloud Computing eligible software solution. FY 2016 funding will be used to design and develop the AIMM S2 SAA services software Release 2 and begin work on final release for AIMM S2 delivering NASR reference data and spatial imaging enhancements.

AIMM S2 will:

- Provide ACS as a single trusted source of aeronautical information
- Expand the distribution of Notices to Airman (NOTAMs) included as part of the Federal NOTAM System
- Support the future global air traffic management environment, expanding access to authorized NAS users by leveraging System Wide Information Management (SWIM) Common Support Services infrastructure
- Integrate aeronautical information into the Traffic Flow Management System (TFMS)
- Allow future integration of aeronautical information with Advanced Technologies and Oceanic Procedures (ATOP), Tower Flight Data Manager (TFDM), En Route Automation Modernization (ERAM), and Common Support Services – Weather (CSS-Wx) (CSS-WX leverages the AIMM S2 Web Mapping Service functionality)
- Provide a fully compliant SOA to facilitate efficient development and implementation of enhancements

AIMM S2 received the Initial Investment Decision approval from the Joint Resources Council (JRC) on November 20, 2013. The Final Investment Decision (FID) was approved on August 20 2014.

AIMM S2 modernizes special activity airspace, NOTAMs, and aeronautical information services. These services are necessary to improve the accuracy and timeliness of SAA and airport information management and flow. AIMM S2 is also on the critical path for instrument flight procedures development enhancements, because it delivers the portal capabilities necessary for third party procedures developers to access instrument flight procedures development applications built in the NAVLean program. The apabltiies are realized through the development of the ACS and the integration of information flows, leveraging SWIM Core Services infrastructure. The ACS is a NextGen common service identified in the NextGen Segment Implementation Plan (NSIP) to support the On Demand NAS Information portfolio and the development and implementation of the SAA, NOTAM, and airport data services for consumption by NAS systems.

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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

$5,000,000 is required to continue design, development and implementation efforts to support an Initial Operating Capability in the fourth quarter of 2015 and the design phase of follow on releases of the aeronautical common service. Releases 2 and 3 are focused on SAA data service enhancements and NOTAM data service enhancements respectively.

The requested FY 2016 funding could reduce a significant level of risk and will facilitate program execution to deliver capabilities in the established timeframe.

What Benefits Will Be Provided To The American Public Through This Request?

The AIMM S2 benefits include SAA hazard reduction, NOTAM safety enhancements, Aeronautical Information Safety Enhancements, and SAA business process improvements and infrastructure enhancements resulting in cost savings for operations and system development. Specifically, through AIMM S2 the Aeronautical Common Service (ACS) will deliver SAA schedules to NAS users via ACS. The flight path savings will include reduced flight time, flight distance, and fuel usage resulting in real dollar savings.

AIMM S2 Aeronautical Information Data Analytics (AIDA), a key AIMM S2 capability consisting of query, metrics engine, data transformation, will enable stakeholders to analyze historical SAA operations. As a result, continuous process improvement opportunities will be identified and realized based on the analysis of SAA usage data.

With the Aeronautical Information Query and Subscription Service (AIQS), AI consumers will receive easier to read information directly into smart systems that map the information and assist pilots with identifying NOTAMs that affect their particular flight and provide the ability for consumers to pull, or push (at requested intervals) on-demand of specific TFRs (based on the consumer's need), providing updates in an efficient and easily consumable format. The AIMM S2 Program will consolidate the AIM Legacy help desk with the AIMM S2 Help Desk, modernize the National Airspace System Resources (NASR), and subsume portal requirements relating to Navigation Procedures Project (NAVLean) data.

Detailed Justification for - 4A10 Cross Agency NextGen Management

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Cross Agency NextGen Managment
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Cross Agency NextGen Management	$0	$2,000	$3,000	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Cross Agency NextGen Management	---	$3,000.0

For FY 2016, $3,000,000 is requested to:

- Coordinate across partner agencies on the future of the aviation transportation system through collaboration on architecture and work plans
- Ensure a coordinated multi-agency plan for NextGen implementation to include schedules and dependencies
- Manage inter-agency special studies and activities to mitigate risk and ensure that critical NextGen interoperability requirements are established for cross-agency harmonization

What Is This Program And Why Is It Necessary?

The development of NextGen is a priority for the Administration and active participation by the NextGen agencies partners, like Department of Commerce (DOC), Department of Homeland Security (DHS), National Aeronautics and Space Administration (NASA), and Department of Defense (DOD), in this undertaking is necessary to modernize the air transportation system and safely meet the expected growth in air traffic. Activities conducted under Cross Agency NextGen Management program will continue to identify, facilitate, and integrate activities, commitments and contributions of Federal Partner Agencies and other key stakeholders to ensure the NextGen transformation is realized. This includes cross-agency coordination on research, such as the ongoing technology transfer with FAA and NASA, and expanding to include technology transfer between FAA and NWS. Additionally, this program is necessary for capturing high-level operational improvements for total NextGen mission, and assessing NextGen benefits beyond mid-term. This program will also work with the industry through the established NGATS initiatives.

DOT Strategic Goal - Economic Competitiveness

- Maximum economic returns on transportation policies and investments.

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

$3,000,000 is required to continue execution of work related to cross agency planning, analysis of special topic areas, and architecture development. This level of funding is required to provide a foundation for managing the interagency NextGen portfolio. This effort will ensure coordination between all Federal partners whose decisions impact NextGen.

What Benefit Will Be Provided To The AmericaPubic Through This Request?

This effort will ensure efficient coordination betweern all Federal partners whose decisions impact NextGen.

Detailed Justification for – 5A01 Personnel and Related Expenses

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Personnel and Related Expenses
($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
Personnel and Related Expenses	$450,250	$460,000	$470,049	+$10,049

For FY 2016, $470,049,000 is requested to pay the personnel, travel and related expenses for the Federal Aviation Administration (FAA) Facilities and Equipment (F&E) workforce performing work essential to FAA's efforts to sustain and modernize the National Airspace System (NAS). This includes increases of $875,097 for the annualized cost of the FY 2015 pay raise; $3,688,464 for the FY 2016 pay raise; $1,594,773 for the additional compensable day in FY 2016; $1,356,514 for the FERS contribution increase; $13,258 for Working Capital Fund rate increases; and $2,520,894 for non-pay adjustments.

The FAA F&E workforce includes electronic, civil and mechanical engineers; electronics technicians; quality control and contract specialists, Ops research analysts as well as safety inspector personnel from the following Lines of Businesses: Air Traffic Organization, Aviation Safety, NextGen, and Finance and Management. Sixty-five percent of the FAA F&E workforce is located in the field.

The F&E personnel provide oversight and management of the FAA's capital projects including the NextGen portfolio. F&E personnel and related expenses are distributed across FAA Organizations as follows:

FTE

Organization	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
ATO	1,858	1,908	1,908	0
AVS	77	77	77	0
ANG	579	592	592	0
AFN	156	156	156	0
Total	2,670	2,733	2,733	0

(Dollars in Thousands)

Organization	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
ATO	$317,771	$319,520	$324,149	+$4,629
AVS	11,343	12,148	13,151	+1,003
ANG	89,386	91,191	95,440	+4,249
AFN	31,750	37,141	37,309	+168
Total	$450,250	$460,000	$470,049	+$10,049

What Is This Program And Why Is It Necessary?

F&E employees perform essential services in managing the acquisition and installation of new systems, including NextGen programs, into the NAS. Major capital programs can take over a decade to implement from proof of concept to final implementation, which requires a sustained engagement. Civil, mechanical and electrical engineers, along with technicians, provide technical support for design reviews, perform site preparation and installation, conduct technical evaluations, and provide systems integration and in-service management. Operations research analysts and cost estimators conduct investment analyses for new capital projects. Contracting officers provide acquisition services, and Safety Inspectors conduct the necessary regulatory and safety oversight functions for new services and operational capabilities being installed in the NAS.

Payroll, travel, and related expenses for the FAA F&E workforce are paid for out of this activity. On an annual basis, approximately 89 percent of the program covers FAA F&E workforce payroll costs; 11 percent of the program supports programmatic travel and related expenses of the workforce.

Why Do We Want/Need to Fund This Program at the Requested level?

Each year Congress appropriates over $2.1 billion for capital improvement to the NAS. These funds are available for a period of three years. As a result, each year the FAA is managing three years of active program funding (approximately $6 billion per year) in over 130 Capital Investment Programs (CIPs).

On average, the FAA has over 8,000 active projects being managed by F&E staff. Each year the FAA completes 2,000 to 2,500 projects. This requires long-term program management and oversight capabilities to ensure continuity and to get best-value for the government's investment in new systems and technology. Some major capital investments like ERAM, ADS-B, and TAMR are system-wide in scope and take years to fully implement, and this program provides FAA personnel with the long-term technical expertise necessary to oversee the design and implementation of new NAS systems.

The request will support a staffing level of approximately 2,700 full time equivalents who are assigned to all phases of managing and implementing major capital acquisitions including site engineering, installation and implementation, and oversight of capital programs. The request also provides for on-site travel, IT support and supplies.

What Benefits Will Be Provided To The American Public Through this Request?

The FAA's Facilities and Equipment capital program invests in developing and implementing new technologies to meet future demand and to sustain the current NAS.

The FAA is undertaking a wide-ranging transformation of the United States air transportation system. NextGen proposes to transform America's air traffic control system from a ground-based system to a satellite-based system. GPS technology will be used to shorten routes, save time and fuel, reduce traffic delays, increase capacity, and permit controllers to monitor and manage aircraft with greater safety margins. Planes will be able to fly closer together, take more direct routes and avoid delays. This transformation has the aim of reducing gridlock, both in the sky and at the airports to accomplish NextGen and to maintain the current infrastructure the FAA requires a stable workforce focused on the sustained effort necessary for the acquisition of major capital assets.

Detailed Justification for - 6A01 Automated Dependent Surveillance – Broadcast (ADS-B) Subscription Costs and Wide Area Augmentation Services (WAAS) Geostationary (GEO) Satellite Leases

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – ADS-B Services and Wide Area Augmentation System (WAAS) GEOs

($000)

Activity/Component	FY 2014 Actual	FY 2015 Enacted	FY 2016 President's Request	Difference From FY 2015 Enacted
ADS-B Services and Wide Area Augmentation System (WAAS) GEOs	$0	$0	$166,000	+$166,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Wide Area Augmentation System (WAAS) GEO Satellite Leases	---	$26,600.0
B. ADS-B and Colorado WAM Subscription Costs	---	139,400.0
Total	Various	$166,000.0

For FY 2016, $166,000,000 is requested for the sustainment of NAS Service Acquisitions that are satellite based service contracts, which are paid in full in the first year of F&E funding availablity. Although this is a new budget line item that begins in FY 2016, it is a transfer from two preexisting programs under Activity 2: 2A12 ADS-B and 2D03 WAAS.

A. Wide Area Augmentation System (WAAS) GEO Satellite Leases

For FY 2016, $26,600,000 is requested for the Wide Area Augmentation System (WAAS) to complete the on-going Lease payments for the operational 3rd, 4th and Gap Filler GEO services.

B. ADS-B and Colorado WAM Subscription Services

For ADS-B, $139,400,000 is requested in FY 2016 for continuing ADS-B Baseline Services, utilizing performance based service fees for ADS-B infrastructure owned and operated by the prime contractor. Subscription charges to the Service Provider consist of Service Establishment Charges (SEC's) for new service volumes and annual subscription charges to provide essential services to existing service volumes.

The budget also provides subscription charges for the Colorado WAM project, which is operating a Multilateration surveillance service capability providing aircraft location information to the automation system at Denver ARTCC, allowing controllers to provide separation services at four Colorado airports (Durango, Gunnison, Montrose and Telluride).

Activities planned by ADS-B for FY 2015 include the following:

- Provide WAM surveillance services supporting air traffic operations for four Colorado airports
- Provide service at over 300 service volumes within specified requirements
- Pay performance based subscription charges

What Is This Program And Why Is It Necessary?

A. Wide Area Augmentation System (WAAS) Geostationary (GEO) Satellite Leases

WAAS consists of a network of 38 FAA ground reference stations distributed across the continental United States and Alaska that monitor the Global Positioning System (GPS) satellite signals. 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 three commercial 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 across the entire NAS and precision approach take off and landings at 95 percent of the qualifying airports in the 48 contiguous states. WAAS is not mandatory for ADS-B operations, but will allow for ADS-B enhanced operations.

Three GEO satellites are required to meet WAAS performance requirements. This BLI is to specifically cover the ongoing lease costs of the three existing GEO satellites.

B. ADS-B and Colorado WAM Subscription Services

ADS-B consists of a network of over 630 GBTs broadcasting across more than 300 service volumes, utilizing performance based service fees for ADS-B infrastructure owned and operated by the prime contractor. Subscription charges to the Service Provider consist of Service Establishment Charges (SEC's) for new service volumes and annual subscription charges to provide essential services to existing service volumes.

ADS-B is an advanced surveillance technology that provides highly accurate and more comprehensive surveillance information. Aircraft position (longitude, latitude, altitude, and time) is determined using the Global Navigation Satellite System (GNSS), and/or an internal inertial navigational reference system, or other navigation aids. The aircraft's ADS-B equipment processes this position information along with other flight parameters for a periodic broadcast transmission, typically once a second, to airborne and ground-based ADS-B receivers. The information will be used to display aircraft position on en route and terminal automation systems such as Common Automated Radar Tracking System (CARTS), Standard Terminal Automation Replacement System (STARS), Microprocessor En Route Automated Radar Tracking System (Micro EARTS), En Route Automation Modernization (ERAM), and Advanced Technologies and Oceanic Procedures (ATOP).

DOT Strategic Goal – Safety

- Reduction in transportation related injuries and fatalities.

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

A. Wide Area Augmentation System (WAAS) GEO Satellite Leases

FAA has two existing contracts to cover leases of the three operational WAAS GEOs. Funding at the requested level is needed to meet FAA's contractual obligations and to avoid incurring termination liability for failure to meet these obligations.

B. ADS-B and Colorado WAM Subscription Services

In FY 2016 NAS Wide operation of ADS-B will continue with subscription services for surveillance across the NAS and for weather in the Gulf and Alaska. The national deployment of over 630 stations in FY 2014 served as the entrance criteria for stakeholders to accelerate the installation of ADS-B Out avionics that meet the performance requirements of 14 CFR §91.227. This will allow for the ADS-B capability to deliver the benefits identified in the business case.

What Benefits Will Be Provided To The American Public Through This Request?

A. Wide Area Augmentation System (WAAS) GEO Satellite Leases

The three existing WAAS GEO satellite leases ensure that WAAS is able to meet its availablility requirements over the entire WAAS service volume. Failure to fund these leases would result in loss of availability over certain portions of the service volume, particularly Alaska, in addition to increased system outages over the National Airspace System.

B. ADS-B and Colorado WAM Subscription Services

ADS-B is a technology that will allow implementation of new air traffic control procedures based on more accurate aircraft position information that will allow better use of existing airspace. This should result in an increase in capacity and will result in fewer delays and more optimal routing for aircraft. The efficiency benefits include reductions in weather deviations, reduced cancellations resulting from increased access to some Alaskan villages during reduced weather conditions, additional controller automation, and additional aircraft to aircraft applications. The efficiency benefits translate to savings in both direct aircraft operating costs and passenger value of time. The Business Case Analysis Report dated May 15, 2012 shows $3.2B in capacity and efficiency benefits.

Expected benefits include reduced delays and fuel burn, and consistent, low variance relative spacing between paired aircraft which will improve arrival capacity.

Also included in this activity are subscription charges for the Colorado WAM surveillance service capability. The traditional surveillance coverage provided by existing ground based radar does not allow coverage below 9,000 feet due to the mountainous terrain. The lack of surveillance forced controllers to use procedural separation standards for the Instrument Flight Rules (IFR) arriving/departing aircraft. To provide this surveillance service, receivers/transmitters were placed at multiple locations on the surface to determine the location of aircraft by triangulating the transponder signals broadcast by the radar beacon and Mode S avionics. This aircraft location information is provided to the automation system at Denver ARTCC to allow controllers to provide separation services at four Colorado airports (Durango, Gunnison, Montrose and Telluride). The increased accuracy of this surveillance technique safely expands the capacity of these airports to allow additional aircraft operations during instrument landing conditions.

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3C. RESEARCH, ENGINEERING & DEVELOPMENT

RESEARCH, ENGINEERING, AND DEVELOPMENT (AIRPORT AND AIRWAY TRUST FUND)

For necessary expenses, not otherwise provided for, for research, engineering, and development, as authorized under part A of subtitle VII of title 49, United States Code, including construction of experimental facilities and acquisition of necessary sites by lease or grant, $166,000,000, to be derived from the Airport and Airway Trust Fund and to remain available until September 30, 2018: 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.

PROGRAM AND FINANCING
($ in Millions)

Identification code: 69-8108-0-7-402	FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
Obligations by program activity:			
Direct Program			
0011 Improve aviation safety	83	89	94
0012 Economic competitiveness	27	33	27
0013 Reduce environmental impact of aviation	37	32	37
0014 Improve the efficiency of mission support	6	4	5
0100 Subtotal, direct program	153	158	163
0799 Total direct obligations	153	158	163
0801 Reimbursable program	2	2	2
0900 Total new obligations (total)	155	160	165
Budgetary resources available for obligation:			
1000 Unobligated balance brought forward, Oct 1	85	66	66
1021 Recoveries of prior year unpaid obligations	2	.....	.....
1050 Unobligated balance	87	66	66
New budget authority (gross), detail:			
Appropriation, discretionary:			
1101 Appropriation (special or trust fund)	159	157	166
1133 Unobligated balance of appropriations temporarily reduced	-26	.....	.....
1160 Appropriation, discretionary (total)	133	157	166
Spending authority from offsetting collections:			
1700 collected	1	3	3
1701 Change in uncollected payment, Federal sources	1	.....	.....
1750 Spending auth from offsetting collections, disc (total)	2	3	3
1900 Budget authority (total)	135	160	169
1930 Total budgetary resources available	222	226	235
Memorandum (non –add) entries:			
1940 Unobligated balance expiring	-1	.....	.....
1941 Unexpired Unobligated balance, end of year	66	66	70
1950 Other balances withdrawn and returned to unappropriated receipts	2	.....	.....
1951 Unobligated balance expiring	1	.....	.....
1952 Expired Unobligated balance, start of year	6	6	.....
1953 Expired Unobligated balance, end of year	5	.....	.....
1954 Unobligated balance canceling	2	.....	.....
Change in obligated balances:			
3000 Unpaid obligations, brought forward, Oct 1 (gross)	134	136	122
3010 Obligations incurred, unexpired accounts	155	160	165
3020 Outlays (gross)	-150	-174	-182
3040 Recoveries of prior year unpaid obligations, unexpired	-2	.....	.....
3041 Recoveries of prior year unpaid obligations, expired	-1	.....	.....
3050 Unpaid obligations, end of year	136	122	105
3060 Uncollected payments, Federal Sources, brought forward, Oct 1	-3	-3	-3
3070 Change in uncollected payment, Federal sources, unexpired	-1	.....	.....
3071 Change in uncollected payment, Federal sources, expired	1	.....	.....
3090 Uncollected payments, Federal sources, end of year	-3	-3	-3
Memorandum (non-add) entries:			
3100 Obligated balance, start of year	131	133	119
3200 Obligated balance, end of year	133	119	102

	Budget Authority and outlays, net:			
4000	Budget authority, gross	135	160	169
	Outlays, gross			
4010	Outlays from new discretionary authority	48	72	76
4011	Outlays from discretionary balances	102	102	106
4020	Outlays, gross (total)	150	174	182
	Offsets:			
	Against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-2	-3	-3
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pymts, Fed sources, unexpired	-1	. . . . .	. . . . .
4052	Offsetting collections credited to expired accounts	1	. . . . .	. . . . .
4060	Additional offsets against gross budget authority only (total)	. . . . .	. . . . .	. . . . .
4070	Budget authority, net (discretionary)	133	157	166
4080	Outlays, net (discretionary)	148	171	179
4180	Budget authority, net (total)	133	157	166
4190	Outlays, net (total)	148	171	179

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. The proposed funding is allocated to the following performance goal areas of the Federal Aviation Administration: improve safety, economic competitiveness, and environmental performance of the National Airspace System. The request includes funding for several research and development activities of the Next Generation Air Transportation System (NextGen), as well as activities related to unmanned aircraft systems.

OBJECT CLASSIFICATION
($ in Millions)

Identification code: 69-8108-0-7-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Direct obligations:			
	Personnel compensation			
11.1	Full-time permanent	25	29	29
11.3	Other than full-time permanent	1	1	1
11.9	Total personnel compensation	26	30	30
12.1	Civilian personnel benefits	7	9	9
21.0	Travel and transportation of persons	1	2	2
25.1	Advisory and assistance services	29	29	30
25.2	Other services from non-Federal sources	43	43	45
25.3	Other goods and services from Federal sources	3	3	3
25.5	Research and development contracts	23	23	23
25.7	Operation and maintenance of equipment	1	1	1
26.0	Supplies and materials	2	1	2
31.0	Equipment	1	1	1
41.0	Grants, subsidies, and contributions	17	17	18
99.0	Subtotal, obligations, Direct obligations	153	159	164
	Reimbursable obligations:			
99.0	Subtotal, obligations, Reimbursable obligations	2	1	1
99.9	Total new obligations	155	160	165

Employment Summary

Identification code: 69-8108-0-7-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Direct:			
1001	Civilian full-time equivalent employment	225	249	249

EXHIBIT III-1

RESEARCH, ENGINEERING & DEVELOPMENT
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	FY 2014 Actual	FY 2015 Enacted	FY 2016 REQUEST	CHANGE FY 2015 - FY 2016
Improve Aviation Safety	87,244	91,019	96,623	5,604
Economic Competitiveness	24,329	22,286	24,671	2,385
Environmental Sustainability	41,579	37,935	38,884	949
Mission Support	5,640	5,510	5,822	312
TOTAL	**158,792**	**156,750**	**166,000**	**9,250**
FTEs				
Direct Funded	249	249	249	0
Reimbursable, allocated, other	0	0	0	0

Program and Performance Statement

This account provides funding for establishing and overseeing FAA's Research and Development (R&D) policies and plans. Its diverse scientific, engineering and technical workforce supports all aspects of aviation from research on materials to development of new products and procedures.

In partnership with both domestic and international entities within the aviation community, the FAA RE&D programs provide world leadership by conducting high-priority research and developing innovative technologies to support a safe, efficient, and environmentally acceptable global aviation system.

EXHIBIT III-1a

RESEARCH, ENGINEERING & DEVELOPMENT
SUMMARY ANALYSIS OF CHANGE FROM FY 2015 TO FY 2016
Appropriations, Obligations, Limitations, and Exempt Obligations
($000)

Item	Change from FY 2015 to FY 2016 $0	Change from FY 2015 to FY 2016 FTE
FY 2015 Request	**156,750**	**249**
Annualization of FY 2015 FTE	0	
Annualization of FY 2015 Pay Raise	95	
FY 2016 Pay Raise	300	
One Additional Compensable Day	145	
New FTE in FY 2016	0	
Non-pay Inflation	1,188	
Subtotal, Adjustments to Base	**1,728**	**0**
New or Expanded Programs		
Improve Aviation Safety	4,576	
Economic Competativeness	2,152	
Environmental Sustainability	555	
Mission Support	239	
Subtotal, New or Expanded Programs Increase/Decrease	**7,522**	
Total FY 2016 Request	**166,000**	**249**

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Detailed Justification for
A11.a Fire Research and Safety

What Is The Request and What Funds Are Currently Spent on the Program?

FY 2016 – Fire Research and Safety – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.a Fire Research and Safety	$8,000,000	$6,000,000	$6,643,000	+643,000

What Is This Program And Why Is It Necessary?

The purpose of this program is to conduct research to prevent accidents caused by in-flight fire (main emphasis of the current program) and to improve survivability during a post-crash fire. The program supports the FAA's Associate Administrator for Aviation Safety organization which is responsible for issuing regulations, standards and guidance material to ensure the highest level of safety in commercial aviation. Research efforts specific to hazardous material transports are completed in coordination with DOT's Pipelines and Hazardous Materials Safety Administration (PHMSA). The program also benefits the aviation industry by developing, validating and transferring cost-effective aircraft fire safety technology. This program is necessary because of the catastrophic consequences of an uncontrollable aircraft fire – the large loss of life and the destruction of the aircraft.

The benefit of this program will be the enabling technology to prevent accidents caused by fire in freighter aircraft and hidden in-flight fires in passenger-carrying airplanes. Also, new technology of interest to the aircraft manufacturers and operators will be introduced in a fire-safe manner or prohibited if warranted. In addition, safeguards will prevent fires from the growing threat of lithium batteries and protect the airplane from the dangers of hydrogen-fueled fuel cells. Finally, Halon replacement agents and non-brominated flame retardants will be required to maintain an equivalent level of fire safety as the technology is phased out because of environmental restrictions.

1. Freighters. The program is driven by accidents, incidents, NTSB recommendations, new technology, new fire threats, and environmental concerns. In the space of less than one year, two destructive fatal freighter accidents were caused by in-flight fire (UPS 747-400, 9/3/10 and Asiana 747-400, 7/28/11). In both accidents the presence of large quantities of lithium batteries are a potential source of the fire or a contributing factor. As discussed at the NTSB Forum on Lithium Ion Batteries in Transportation held in Washington D.C. April 11-12 2013, as many as six freighter fire accidents are predicted to occur over the next decade (http://www.fire.tc.faa.gov/pdf/TC-13-2.pdf). Potential development of new fire safety standards for freighters, could prevent these predicted incidents.

   Additionally, more than 50 lithium battery fire incidents have occurred in aviation, primarily in cargo shipments where the fire occurred before takeoff. Because of this growing threat, in 2013 the National Transportation Safety Board updated its Most Wanted List to include Improve Fire Safety in Transportation (http://www.ntsb.gov/news/2012/121114.html). More recently, FAA research has demonstrated that an uncontrolled cargo fire involving lithium batteries could cause a sudden and catastrophic accident.

2. Hidden In-flight passenger aircraft fires. In passenger airplanes where the human toll is far greater, there is a real threat of an uncontrollable fire originating in a hidden area, as evidenced by the 900 or more incidents of unknown odor and smoke events each year in the United States. Although unknown to the crew, most of these events are not fire related, but safety impacts the inherent actions a pilot takes at signs of smoke (i.e. return or divert to the nearest airport), and in some cases to initiate an emergency evacuation. If the research to evaluate inflight smoke and odor incidents and identify state-of-the-art detection technologies is successful and if those technologies are implemented, the improved detection capability would be able to discriminate between fire events and non-fire events. This would lead to a significant decrease in the incidents of declared emergencies and flight diversions with the accompanying reduction in hazards those actions create.

3. Composites. Another concern is the fire safety of new materials or new material applications. Structural composites are replacing metal alloys in the fuselage and wings, and proposed new aluminum-lithium alloys raise fire safety concerns. On July 12, 2013, a fire occurred in an Ethiopian Airlines 787 aircraft while parked at London's Heathrow airport. The investigation of this incident is ongoing as of the writing of this budget narrative but preliminary findings indicate a fire involving lithium batteries in the aircraft's Emergency Locator Transmitter (ELT). The fire ignited the composite fuselage skin adjacent to the ELT and spread a considerable distance, raising concerns about the consequences of a similar failure if the airplane was flying. Previous testing involving composite fuselage structure did not exhibit this behavior and additional research and testing is underway. This incident illustrates not only the changes in fire properties of newer materials but also the changes in potential fire scenarios due to higher energy fire ignition sources such as lithium batteries installed in aircraft equipment.

4. Flame retardants. New fire resistant magnesium alloys were found to be fire-safe for seat structure, based on research results from this program, but future applications being proposed include air conditioning ducting in hidden areas which raises other fire risk considerations. The growing risk of lithium battery fires is due to the billions of lithium batteries annually shipped to the US by air, and the very significant increase in the air transport of large lithium batteries for automotive and power grid applications predicted for the near future. Fuel cells powered by compressed hydrogen are being developed for numerous aircraft applications in the future, including auxiliary power units. The aviation industry's preferred extinguishing/suppression agent for approximately the last fifty years has been Halon. Despite the fact that production of new Halon ceased twenty years ago, Halon is still used in currently manufactured aircraft for protection of cargo compartments, engines and APUs, and in handheld fire extinguishers. Worldwide availability of Halon continues to decline and environmental restrictions have been implemented requiring the elimination of any future use of Halon by prescribed dates. These actions will force the use of alternative agents or systems and suitable replacements have not yet been identified, tested or certified. Finally, environmental restrictions are prohibiting the use of brominated flame retardants used to impart fire resistance in numerous interior materials in order to meet stringent FAA flammability criteria.

5. High energy density power sources for aircraft and personal electronic devices. These power sources include existing and emerging lithium battery chemistries and fuel cell technologies. The research will include practical and cost effective aircraft based fire detection and suppression systems for the types and locations of fires that could result from these materials. The outcome of this research will be improved fire safety for these evolving electrical power sources. Research will also be directed at eliminating or identifying inflight smoke and odors as causes for alarms and potential aircraft diversions through improved detection and characterization of these events in order to differentiate between high risk fire and low risk non-fire sources.

Research activities related to aircraft material flammability will focus on providing necessary training support and guidance material for proposed new or improved tests methods. The support will involve research testing on a range of affected materials to identify scenarios that might require specific clarifications based on the behavior of the materials involved. Some materials that could produce unique behavior include leather seat cushions, magnesium ducting, and lithium/aluminum alloy fuselage structure. The support may also involve the production of training videos that demonstrate the proper execution of new and revised flammability tests for field personnel responsible for certifying material compliance. This support is needed to ensure repeatability and reproducibility in the flammability test results among all labs that conduct the new certification tests.

Fire research to model transport of combustion products and fire suppression agents will be validated in a variety of situations and extended to predict flame spread of materials in hidden areas of the cabin. A robust and validated model of the transport of heat, smoke and gases will supplement full scale testing to evaluate methods for the detection of fires in any location inside the fuselage and to evaluate options for applying fire suppression agents for a variety of fire scenarios. Results from fire research on toxic gas production in fires will be the basis for a small scale test that accurately simulates flaming combustion of cabin materials and can be used to establish similarity of halogen replacement flame retardants with flame retardants currently used by aircraft and seat manufacturers that are facing environmental restrictions.

Major activities and accomplishments planned in FY 2016 include:

Aircraft Fire Safety

- Evaluate and test technologies and procedures to mitigate the fire hazards of evolving electrical power sources transported as cargo or baggage and as components of aircraft systems.
- Conduct testing to identify effective options to improve aircraft cargo compartment fire detection and suppression on both freighter and passenger aircraft.
- Evaluate and test technologies and procedures to detect, control and characterize inflight incidents of smoke, fire and fumes.
- Support the standardization of new fire test methods, advisory circulars and training guidance for unprecedented Notice of Proposed Rulemaking to completely revise and update the current FAA flammability regulations for interior materials.
- Validate a computer model for heat, smoke, combustion gas, and fire suppression agent movement throughout the interior spaces of aircraft using experimental data and extend model to flame spread of hidden materials and composite structure.
- Develop small scale test that includes the production of incomplete combustion products as occurs during the burning of aircraft plastics to establish meaningful criterion for similarity of replacement flame retardants for EPA-banned halogenated substances.

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

The vast majority of the research is conducted in the Fire Safety facilities at the William J. Hughes Technical Center, Atlantic City, NJ, by internationally recognized experts in aircraft fire safety research. The FAA operates the most extensive civil aircraft fire test facilities in the world. Outputs from this research to increase aircraft fire safety are fire tests for interior materials, fire detection and suppression systems, fire-fighting procedures, minimum performance standards for mandated halon replacement suppression agents, safeguards to protect against hazardous materials, and technologies to render fuel tanks nonflammable.

Goals for FY 2016 Funding:

- By FY 2020, develop the enabling technology to prevent accidents caused by in-flight fires in freighter (all cargo) and passenger carrying large transport aircraft.
- By FY 2020, ensure the fire-safe introduction of new materials, such as lightweight composite structure and magnesium alloys, and advanced electrical power sources, including lithium batteries and hydrogen-fueled fuel cells, into commercial transport aircraft.
- Support and facilitate the evaluation and replacement of environmentally damaging halon fire extinguishing agents and halogenated cabin material flame retardants, which have both adverse environmental and health effects, with effective and practical alternatives (Ongoing effort as required).

Reductions in program funding will delay improvements in fire safety and thereby increase the risk of an accident caused by fire, particularly in freighter aircraft where the growing threat of lithium battery cargo fires is a major concern. Effective safeguards to protect lithium battery shipping containers and to suppress lithium battery fires are not currently well defined. Freighter standards must also be developed for fire containment covers, fire resistant cargo containers and full compartment fire suppression systems. In passenger aircraft, the source of over 900 smoke and odor incidents must be determined to initiate research on the early detection of hidden in-flight fires. New lightweight materials may be introduced into service without optimal safeguards. The same will be true for hydrogen-fed fuel cells. Unprecedented rulemaking to require more stringent fire test criteria for hidden area materials and to ensure the safe use of lightweight materials may be delayed, increasing the risk of fires and negating reduced fuel consumption/lower environmental exhaust emissions. Toxic flame retardants and ineffective halon replacement extinguishing agents could also be introduced into service. Computer models may not be developed that offer promise as design tools for the early detection of hidden in-flight fires and for effective hidden fire-fighting with hand-held extinguishers.

What Benefits Will Be Provided To The American Public Through This Request?

The primary benefit to the American Public from this research is the prevention of catastrophic aircraft accidents caused by in-flight fires, and the savings of potentially many of hundreds of lives, including the aircraft itself. The risk is particularly great in freighter (all cargo) aircraft, primarily because of the large shipments of lithium batteries (often tens of thousands of batteries are shipped in a single aircraft). Fire safety improvements being evaluated or under development include improved lithium battery packaging, fire containment covers for pallets, fire hardened cargo containers, and on-board water spay fire suppression systems. In passenger aircraft the loss in human lives from an in-flight fire accident is much greater than in freighters. Here the risk is from a fire originating in a hidden area of the aircraft, such as above the cabin ceiling, which is difficult for the crew to detect and extinguish. Moreover, the problem is compounded by the large number of unknown smoke and odor incidents in passenger aircraft (on average, 2-3 per day), which are largely not fire related. Fire safety improvements being evaluated or which will be developed include more stringent flammability tests for hidden materials, detectors that can pinpoint the location of a fire, detectors that can discriminate between fire and non-fire smoke and odor sources, improved methods of using cabin hand-held extinguishers against hidden fires, and on-board fire extinguishing systems for the larger aircraft.

Research products from this program have been implemented in large passenger transport aircraft throughout the world to improve postcrash fire survivability, which was the emphasis of the research in the past. The FAA researchers are internationally-known experts and the bulk of the research is conducted in the FAA's unique aircraft fire test facilities. The benefit from this past research has been a documented reduction by a factor of three in the probability of dying from a survivable postcrash fire. This is perhaps best demonstrated by the following recent accidents in which the aircraft was destroyed by a postcrash fire: Air France 340, Toronto, 2005; Continental 737, Denver, 2008, and Asiana 777, San Francisco, 2013. There were 731 passengers and crew members in the three destroyed airplanes and zero fire fatalities.

Detailed Justification for
A11.b Propulsion and Fuel Systems

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Propulsion and Fuel Systems – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.b Propulsion and Fuel Systems	$1,800,000	$2,000,000	$3,034,000	+$1,034,000

What Is This Program And Why Is It Necessary?

The FAA establishes rules for the certification and operation of aircraft engines, fuels, and fuel management systems that enhance the airworthiness, reliability, and performance of aircraft propulsion and fuel systems. The Propulsion and Fuel Systems Program conducts research on advanced damage-tolerance and risk assessment methods that provide the Office of Aviation Safety (AVS) with the basis for new or revised engine certification and continued airworthiness standards. This research also supports preparation of Advisory Circulars that provide industry with technical information on acceptable means of compliance with regulations. 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 history of turbine engine operation in commercial aviation is a safe one, but the risk 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 very rare, accidents such as United Airlines Flight 232 on July 19, 1989 in Sioux City, Iowa, and Delta Airlines Flight 1288 on July 6, 1996 in Pensacola, Florida are noteworthy because they were caused by the failure of turbine engine components that caused catastrophic loss of life. Propulsion research conducted in conjunction with the manufacturers has shown that the primary failure modes in these accidents resulted from the presence of material and manufacturing anomalies that can degrade the structural integrity of high energy turbine engine rotors. From this research, the FAA made recommendations related to the improvement of titanium metallurgical quality, nondestructive inspection, and turbine rotor structural design and service life prediction standards. This research yielded a probabilistic damage tolerant rotor design and life management code called DARWIN® (Design Assessment of Reliability With INspection) that determines the risk of fracture of turbine engine rotor disks containing undetected material anomalies. It is used by nearly all major engine manufacturers.

This program will develop advanced damage tolerance methods, risk assessment methods and tools, and incorporate them into DARWIN® to enhance its predictive capabilities. These advances are needed to assess damage mechanisms, new design practices, and classes of materials and components not previously addressed by FAA research. The advances will extend the applicability of damage tolerance (as a supplement to conventional "safe life" methods) much more broadly throughout the engine and will introduce an increased level of engineering rigor to the risk assessment process. The research will focus on improved fleet risk assessment methods, turbine engine blade fretting fatigue and edge contact issues, damage tolerance for other rotating and static structures, inherent defects in nickel-based superalloys turbine rotors, and increases in engine operating temperatures.

A separate but related area of research within this budget line will address turbine engine operation in a volcanic ash environment. Typically, there are about 150 volcanic eruptions world-wide on a yearly basis. Many eruptions threaten heavily used airway routes and aircraft safe continued flight. Historically, over 130 volcanic ash aircraft encounters have been reported. Specifically between 1980 and 2006 there were nine encounters with ash that resulted in aircraft engine power loss with a resulting re-start. Three of these encounters involved at least a temporary, and, in some cases, a permanent loss of power in all engines. Although volcanic ash has caused severe engine damage and total power-loss, there have been no accidents resulting from a volcanic ash encounter. ICAO has issued guidance for airline operators when operating in the vicinity of volcanic ash contaminated airspace. US airline operators are directly affected by these international standards which require regulators to assess operator's safety risk assessments for flight near ash contaminated airspace. Given the continued threat of eruptions, it is paramount to develop an understanding of the effects that volcanic ash on the safe operation of commercial turbine engines.

Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major activities and accomplishments planned in FY 2016 include:

Advanced Damage Tolerance and Risk Assessment Methods for Engine Life-Limited Parts (New Materials)

- Enhance DARWIN® code to enable optimal autozoning to handle larger, three-dimensional files now more commonly used by engine manufacturers during rotor design.

Volcanic Ash Engine Ingestion

- Review volcanic ash ingestion results from the 2015 joint agency Vehicle Integrated Propulsion Research (VIPR) program test and provide an accurate assessment of critical engine component degradation from exposure to volcanic ash.

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

Goals for FY 2016 Funding:

- By FY 2018, develop advanced damage-tolerance based methods for aircraft turbine engine life-limited parts that will be used to improve engine certification standards and reduce the risk of turbine engine failures.
- By FY 2018, gather sufficient engine data that relates engine performance and degradation to volcanic ash ingestion to provide guidance for the development of risk-based operational guidelines.

Funding is necessary at the requested levels to continue the development of advanced damage tolerance and risk assessment methods that reduce the risk of failures of high-energy rotors and other life-limited engine components. Implementation of new and revised engine certification and continued airworthiness standards and Advisory Circulars will be produced that reduce the risk of failures of high-energy rotors and other life-limited engine components.

Additionally, there is no FAA guidance on inadvertent exposure to volcanic ash. Therefore, should such an encounter take place, the FAA cannot recommend any level of inspection, impact, nor critical part review. This research would begin the process of documenting the effect of exposure and as a result, the risk to exposure.

What Benefits Will Be Provided To The American Public Through This Request?

Rapid change is occurring in all aspects of aviation. The research conducted under this program is critical to the FAA's ability to understand those changes and ensure safety as they are incorporated into the user community. This research program identifies, develops, and provides safety research products and knowledge that support the regulatory and oversight needs of FAA and improves the aviation safety metric to ensure the safety of the flying public. Research includes the study and exploration of threats to aviation safety that leads to resolutions, preparation for the safe integration of new technologies and investigation of continued airworthiness issues. The specific benefit of research from this budget line will be the reduction or elimination of commercial aircraft uncontained turbine engine failures and in-flight engine shut down events attributable to rotor design, manufacturing, and service induced anomalies and engine ingestion of volcanic ash. Benefits will accrue in the form of reduced risk of engine failures and fewer accidents, which in turn will lead to fewer fatalities, injuries, and aircraft damage.

Detailed Justification for
A11.c Advanced Materials/Structural Safety

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Advanced Materials/Structural Safety – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.c Advanced Materials/Structural Safety	$2,600,000	$2,909,000	$3,625,000	+$716,000

What is this Program and Why is it Necessary?

FAA establishes rules for the certification which assure the safety of aircraft designed and constructed of a variety of materials and fabrication methods. The Advanced Materials and Structural Safety program conducts research activities to support the FAA safety and regulatory activities, such as rulemaking, guidance, and advisory circulars, in the technical areas of composite and other advanced materials, and aircraft dynamic impacts. This program is divided into two research areas: Advanced Materials and Structural Safety (Crashworthiness).

The use of new materials, processes, and forms on aircraft continues to push the knowledge base for certification in providing safe aircraft for civilian applications. In the last decade, this has been accelerated due to the rapid expansion of the use of composites in increasingly larger structures. Dominating the rapid expansion has been the use of reinforced composites to provide lighter, fuel efficient airframe and engine components including, in recent applications, full fuselage barrels and wings. Understanding these emerging technologies is paramount to assure the safety of the civil aviation and the flying public. The current certification process for many advanced materials and structures was established for smaller, less critical components and service conditions. The difference in structural characteristics of new components and increased scale of these components must be understood and incorporated in certification and operational plans to assure safety for new aircraft that incorporate these advances.

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 improved level of safety compared to that achieved with current operational aircraft. Requests from the Aircraft Certification Offices and from the aircraft manufacturers seeking Type Certification (TC) approval are major influences that shape research requirements, as the FAA seeks to evaluate the safety of 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. These are examined to determine if modifications to certification methods are required for novel materials, processes, and forms that are being introduced on civil aircraft. The National Transportation Safety Board review of accidents (e.g., AA587, R22) involving these structures provides additional impetus for research required to understand these emerging technologies.

The Advanced Materials program investigates damage tolerance and fatigue issues of composite structures, including the assessment of impact damage threats (e.g., in-flight hail, ground vehicle collisions), and fatigue effects of composite materials on structural strength. The program explores composite environmental and aging effects; control issues related to composite fabrication and continued operational safety; bonded joints; bonded and bolted repairs; and the characteristics of new materials and applications used in aircraft structures. The program develops safety awareness training for advanced composite materials and manufacturing processes for education of aviation workforces.

The Structural Safety program performs research to evaluate analysis and test procedures used by the industry to meet crashworthiness regulations. These regulations are evolving and are supplemented with special conditions for transport aircraft with composite fuselage and wing structures. The program ensures new aircraft structures demonstrate levels of safety equivalent to existing aircraft structures subjected to survivable crash conditions. The program develops dynamic test methods to determine composite material properties, accesses loading rates for emergency landing conditions including strain rates, typical material response rates at the component and system level; occupant survivability; identifies issues and limitations associated with structural scale and boundary effects, and develops crashworthiness safety awareness training materials.

Major activities and accomplishments planned in FY 2016 include:

Advanced Materials

- Damage Tolerance of Composite Structures

  This activity will document severe impact damage mechanisms from simulated service vehicle collisions and effect on structural properties. It will provide test and analysis guidelines to assure designs are resistant to such damage used to establish future certification policies. Studies will isolate critical damage and defect types for dynamic components, including focused studies on safety issues derived from service. These studies will also be performed to evaluate advances in analysis methods, failure criteria and test procedures applied to composite fatigue and damage tolerance. Newly developed alternates to environmentally hazardous materials will be investigated for their effect on structural materials. Evaluation methods for determining structural failure causes after a post failure fire will be investigated.

- Composite Maintenance Practices

  Repair trials, inspections, and structural integrity data that serve as proof of consistent and reliable composite maintenance practices used by the industry, will be evaluated. Evaluation of field bonded and bolted repair practices to update related guidance and training for composite aircraft structures will be completed. These evaluations of industry repair design characteristics, quality control procedures, and structural performance will be used to develop the associated policy, guidance materials and training materials. Detailed technical background will be established to support expanding applications, advances in technology, and new rules, policies and guidance.

- Structural Integrity of Adhesive Joints

  Collection of structural integrity data, for composite and metal bonded structure that is representative of the design and processing variables used for aircraft structures currently in service will be performed. Evaluations of industry process quality control procedures and the tests & analysis methods used for structural integrity will be done to yield an assessment of the strengths and limitations. The best practices for applying these procedures and methods will be documented. One of the primary outs from this requirement will be reliable tests to evaluate the long-term durability of both composite and metal bonded joints. Training and detailed background on best industry practices will be established to support guidelines for expanding applications and new rules, policies and guidance. A strong industry interface will be used to help adopt safety management principles in creating new or updating existing composite guidance materials. This will lead to standards that can reliably be applied throughout the industry in dealing with the issues associated with bonded structures.

- Lightning Strike Test Standards for Composite Structure

  The test methods for detecting lightning strike attachment in composite structure will be coordinated with the SAE AE2 Lightning committee. Research in this area will be based on a need to better understand the performance of composite structures subjected to lightning. Aircraft lightning specialists worldwide will be engaged, particularly with the SAE AE2 and EUROCAE WG-31 Lightning Committees. This research will also be coordinated with existing lightning test laboratories. The SAE AE2 Lightning Committee can coordinate round-robin tests among participating lightning test laboratories to validate methods identified through this research.

- Composite Materials Handbook 17 (CMH-17, formerly MIL-HDBK-17)

  The composite handbook will continue to develop content for the next revision. It will incorporate findings from the research performed in the other research areas to provide a reference for civil aviation industry.

Priority areas of development will be in sandwich composite materials, damage tolerance, and adhesive structural bonding.

Structural Safety

- Transport Airplane Ditching

  Water ditching studies will be reviewed with regard to design and operational standards of transport aircraft and compare with current FAA certification requirements. This will include recent water impact events (i.e. US Airways 1549 – Hudson accident). An aircraft ditching model will be developed to perform parametric studies to identify crashworthiness areas that need investigation.

- Airframe Structural Crashworthiness Response Characterization

  A tool will be developed to characterize the baseline crashworthiness performance of traditional metallic transport aircraft. This tool will help to identify necessary inputs and important parameters necessary to characterize aircraft structural response during a survivable impact scenario. The use of existing data and modeling and simulation techniques will provide a means to establish structural scale and boundary effects and constraints.

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

Advanced Materials

While the top level requirements for demonstrating safety of aircraft are the same for composite or metal materials, different characteristics of composite structural materials requires understanding of their unique response to the civil aircraft operational environment. Advisory Circular (AC) 20-107, "Composite Aircraft Structure" is the primary guidance for composite aircraft structures. It requires continual review and periodic update to assure civil aircraft continue to meet the applicable safety standards as changes in the materials and processes are introduced into their design. Advances in understanding of composite structural response leads to periodic updates and revision of safety requirements for composite structures. These updates are identified and requirements are investigated through the research performed by this program. Workshops and industry involvement provide timely information to the aviation community and focus the research on workable solutions to safety concerns. The FAA Aircraft Certification Service engineers, applicants, certificate and approval holders, parts manufacturers, material suppliers, maintenance, and repair organizations use the technical information developed in this program through direct involvement in the research, technical reports, handbooks (e.g. Composite Materials Handbook 17), guidance, policy, and training courses. This data exchange allows the regulatory process to address industry advances and assure the safety of state-of-the-art technology and design.

Structural Safety (Crashworthiness)

The FAA revises or updates crashworthiness-related regulations and standards to enhance the safety of airframe structures by studying and developing new information for overhead stowage bins; auxiliary fuel tanks and fuel systems; aircraft configurations; seat and restraint systems; and human tolerance injury criteria. It supports development of alternative methods to improve the certification process (e.g., certification by analysis and component tests in lieu of full-scale tests).

Goals for FY 2016 Funding:

- By FY 2020, document severe impact damage mechanisms from simulated service vehicle collisions and effect on structural properties. Outline test and analysis guidelines to assure designs are resistant to such damage.
- By FY 2020, provide detailed background on the unique static, fatigue, environmental durability and impact performance of advanced composite splicing concepts.
- By FY 2020, complete an evaluation of field bonded and bolted repair practices to update related guidance and training for composite aircraft structures.

- By FY 2020, develop information on the effect of environmental and heat exposure on structural properties and durability of composite structures.
- By FY 2020, provide documentation and background data for regulatory action to assure reliable processing of adhesively bonded structural.
- By FY 2018, assess loading rates for emergency landing conditions at the component and system level including occupant survivability.
- By FY 2018, identify needs for lightning strike criteria and policies specific to composite structures.
- By FY 2018, identify issues and limitations associated with structural scale and boundary effects on crash analysis.
- By FY 2018, develop recommendations for guidance and certification requirements for transport airplane ditching.
- By FY 2018, develop basis for performance related crashworthiness certification requirements.

This program depends on an exceptional combination of individuals from industry, academia, and regulators to develop focused research efforts where the products of the research are usable immediately in certification and other related safety programs. The engagement of industry in the process is contingent on the research reaching a specific level of development before industry review. The program is responsible for maintaining a momentum that keeps all parties engaged without over burdening any of the partners. Requested funding will provide the ability to determine the adequacy of the current composite structural and crashworthiness certification protocols for the continued operational safety of the current fleet and the designs, materials, and processes of future aircraft certification projects.

What Benefits Will Be Provided To The American Public Through This Request?

Rapid change is occurring in all aspects of aviation. The research conducted under this program is critical to the FAA's ability to understand those changes and ensure safety as they are incorporated into the user community. This research program identifies, develops, and provides safety research products and knowledge that responds to the regulatory and oversight needs of FAA and improves the aviation safety metric to ensure the safety of the flying public. Research includes the study and exploration of threats to aviation safety that leads to resolutions, preparation for the safe integration of new technologies in the cockpit, and investigation of continued airworthiness issues.

The use of advanced materials and structural concepts is central to a vibrant aviation industry in the U.S. All aircraft manufacturers are using more and more advanced materials on their aircraft. As the methods of structural verification are being extended to new components and aircraft applications, it is important to understand the envelope of acceptable design parameters that have not been explored with traditionally designed advanced composite structures. This will ensure as more applications are introduced the safety record of composite structures is maintained. This effort will assure the civil aircraft manufactured with these materials are safe and reliable. The concerns include strength, endurance and environmental durability.

Currently there are no existing structural crashworthiness requirements for transport airplanes. The development of new materials and novel designs has required the manufacturers to provide a level of safety comparable to existing traditional metallic structures. The FAA is seeking to develop a single policy for demonstrating crashworthiness that would be applicable to all transport airplanes regardless of the structure. The FAA would develop requirements to establish acceptable levels of safety and guidelines to help industry meet these accepted levels of safety. The benefits to the American public as well as air travelers at large is a defined minimum level of safety to support the reduction in fatalities and the extent of injuries in the event of a crash.

Detailed Justification for
A11.d Aircraft Icing/Digital System Safety

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Aircraft Icing/Digital System Safety – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.d Aircraft Icing/Digital System Safety	$7,500,000	$5,500,000	$6,920,000	+$1,420,000

What Is This Program And Why Is It Necessary?

The FAA establishes rules for the certification and operation of aircraft in icing conditions and for the use of digital systems. The agency uses research results to generate Advisory Circulars (ACs) and other forms of technical information to guide certification and airworthiness specialists and inspectors on acceptable means for meeting requirements.

<u>Aircraft Icing</u>

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. Between 1982 and 1992, there was a series of accidents of large commercial transport aircraft taking off in icing conditions resulting in hundreds of fatalities. During the 1990s, there were approximately 100 fatalities from in-flight accidents of regional commercial transport aircraft in the United States. Since 2000, there have been no fatalities from accidents due to icing of these aircraft in the United States, although fatal accidents in general aviation aircraft continue to occur. However, even with advancements over the years, equipment on the aircraft (i.e. engine loss, instrument inconsistencies) can be caused by ice crystals and impact safety.

The FAA, working with industry, has identified over 160 ice crystal turbine engine power loss events (a power-loss event is a surge, stall, rollback, or flameout of one or more engines) and engine damage events occurring between 1989 and 2014. There were also 11 total power loss events from flameout and one forced landing due to ice crystals. Ice crystals have also caused engine thrust events due to ice crystal blockage of the inlet temperature probe. The FAA is also aware of events where pitot probes have stopped working in ice crystal conditions and the flight crew temporarily lost all indication of airspeed. Temporary inconsistency between the airspeed measurements, likely following obstruction of the pitot probes by ice crystals, was identified by the investigating authority as one of the causes of an airplane accident that occurred on June 1, 2009 in which there were 228 fatalities.

The Aircraft Icing program will improve existing capabilities and develop new engineering tools to support improved means of compliance and new guidance material for engine and airframe certification and operations in SLD, mixed-phase, and ice crystal icing conditions. The outputs will support new guidance materials for advisory circulars. Research will study the effects of various winter weather conditions, including mixed conditions, on the performance and aerodynamic effects of anti-icing fluids, new non-glycol fluids, and ice phobic applications. Research will support holdover time determination and operational assessment of fluid effectiveness and will yield data packages for development of operational guidance and standards on their use. Finally, the FAA will enhance icing simulation methods for means of compliance; conduct swept-wing ice accretion experiments for a validation database and to better understand three-dimensional (3-D) iced aerodynamic flow phenomena. The outcome of this R&D will provide new test methods and a 3-D ice accretion database to support validation of computer codes and means of compliance for certification.

<u>Digital System Safety</u>

Airborne systems designs have become increasingly dependent on highly integrated software and hardware architectures that share power, computing, networking, input/output, and other resources to support the needs of multiple aircraft The complexity is reaching the point that it may not be possible to completely understand and track the interactions of these functions especially during abnormal operating conditions (e.g. component failure, single event upsets). While great strides have been made in the process of verifying individual components, the process of validating and verifying the behavior of a system of systems contains gaps to be resolved at the system and aircraft level. The FAA has taken a proactive approach, to keeping pace with the ever changing technological industry and is conducting research on software and digital aircraft systems, before they become too complex to safely certify. Thus, the program conducts research to identify possible issues and shortcomings with the current process used by the commercial aviation industry regarding requirements definition, validation, and verification for airborne systems. Specific to software assurance, the program identifies, analyzes and addresses issues associated with new software development techniques and the tools. The research examines approaches used in other engineering disciplines to determine if they can be used to demonstrate compliance with the airworthiness rules and are cost efficient, repeatable, and reliable. Specific to airborne electronic hardware, the program seeks to ensure compliance with airworthiness regulations of the highly integrated, complex systems that use many readily available Commercial-off-the-Shelf (COTS) components that are smaller in weight and size but have larger electronic storage and computing capacity. The research addresses issues associated with design techniques and the tools used in the design process to determine if potential certification or assurance issues can be identified at earliest stage of the process. Requirements definition, design, implementation, validation, verification, configuration management, and process assurance are the stages that will be researched.

Aircraft network systems security is an increasing concern on current and future aircraft. The next generation of aircraft is increasingly becoming network centric with expanded internet access capabilities. Aircraft manufacturers and modifiers are installing avionics systems to allow increased connectivity to aircraft systems within an aircraft and to networks external to the aircraft to take full advantages of new computer technologies for more efficient aircraft operations and safety enhancements. The increased connectivity, particularly to external networks and systems without sufficient security controls could have information security vulnerabilities, which if exploited, could impact the aircraft safe operations and continued airworthiness. Examples of such external networks and services include airlines operation centers, airport gate links, aircraft software uploads and maintenance, flight information databases, etc., the research will address issues introduced by connectivity to aircraft systems that are internal and external to the aircraft; protection mechanisms; and related electronic security and safety network concerns**.** This research will also consider electronic security issues, including cyber threats, as they affect operations and continued airworthiness of aircraft systems. The program focuses on cyber security vulnerability/threat identification and risk mitigation to provide necessary information in supporting the development of aviation policies, guidance, and training requirements to assure the resilience of aircraft network systems from cyber-attacks.

The technical data from the research will be used to develop policy, guidance, best practices, standards, regulatory, and training development to address gaps, safety issues, and potential malicious generated as findings from the research. In addition, the outputs will be used to enhance standardization and support timely certification for complex systems with cyber security vulnerabilities.

Major activities and accomplishments planned in FY 2016 include:

Aircraft Icing

- Research on Ice Crystal Icing Conditions to Support Means of Compliance
- Study ice formation mechanisms in warm environments representing an engine compressor using a rotating rig in a pressure-controlled facility.
- Compare results of analysis of data thus far available for high ice water content (HIWC) flight research to engineering standard and facility testing capabilities for convective weather ice crystal conditions.
- Safe Operations and Take-off in Aircraft Ground Icing Conditions
- Compile data and information package needed to update annual winter notice that provides guidance for formulation of ground deicing plans for airlines as required by 14 CFR 121.624.
- Investigate operational issues related to failure to rotate and other safety concerns for thickened anti-icing fluids on horizontal stabilizers for lower speed rotation aircraft.

- Simulation Methods Development/Validation to Support Appendix C Icing Certification and Continued Operational Safety
- Conduct aerodynamic wind tunnel testing of ice shapes from icing wind tunnel testing on a swept wing model.
- Supercooled Large Drop (SLD) Engineering Tools Development and Validation
- Define limitations of and primary research areas to improve SLD engineering tools for certification compliance.

Digital System Safety

- Onboard Network Security and Integrity
- Study security risks and effectiveness of current safety-based processes to uploading aircraft software in the field.
- Connect security risk assessments and mitigation methods of electronic flight bags (EFBs), specifically Class I and II EFBs if they are directly connected to aircraft network systems.
- Software Development Techniques and Tools
- Identify verification issues and assurance risks of applying newer techniques and technologies and propose recommendations for the certification process.
- Airborne Electronic Hardware Design Techniques and Tools
- Propose assurance criteria for commercial off-the-shelf components and study advanced verification methods for safety critical airborne electronic hardware.
- Systems Considerations for Complex Software Intensive Systems
    - Study and identify the certification challenges in the assurance of complex digital software intensive systems and propose mitigation approaches.

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

The Aircraft Icing 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. 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 guidance materials and technical standards, and develop databases and test methods that will support certification for operations in icing conditions. Current aircraft that are certificated for flight in icing conditions (based on Appendix C engineering standards) can fly in icing conditions as long as they are not operating in severe icing (conditions where the rate of accumulation cannot be managed by the deicing/anti-icing equipment; an immediate flight diversion is necessary). New regulations for operations in icing conditions will change the criteria for operating in icing conditions. There will be two additional Appendices, Appendix O will be for supercooled large droplets, and Appendix D will be for ice crystals. The program's researchers have contributed to the development of technical data and advisory materials to assist in certification for these new Appendices and will develop new means of compliance, guidance material, and new technologies to support ground and in-flight operations under these new icing regulations.

The Digital System Safety program supports development of new guidelines for testing, evaluating, and approving digital systems during the certification of aircraft and engines. The program also studies the airworthiness requirements of airborne cybersecurity as it applies to aircraft and engine certification. The program supports development of policy, guidance, best practices, and training needs of the Aircraft Certification Service and Flight Standards Service on airborne digital system safety and their safe applications to aircraft systems. The goal of this program is to approve and maintain aircraft safety by taking a proactive approach to the ever changing technological marketplace and conduct research in the areas of advanced digitally intensive systems and assess how they can safely be deployed in the onboard airborne systems of systems environment. These systems include fly-by-wire flight controls, augmented manual flight controls, navigation and communication equipment, autopilots, etc., and includes those systems with network connectivity both within and outside the aircraft. The program also works with industry, Government agencies, and aviation standards development bodies, such as RTCA, EUROCAE, and SAE, to establish consensus-based standards and improve the effectiveness of the FAA rulemaking and policy issuances in digital aviation systems.

Goals for FY 2016 Funding:

- By FY 2016, complete development of scaling procedures and test methods for sea level testing of engines for susceptibility to compressor icing in high ice water content conditions.
- By FY 2018, complete test and analytical study of operational issues related to failure to rotate and other safety concerns for thickened anti-icing fluids on horizontal stabilizers for lower speed rotation aircraft.
- By FY 2018, complete a benchmark database of swept wing of ice shapes and their aerodynamic for evaluation and validation of computer codes for prediction of ice shapes and of their aerodynamic effects.
- By FY 2020, develop engineering tools, validation databases, and icing test facilities for freezing drizzle and potentially freezing rain icing conditions, and data and technical information supporting improved methods of compliance for airplane certification to these conditions.
- By FY 2019, determine an acceptable means to analyze, integrate, validate, and verify complex airborne digital systems and improve safety.
- By FY 2017, analyze software development and verification techniques and tools to identify issues that affect the aircrafts airworthiness.
- By FY 2018, identify and analyze airborne electronic hardware issues that could affect aircraft airworthiness.
- By FY 2018, develop methodologies for identification and analysis of security threats to aircraft safety in an airborne network environment.

Funding at the requested level for aircraft icing is needed for the reduction of the risk of stall, flameout, and other adverse engine events in high ice water content ice crystal conditions, for safe operation in more ice pellet mixed conditions, and for validation of new computer programs for the certification of aircraft for icing.

Funding at the requested level is needed to allow the FAA, to evaluate emerging, highly-complex aircraft systems implemented digitally using hardware and software techniques. This would allow certification specialists to properly assess proposed aircraft and systems designs which employ this technology for flight-essential and flight-critical applications. In addition, funding would provide the FAA with needed technical input to develop and update certification policy, criteria, and training as needed to accommodate new technologies or methodologies. If funding is reduced, the ability to develop, validate, and improve certification methods will be negatively impacted.

What Benefits Will Be Provided To The American Public Through This Request?

The benefits to the public through the aircraft icing request are continued or improved safety in ground and in-flight icing conditions. The ground icing research program is managed in such a way that it can address safety and other issues through testing within months of them being identified. The inflight icing program is currently focusing on the threat of high ice water content conditions turbine engines, supporting improved characterization of the conditions for certification and simulation in test facilities for evaluation of existing designs that have had adverse events and certification of new designs.

Outputs from Digital System Safety will be used to develop new or revised guidance and training material as well as recommend best practices for the industry. These outputs will generate the following benefits: continuous improvement and risk management; increased efficiency and effectiveness; increased organizational knowledge; improved harmonization with international authorities; and reduced certification time and cost to both industry and FAA; all leading to increased public safety while onboard an aircraft.

Detailed Justification for
A11.e Continued Airworthiness

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Continued Airworthiness – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.e Continued Airworthiness	$8,000,000	$9,619,000	$8,987,000	-$632,000

What Is This Program And Why Is It Necessary?

Aircraft and engines are extraordinarily complex systems, operating in an unforgiving environment, with an extremely long design service life. Like most complex systems, continued operational safety is ensured in several phases: design and certification; operational maintenance; and timely discovery and repair of damage and unanticipated issues. FAA issues rules and advisory materials regulating all of these phases. As aircraft design and systems mature, operational data become available from several sources including Service Difficulty Reports, Aviation Safety Action Program reports, and the Aviation Safety Reporting System. FAA uses this information to fine tune these oversight instruments, continually increasing safety. However, as new technologies are introduced, FAA must work without this operational data to anticipate all potential problems, ensuring that issues do not become problems. The Continued Airworthiness Program supports this mission in a variety of ways.

As aircraft products age, the probability of failure of components and subsystems increases. Structures fatigue, corrode, and crack; moving parts wear; electrical systems fail; and aircraft suffer damage from a myriad of mishaps on the ground and in the air. The FAA uses regulations and guidance that require manufacturers to assess potential failures in their designs and establish design and inspection requirements to reduce the probability of catastrophic failure. Over the past 25 years, this program successfully addressed issues of continued airworthiness by providing the information and data that support those regulatory efforts that enable the current high level of safety of commercial aircraft.

New aircraft designs, materials, both metallic and composite, and fabrication techniques have entered service in recent years which may require updated regulatory guidance and requirements to maintain the current level of aviation safety. Flight controls, avionics, and other electrical and electromechanical systems have been rapidly evolving for some time and the newest aircraft share little in common with airliners of just a decade ago. These advanced aircraft are introducing new challenges and issues for continued airworthiness. One of the primary goals of this program is to anticipate those issues and plan and execute the necessary research to support appropriate regulatory policy and procedures.

Issues of continued operational safety are not limited to new aircraft types. Even older aircraft types are continuously being updated and new issues arise as the individual aircraft age. Recent in-flight incidents, such as Southwest Airlines flights 2294 in 2009 and 812 in 2011, demonstrate the technical challenges of maintaining continued airworthiness, predicting potential failures, and determining appropriate maintenance actions.

The Continued Airworthiness program focus is on the continuing operational safety of all aircraft throughout their lifecycle. It is based on research requirements developed by the FAA Office of Aviation Safety. The requirements reflect the need of the regulatory office for technical data and information to support regulatory activities or for possible solutions to real world questions and problems. For example, the inspection of composite, metallic, and bonded structures in an accurate and reliable way presents a significant challenge for regulatory engineers, inspectors and the industry. The program investigates improved inspection technologies and procedures and quantifiable measures of accuracy. Research outputs include feasibility demonstrations of inspection technologies, characterization of new inspection methods and procedures, or proposed inspection standards for the aviation industry.

In FY 2016, the planned activities and accomplishments focus on five technical areas: Flight Controls and Mechanical Systems (FCMS), Maintenance and Inspections (M&I), Rotorcraft Systems (RS), Electrical Systems (ES) and Structural Integrity Metallic (SIM). Funding will also provide for engineering, technical, and management support of overall research activities. Additionally, funding may provide for build-out of laboratory facilities to support test equipment.

- Flight Controls and Mechanical Systems (FCMS). In the FCMS effort, the research will focus on providing angle of attack (AOA) information to the pilot to help reduce the number of fatal general aviation accidents. The number one cause of fatal accidents in GA is loss of control, usually preceded by dynamic stall at low altitude. The research will investigate how sensed and derived angle of attack systems can be incorporated into general aviation cockpits to prevent stall, and identify potential future certification requirements for AOA systems. The research will review pertinent loss of control accidents, pertinent fly-by-wire system failures, how sensed aircraft states have played a role in the system failures, and develop system architecture and design requirements to prevent similar events from occurring in the future. Also studied will be flight crew loss of control, anthropometric design assurance, and tire failure modeling.

- Maintenance and Inspections (M&I). The M&I research will evaluate current and advanced nondestructive inspection (NDI) methods for composite and metallic structures for both line and heavy maintenance environments to assess continued airworthiness. It will include evaluation of aged in-service composite and metallic component bonded repairs for age and environment related strength degradation including NDI methodologies for assessing bond integrity, generation of reliability data on capabilities of various NDI methods, and support updating training materials as required by relevant parts of the rules for maintenance and repairs. The research will provide new guidance and revision updates for existing Advisory Circulars: (AC) 65-33 Development of Training/Qualification Programs for Composite Maintenance Technicians, and (AC) 43-214 Repairs and Alterations to Composite and Bonded Aircraft Structure.

- Rotorcraft Systems (RS). The RS research will be initiated to improve the continued operational safety of rotorcraft by reducing the level of risk associated with bird strikes. This research will analyze bird strike incidents to determine feasible methods of mitigating risk, including aircraft operating procedures and the possible use of audio and visual systems to keep birds from rotorcraft. In addition, research will be conducted that will yield technical data to support the development of new regulations and advisory material for certification of rotorcraft advanced flight control systems. This research will examine the safety aspects of certification of fly-by-wire technology for rotorcraft as well as the continued operational safety of that technology.

- Electrical Systems (ES). The ES research will address three safety and environmental-efficiency needs: (1) develop technical data to support the development of appropriate rules and guidance that will ensure integrity of electrical systems and safety of aircraft equipped with fuel cells; (2) investigate the safety aspects of non-flammable electrolyte lithium batteries in aerospace applications; and (3) determine characteristics of safe rechargeable lithium batteries and battery system installation that will yield technical data to develop new regulatory requirements to support this pervasive and still relatively new technology.

- Structural Integrity Metallic (SIM). The SIM research area consists of research for both transport and small airplanes. New metallic materials being introduced are much more process intensive and a good understanding on their mechanical behavior and long term durability is needed to provide the appropriate regulatory guidance. Research will focus on emerging technologies such as damage tolerance and durability issues of new aluminum-lithium alloys, new and emerging alloys to be studied for inclusion in Metallic Materials Properties Development and Standardization (MMPDS), and risk management methods to support the Aircraft Certification Services Monitor Safety/Analyze Data (MSAD) initiative, which is a data-driven, risk-based continued operational safety decision-making process.

Major activities and accomplishments planned in FY 2016 include:

Fuel Cell Systems for Aircraft Applications

- Develop a project plan and initiate research on using fuel cell systems for aerospace applications.

Rechargeable Lithium Batteries and Battery Systems for Aircraft Applications

- Develop a project plan and initiate the investigation of non-flammable electrolyte lithium batteries in aerospace applications.

Preventing Loss of Control in Part 23 by Safer Automation using Envelope Protection

- Use derived AOA data to feed an automatic flight control system, with speed protection.
- Investigate energy state displays that do a real time comparison of aircraft energy for safety impact.
- Conduct experiments to quantify the various merits of display technologies in preventing loss of control accidents.
- Produce articles for Safety Briefing magazine illustrating benefits of using AOA data in automation.

Tire Failure Characteristics

- Develop and validate a thrown tire tread model.

Continued Airworthiness of Composite Structures

- Procure test articles supporting the pre-inspection, teardown, and post inspection of aged in-service component bonded repairs for use in developing training and advisory material for composite and metallic repairs.
- Conduct initial visual and NDI inspections of repairs and surrounding structure

Rotorcraft Advanced Flight Control Systems

- Develop minimum performance criteria required to maintain continued safe flight and landing for any foreseeable conditions the rotorcraft are intended to be operated
- Develop and validate acceptable minimum performance criteria required to maintain safety for degraded operation of fly-by-wire systems, including unacceptable systems hazards

Rotorcraft Continued Operational Safety

- Conduct an analysis of helicopter bird strikes and analyze their potential effect on the pilot and on the structural integrity of the helicopter

Risk Assessment and Risk Management Methods for Small and Transport Airplane Continued Operational Safety

- Maintain FAA support for NASGRO - Industry standard for fatigue crack growth and fracture analysis

Emerging Technology – Active Flutter Suppression

- Review flutter and aeroservoelastic research involving active flutter suppression, including military application of the technology

MMPDS Support and Design Values for Emerging Materials

- Develop, maintain, and distribute the annual update to the MMPDS Handbook and derivative products

Damage Tolerance and Durability Issues for Emerging Technologies

- Complete draft report with technical data to assess the fatigue and environmental durability of bonded repairs to metallic airframe structure
- Develop preliminary procedures and guidelines for establishing design values for highly process-dependent emerging metallic-based materials (e.g. additive manufacturing)
- In partnership with Boeing, develop capabilities for structural integrity testing of wing-like structure

- Develop technical data to assess first commercial use of structural health monitoring (SHM) to determine methods of certification compliance

Probabilistic Approach to Detecting Fatigue Damage Before Developing an Unsafe Condition

- Complete a draft Survey Findings Report documenting the damage reported from actual airplane service history (maintenance records, inspection records, tear-down reports, accident/incident reports, service difficulty reports, etc.)

Flight Data Monitoring System Installation, Helicopter Operations

- Study the advantages or disadvantages of the installation location of each FDM system by conducting test flights to collect data at different locations

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

The Continued Airworthiness program addresses issues of continued operational safety in a range of structural and systems areas. Proactive research is being done in several areas including: emerging metallic structures to determine the appropriate FAA response to the introduction of these process intensive materials for which the FAA has no previous experience; NDI of the new generation of advanced metallic and composite aircraft; advanced flight control systems; and active flutter suppression systems which are being introduced. Other research focuses on known issues such as loss of control in Part 23 aircraft, operational safety of rotorcraft, management of fatigue in small airplanes, aging of electrical systems, the evolving use of maintenance and repair organizations, and NDE of rotating engine components.

Goals for FY 2016 Funding:

- By 2018, develop process for establishing mechanical property standards for emerging metallic-process intensive materials, property standards that are needed for FAA certification guidance.
- By 2019, develop an understanding of the durability and damage tolerance behavior of emerging technologies including unitized welded structure, new metallic alloys, and hybrid bonded construction to be used in FAA guidance material.
- By 2018, develop an increased understanding of aged bonded repairs for use in new and existing FAA guidance material.
- By 2019, provide data relative to active flutter suppression to allow for the review of pertinent regulations and guidance material, and prepare recommendations (if needed) for new, modified, or otherwise improved criteria.
- By 2019, make recommendations for FDM system installation policy and guidance

This research supports the preparation of FAA regulatory instruments that ensure the continued operational safety of both the commercial and general aviation fleets.

There is a risk profile associated with the life cycle of every aircraft type and every specific airframe. Newer aircraft types tend to have a lower risk profile while older aircraft tend to have a greater risk profile. The introduction of new designs, materials, fabrication techniques, etc., increase the risk associated with new aircraft types. This is borne out by the fact that the structural and electrical problems already in the first years of service of the advanced aircraft far outstrips those seen on more mature aircraft types such as the Boeing 747. New aircraft technology also brings with it the near certainty of new problems which did not pertain to previous aviation technology and therefore are not anticipated or remediated. This increases the risk associated with aging airframes and reduces predictability of that risk.

This program supports the regulatory and certification updates intended to reduce the risk associated with all phases of the lifecycle of traditional and advanced aircraft. This program depends on an exceptional combination of individuals from industry, academia, and regulators to develop focused research efforts where the products of the research are usable immediately in certification and other related safety programs. The program also leverages its resources to obtain significant support from industry in funding, equipment, and manpower.

What Benefits Will Be Provided To The American Public Through This Request?

The Continuing Airworthiness program provides increased safety for the flying public. The Rotorcraft Systems research is working to support the International Helicopter Safety Team goal to reduce helicopter accident rates by 80% worldwide.

One of the primary benefits of the Structural Integrity of Metallic research is to allow the safe introduction of new metallic material forms and technology advancements onto the U.S. aviation fleet that will improve operational safety, ensure continued airworthiness, and prevent and mitigate accidents. In addition, the program promotes a uniform level of safety by developing and maintaining safety standards through a widely recognized government-industry organization. Through this program, FAA resources are optimized by streamlining approval of data submittals, allowing for the rapid response to safety issues, and providing improved confidence in data for decision-making.

Maintenance and Inspection research provides increased capability to determine adequate bonded repair strength to ensure continued airworthiness through in-service bonded repair tear down research and advanced inspection methods.

Detailed Justification for
A11.f Aircraft Catastrophic Failure Prevention Research

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Aircraft Catastrophic Failure Prevention Research – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.f Aircraft Catastrophic Failure Prevention Research	$1,500,000	$1,500,000	$1,433,000	-$67,000

What Is This Program And Why Is It Necessary?

To reduce workload and allow for the timely processing of applications, FAA engineers need publicly available tools to standardize the analysis of engine and aircraft for rotor burst and fan blade containment. An increasing number of engine and aircraft projects are relying on proprietary analysis tools to show compliance, complicating the FAA task of making compliance findings and allowing potential variation in the standard of safety. The goal of this research program is to have a public tool with standardized generic models, user guides, training, software quality control process, and validated public material models. This will allow engineers to validate the proprietary tools, streamline the certification process, and help mitigate fatalities and injuries when these events occur.

The need for FAA aircraft specific research is that impact problems by the majority of the LSDYNA user community deal with relatively low speed automotive crash. At the other end of the spectrum are very high speed military threats and explosions that are well above the speed of sound. In commercial transport engine failure, rotating speeds of the engine are limited to the speed of sound at the tips of the largest blades, so fragment velocities vary from several hundred feet per second up to near the speed of sound. This is a unique speed range because the mode of failure changes with speed causing aerospace impact to result in many different failure modes. Predicting the proper mode is critical to accurate analysis results.

The Aircraft Catastrophic Failure Prevention Research program is largely driven by accidents, incidents, National Transportation Safety Board (NTSB) recommendations, and the introduction of new technologies. 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 program works closely with the Aviation Rulemaking Advisory Committee, Aerospace Industry Association (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. A new Australian Transportation Safety Board Recommendation was created for FAA action in response the Qantas Airlines Uncontained Engine Failure on the Airbus A-380 Aircraft. This program has been tasked with performing a review and update to the guidance for AC20-128 and the UEDDAM code as the means for the FAA to respond to this recommendation.

A new challenge has emerged with the proposed open rotor engine concept, which promises greater efficiency. In this design, the engine containment is removed and two rows of counter rotating fan blades create a new certification configuration. Current ducted fan designs used in large commercial transport completely mitigate a fan blade loss with engine containment. For these new engines a fan blade failure is not contained, therefore fuselage shielding is needed. The analytical tools developed under this program are being used to evaluate this new configuration that has the same physics of failure as the engine containment impacts.

Standardized methods and numerical tools to analyze effects of both engine rotor burst and fan blade releases assist the FAA certification offices and industry applicants in gaining a common understanding in demonstrating compliances of regulatory requirements. The current regulatory demonstration requirement by full-scale destructive tests of a single blade failure needs more robust and accurate analytical methods and predictive tools to assess safety risks to the aircraft. With these methods and tools validated and available, the option for standardized compliance by analysis (for specified rules) for derivative designs of already certified engines will be possible. The analysis tools developed in this program will also help to mitigate aircraft damage from an uncontained engine failure and prevent potential aircraft catastrophic failures. It provides FAA engineers a means to validate proprietary tools currently used by engine manufacturers and streamline the certification process. The long term goal is certification by analysis.

The new work in this program is moving away from the traditional aluminum structure and into composite structure. This is a significant increase in the model complexity. Metal alloys typically have the same properties throughout the material and in all directions, they are isotropic. Composites have very different properties depending on the fiber orientation in the resin. Industry trends indicate an increased use of composites for both engine containment and fuselage structure. Better algorithms to predict the failure of these materials are needed. Building on the recent success with metals, and the increasing capability of computer platforms thru parallel processing, we will develop a new generation of predictive anisotropic models.

The program will develop, test, and analyze methods that produce publically available tools to better predict aerospace engine impact events. Past research focused on material characterization tests for titanium, aluminum, and Inconel 718 to develop unique, state-of-the art models in a general-purpose finite element program called LS-DYNA. LS-DYNA is widely used by industry and government for impact analysis and risk assessment related to engine containment issues. The material models greatly improve the accuracy of the analysis and the safety of aircraft designs. The process for developing these unique material models is used by automotive companies and aircraft companies in crash analysis studies. To continue the success of these tools more complex examples of how to utilize them are needed with sensitivity studies to understand the response to adjustments in contact, friction and impact speed.

In FY 2015, the program will initiate efforts related to composite materials including development of the framework by which impact and failure will be mathematically tracked during an impact event in composites. In parallel, test data will be developed for a publicly available composite material in each of the three principal directions for multiple loading conditions to populate the tabular data set that will be used by the new material model. As the composites effort is ramping up the final aspects of the metals work will be completed in terms of testing and developing material input curves from the test data. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major activities and accomplishments planned in FY 2016 include:

Advanced Analysis Methods for Impact of Composite Aircraft Materials in Rotor Burst and Blade Release.

- Support industry use of developed impact analysis tools through the LSDYNA Aerospace Users Group.
- Complete Phase 1 composite material model for aerospace impact problems.
- Develop a revised uncontained engine debris model that includes the Airbus A380 event and other events that were not included in the 1990's debris model.
- Evaluate open rotor engine shielding options.

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

The program develops data, analytical tools and methods for both uncontained engine fragment impact and engine containment systems. Aircraft Safety depends upon protecting identified critical systems that may need shielding from uncontained engine debris. Through the LS-DYNA Aerospace Users Group, FAA works with industry to establish standards for finite element analysis and guidance for use in support of aircraft engine and aircraft certification. The program provides technical information to establish certification criteria for aircraft and support for certification of new technologies and supports development of Advisory Circulars that outline acceptable means of compliance in meeting regulatory mandates.

The program also develops an Uncontained Engine Debris Damage Assessment Model (UEDDAM) which evaluates aircraft vulnerability and mitigates damage from uncontained engine events. Research will develop improvements to the UEDDAM model to address the Australian Transportation Safety Board Recommendation.

Goals for FY 2016 Funding:

- Support the use of the new impact and failure models available in LSDYNA through the LSDYNA Aerospace Users Group during 2016
- By August 2016, complete Phase 1 development of a new anisotropic composite material model.
- Respond to the Australian Transportation Safety Board Recommendation on the Airbus A-380 uncontained engine failure, specifically address "13.130. The Australian Transport Safety Bureau recommends that the US Federal Aviation Administration, in cooperation with the European Aviation Safety Agency, review the damage sustained by Airbus A380-842, VH-OQA following the uncontained engine rotor failure overhead Batam Island, Indonesia, to incorporate any lessons learned from this accident into the advisory material during 2016.
- Support the certification of open rotor engines with improved composite modeling and improved properties. This work will be coordinated with the NASA Advanced Composites Program during 2016.

What Benefits Will Be Provided To The American Public Through This Request?

The program has a long history of addressing the overlap between aircraft certification and engine certification known as engine installation. Continued investment in computing capability promises to provide opportunity to improve the accuracy of failure analysis for the rare but hazardous engine fragment impact events. The long term goal is to advance certification by analysis with predictive tools. This will improve safety and also reduce the cost of producing new engine and aircraft designs. Composites and anisotropy are the current focal areas of interest in impact analysis; and the A-380 accident recommendation is the current focus of aircraft vulnerability analysis.

Detailed Justification for
A11.g Flightdeck/Maintenance/System Integration Human Factors

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Flightdeck/Maintenance/System Integration Human Factors – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.g Flightdeck/ Maintenance/System Integration Human Factors	$5,000,000	$6,000,000	$9,947,000	+$3,947,000

What Is This Program And Why Is It Necessary?

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 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 focuses on the needs of pilots, inspectors, and aircraft maintainers. The revolution in digital avionics has changed flightdeck design and operational practices and enabled new head-up display technologies, 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 applied in the appropriate guidance material developed for policy, procedures, operations, and training. The research supports the development of these products. Human error continues to be a major contributor to aircraft accidents and incidents both in commercial and general aviation. 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.

The FY2016 research program develops human factors scientific and technical information to support the development of standards, procedures, training, policy, and other guidance material addressing human factors in safety-critical flight crew performance areas. For example, human factors efforts addressing Loss of Control and Recovery, as well as Flight Envelope Protection are intended to provide training and checking guidance that will reduce accidents and fatalities due to flight crew loss of aircraft control in air carrier and general aviation operations. Research will also continue to advance the scientific knowledge base supporting flight deck technologies such as advanced vision systems, ADS-B/CDTI symbology, electronic flight bags (EFB), and night vision goggles (NVG). Finally, the human factors R&D efforts supporting Unmanned Aircraft Systems (UAS) will produce guidance that could be critically valuable for the safe integration and efficient use of these new aircraft in the National Airspace System. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major activities and accomplishments planned in FY 2016 include:

Enhancing Aviation Safety through Advanced Procedures, Training & Checking Methods, to include Loss of Control Detection, Avoidance, and Recovery

- Conduct experiment to evaluate mitigations for startle, surprise, and distraction and document research findings.
- Report on flight path management that provides data as to whether guidance is needed to train pilots to override or intervene in aircraft systems.

Human Factors Maintenance Risk Management

- Develop advisory materials, implementation support, and effectiveness assessment for Maintenance and Ramp Line Operations Safety Assessment (MxLOSA).
- Develop support materials for Fatigue Risk Management for aviation maintenance operations.
- Develop guidance materials for Technical Documentation challenges and solutions.

Avionics and New Technologies: Certification and Operational Approval Criteria

- Complete a report on human factors issues for advanced PED integration; develop research plan for follow-on research and conduct research.
- Investigate and report on effects of ADS-B/Cockpit Display of Traffic Information (CDTI) advanced application effects on pilots.
- Complete a research compendium update for Human Factors Displays and Controls General Guidance Document (HF General Guidance document).

Advanced Vision Systems (Enhanced Flight Vision System (EFVS), Enhanced Vision Systems (EVS), Synthetic Vision Systems (SVS), and Combined Vision System (CVS)), Heads Up Displays (HUD), Helmet Mounted Displays (HMD): Certification and Operational Approval Criteria

- Address minimum equipment requirements for new operational concepts using advanced vision systems and HUDs/HMDs.
- Identify human factors/pilot interface issues and interaction with pilot's conventional intended functions of the Primary Flight Display (PFD).
- Define training scenarios and minimum training requirements to ensure the safe use of these technologies.

Unmanned Aircraft Systems (UAS) Human Factors Considerations

- Complete a report documenting ground control station requirements, describing reviews of applicable human factors research studies; results of incident and accident data analysis; and a review and gap analysis of regulations, standards, and guidance.
- Complete a report documenting analyses of UAS human factors related incidents and accidents related to visual observers providing information to the pilot regarding the traffic and environmental conditions relative to the UAS flight.

Fatigue Mitigation in Flight Operations

- Complete a report that will be used to develop and update policy for 14 CFR § 117 and 121 and OpSpec A318, Authorization to Conduct Operations Under a Fatigue Risk Management System.

Human Factors R&D for Improved Rotorcraft Operational Safety

- Develop recommended updates to Flight Standards Information Management System FSIMS (Order 8900.1) guidance for aviation safety inspectors concerning human factors to consider when reviewing and approving operator use of Night Vision Imaging Systems (NVIS) in night rotorcraft operations.
- Identify human factors affecting pilot workload in rotorcraft flight operations, and develop recommendations for potential operating limitations and other mitigations such as streamlined IFR airways in metroplex areas and reduced complexity area navigation and required navigation performance (RNAV/RNP) procedures for helicopter operations.

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

A major goal of the program is to improve pilot, inspector, and maintenance technician task performance. Research results support enhanced methods for training and evaluating performance especially associated with new technologies and aircraft systems. Performance and evaluation capabilities are also enhanced through research that facilitates an improved understanding and application of risk and error management strategies in flight and maintenance operations.

Goals for FY 2016 Funding:

- By 2018, define methods for evaluating both traditional and Advanced Qualification Program training programs to support updates to guidance for crew resource management (CRM).
- By 2018, provide guidance and training materials on methods for evaluating and improving aircraft maintenance technical documentation.
- By 2018, provide recommendations on the use of synthetic vision head down displays and synthetic vision head up displays for operations conducted on Special Authorization Category I and Category II approaches.
- By 2018, provide recommendations for ADS-B/CDTI for minimum operational performance standards and related FAA guidance.
- By 2018, provide safety analysis report for PEDs incidents and accidents in aviation.
- By 2018, provide recommended minimum standards and design guidelines for UAS control stations and recommended UAS crewmember training and certification requirements.
- By 2018, guidance for aviation safety inspectors on factors to consider when reviewing and approving operator use of Night Vision Imaging Systems in night rotorcraft operations.
- By 2018, provide assessments and recommendations on the effectiveness of fatigue risk management approaches to improve flightcrew member alertness and inputs for development of guidance and educational materials associated with Fatigue Risk Management Systems documentation.

This program directly supports the engineers, test pilots, human factors specialists, and inspectors within FAA Aviation Safety who are responsible for approving flight deck systems, equipment, procedures, and maintenance and also responsible for developing the regulatory and guidance material in these areas. The research ensures that the critical FAA decisions to approve a given system, operation, procedure, etc. are made based on data. Human error routinely appears as a critical safety risk. The research is aimed at identifying and mitigating the human factors issues. The research results feed into the Aviation Safety's regulatory and guidance material.

What Benefits Will Be Provided To The American Public Through This Request?

The flying public looks to the FAA to ensure the safety of flight operations and this program supports that goal by providing scientific and technical information feeding into regulations and guidance that ensure safe pilot and maintainer performance. Human error is typically cited as a contributory factor in 80% air carrier accidents. Recent accidents such as Asiana and Colgan emphasize the continuing need to address flightcrew performance. One product from this program will provide recommendations for training and checking guidance on loss of control detection, avoidance, and recovery. Another product will provide recommendations on the effectiveness of fatigue risk management approaches to improve flightcrew member alertness. Finally, research will address human factors considerations that will mitigate the increasing incidence of helicopter accidents to include Helicopter Emergency Medical Services.

Detailed Justification for
A11.h System Safety Management/Terminal Area Safety

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – System Safety Management/Terminal Area Safety – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.h System Safety Management/ Terminal Area Safety	$11,000,000	$7,970,000	$6,063,000	-$1,907,000

What Is This Program And Why Is It Necessary?

The System Safety Management program is designed to identify and analyze emerging safety issues in a cooperative nature with the aviation industry. Working with aviation stakeholders, the program provides the ability to analyze trends across the aviation community that is much more effective than monitoring individual certificated entities, e.g., airlines. Through this program, FAA has developed an infrastructure and capabilities, called Aviation Safety Information and Analysis Sharing (ASIAS), to enable the free sharing and analysis of de-identified safety information derived from government and industry sources.

The ASIAS team with collaboration with aviation industry and the Commercial Aviation Safety Team (CAST) have developed safety metrics for monitoring precursors to aviation accidents such as Near Midair Collision, Runway Excursion and Incursion, Loss of Control, and Controlled Flight Into Terrain. The ASIAS team regularly monitors safety metrics and uses specific measures to understand the safety enhancements put in place by the CAST to detect changes, if any, in the current levels of safety. While ASIAS research for commercial aviation safety ends in FY15, the research for helicopter safety will continue into FY16 and beyond. Safety metrics have not yet been developed to apply to the rotorcraft domain. Research is necessary to understand the unique challenges posed by helicopters in terms of Helicopter Flight Data Monitoring (FDM) equipment, data formats, and processing techniques and how to apply different safety risk methodologies to increase helicopter safety throughout complex mix of helicopter mission segments and operational environments. Research will, in turn, identify the tools and techniques necessary to analyze rotorcraft flight data and create prototype safety metrics specific to the unique needs of the helicopter community.

Along these lines, the System Safety Management program addresses issues identified in several GAO studies, e.g., http://www.gao.gov/assets/310/304182.pdf and http://www.gao.gov/assets/600/590389.pdf, that call for the FAA to collect better data and improve its effort to identify and address safety issues.

Research projects in the System Safety Management program are necessary as they are designed to increase system safety through the use of data and other safety information. This will occur with the development of enhanced methods of data collection and analysis spanning a wide range of operational areas such as commercial, general aviation, and rotorcraft, and aircraft type certification regulations. This allows the FAA to (a) identify system-level vulnerabilities through evaluating and developing aggregate level data and metrics, (b) determine indicators of performance (safety metrics) and processes to reliably identify potential risk, and (c) identify and assess risks associated with anticipated changes in procedures or technologies.

The System Safety Management program research outputs include methodologies, case studies, and guidance material that provide the capabilities of systematically assessing potential safety risks and applying proactive solutions to reduce aviation accidents and incidents.

The Terminal Area Safety program improves the safety of operations near or at an airport. It provides solutions to reduce fatal accidents in the terminal area through (1) extending simulator models to allow for better upset training, (2) exploring alternatives to determine runway slipperiness, (3) developing motion criteria to minimize inappropriate simulator training, and (4) enabling safe helicopter approaches when using advanced vision systems. Overall, these projects not only address the principal causes of fatalities in the commercial jet fleet but also fill aviation safety research gaps identified in National Transportation and Safety Board's Safety Recommendations A-01-69, A-04-62, A-07-003, and A-07-64 available at http://www.ntsb.gov/safetyrecs/private/QueryPage.aspx.

Research projects in the Terminal Area Safety program focus on developing training solutions and identifying effective technologies to mitigate the key causes of fatal accidents, such as the loss of control, runway excursions, and runway overruns, in the terminal area. The loss of control, runway excursions, and runway overruns are leading causes of fatalities in the worldwide commercial jet fleet.

In particular, flight simulator improvements will mitigate the loss of control through better awareness, recognition, avoidance, as well as teaching appropriate recovery techniques if loss of control occurs. The runway slipperiness research investigates an alternative technology to determine runway friction levels in all runway conditions using the data from aircraft onboard sensors. With this technology there is no need to halt runway operations to use specialized equipment to measure runway friction levels. The motion cueing research aims to test objective criteria and provide guidance for the acceptability of the motion cueing in flight simulators. Objective criteria are sought for to prevent variances in flight simulator settings, as they may be leading to variances in training, which could adversely affect aviation safety.

The Terminal Area Safety program outputs will be new operational guidance and data packages in support of training and standards that mitigate risk in the terminal area.

Major activities and accomplishments planned in FY 2016 include:

System Safety Management

- Helicopter Flight Data Monitoring (FDM) for ASIAS
- Expand rotorcraft FDM to new operation types and to include new data sources.
- Develop advanced analytical capabilities for monitoring metrics and precursors to occurrences, incidents, and/or accidents.

Terminal Area Safety

- Models that Enhance the Ability to Use Advanced Flight Simulators for Advanced Maneuvers
- Conduct an engineering evaluation of stall models and compare the dynamic aircraft response.
- Perform subjective evaluation in full flight simulators to investigate simulator characteristics.
- Determine Runway Friction from Airplane [Flight Digital] Data
- Analyze potential errors in the identified algorithms using data from landed airplanes.
- Evaluate Simulator Motion Cueing Criteria Project
- Conduct testing of criteria by varying 'motion' characteristics of full flight simulators.
- Investigate Helicopter Operational Safety Improvements Using Advanced Vision Systems Project
- Conduct analysis and determine what type, and how much, of data are needed to evaluate and certify helicopter advanced vision systems.

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

The System Safety Management promotes system-wide access and sharing of aviation safety data and analysis tools within the aviation community by providing safety resources that are integrated with the operations of aviation industry stakeholders. Directed studies using ASIAS and other safety aviation data commissioned by CAST have led to the development and implementation of intervention strategies that are currently being monitored for effectiveness. The helicopter FDM data gathering and analysis project, i.e., expansion of ASIAS to helicopters, provides capabilities to develop a proactive approach to address helicopter safety issues. In the NTSB Public Hearing on Helicopter Emergency Medical Services (HEMS), the NTSB recommended collection of flight, weather and safety data for the prevention of accidents (Recommendation A-09-090), which highlights the value of the proactive approach to helicopter safety. In addition, the NTSB has two open recommendations (A-13-12 and A-13-13) on the installation and use of Flight Data Recorder Systems for Rotorcraft operating under commercial and general aviation rules available at http://www.ntsb.gov/safetyrecs/private/QueryPage.aspx.

The Terminal Area Safety program improves continued operational safety. In FY 2016, one project addresses requirements of Section 208 "Implementation of NTSB Flight Crewmember Training Recommendations" in FAA Extension Act of 2010 (P.L. 111-216); four projects address NTSB recommendations; three projects address the number one and three causes of fatal accidents in the worldwide commercial jet fleet as reported in the 2004 through 2013 Statistical Summary of Commercial Jet Airplane Accidents (Aviation Safety, Boeing Commercial Airplanes, August 2014 http://www.boeing.com/news/techissues/pdf/statsum.pdf), the number 1 aviation occurrence category of fatal accident in worldwide commercial jet fleet is loss of control in flight, and the number three category is runway excursion during landing (including abnormal runway contact and undershoot/overshoot); and one project addresses Flight Safety Foundations top cause of accidents. These projects will develop and evaluate new methods and technologies to improve terminal area operational safety, and will produce output in support of changes in standards or policy.

Goals for FY 2016 Funding:

- By FY 2017, expand risk analysis capabilities for helicopter ASIAS.
- By FY 2017, develop a satisfactory process for creating representative stall models.
- By FY 2017, determine the feasibility to report airplane-based runway conditions in real time.
- By FY 2017, conduct tests to evaluate motion criteria for the qualification of flight simulators.
- By FY 2017, conduct research on visibility minima in US Standard for Terminal Instrument Procedures for helicopters.

What Benefits Will Be Provided To The American Public Through This Request?

The flying public will benefit from increased helicopter operational safety. In summer of 2013, there have been several notable fatal rotorcraft accidents. These accidents have spanned across wide range of operations as well as geographic diversity, including Air Tour and Heavy Lift operations in Hawaii, Emergency Medical Services (EMS) operations in Kentucky and Missouri, Training and Private operations in Pennsylvania, and several others. While all displayed different root causes, there is no question that the inclusion of FDM research leading to more robust FDM programs could have potentially identified the precursors necessary to prevent these tragedies. The helicopter FDM data gathering and analysis project will provide advanced analytical capabilities, methodologies, and data-sharing architecture leading to the identification of contributors and precursors to helicopter incidents and accidents. Together with guidance of industry-government teams, this will help to reduce helicopter accident rate.

The Terminal Area Safety projects provide solutions to mitigate the key causes of fatal accidents in the terminal area. The benefits will result in reduction in upset incidences and loss-of-control accident rate, reduced runway excursions and less capacity reduction, minimized danger of inappropriate simulator training, and improved rotorcraft safety in low visibility conditions.

Detailed Justification for
A11.i Air Traffic Control/Technical Operations Human Factors

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Air Traffic Control/Technical Operations Human Factors – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.i Air Traffic Control/Technical Operations Human Factors	$5,000,000	$5,400,000	$5,995,000	+$595,000

What Is This Program And Why Is It Necessary?

The Air Traffic Control/Technical Operations (ATC/TO) Human Factors program focuses on the integration of human considerations into the system acquisition process to enhance user-system design, reduce life cycle ownership costs, improve safety, and optimize total system performance. Human Factors and Human System Integration accomplishes this by ensuring that the human is fully and continuously considered as part of the total system in the operation, development and/or acquisition of all systems. Human performance is a key factor in total system performance, and enhancements to human performance will contribute to enhanced total system performance and help reduce life cycle ownership costs.

Our research enhances the Air Traffic Organization's (ATO) understanding of the roles that training, human performance in safety, and system design play in mitigating human error, a major contributor to loss of separation events and runway incursions. This program provides the only resources in the ATO regarding the human role in the ATC mission and provides research products related to the interactions between major system acquisition and the workforce, effective implementation of efficiency initiatives, the effectiveness of safety interventions, and innovative training methods to meet the ATO's needs. The program, through Program Management Office (PMO) coordination, strives to include human factors research early in the development and implementation of new technologies to avoid cost and schedule overruns, particularly from unplanned changes to requirements. Researchers are developing methods to train new air traffic controllers, instructors, and maintainers to minimize cost, increase the probability of success in training and on the job, and also to improve reliability and availability of the NAS. The ATC/TO Human Factors program includes the following research activities:

- Developing improved training methods to reduce the time and cost of training as well as increasing the probability of success for trainees.
- Developing and evaluating potential mitigations for human error related to air traffic safety for implementation by safety and operational organizations in the ATO.
- Providing direct laboratory support to acquisition program offices through rapid prototyping of candidate ATC displays; human-in-the-loop simulations of systems under consideration; and providing human factors expertise during the development process.

The human factors program is necessary to assure that the human component to NAS performance meets expectations. Human System Integration enables the agency to achieve its goals with respect to the human component of air traffic control. The program assures that the proper roles and responsibilities are assigned to the ATO work force to assure safety and efficiency when coupled with advanced technology and that the level of performance meets the needs of the flying public.

Among the most complex problems facing aviation safety are those involving human error. To achieve quantifiable improvements in aviation safety and economic competitiveness, increasing emphasis is being placed on the human operator and those involved with the safe and efficient conduct of flight (e.g., supervisors, air traffic controllers, maintenance technicians). To achieve agency goals regarding safety we lead the human component portion of NAS safety and we are responsible for pro-actively identifying the potential for human error and recommending mitigations to reduce the probability that people will make errors, minimize the impact of such errors, and enhance the potential for human operators and maintainers to arrest the error and recover in a timely manner. This program is providing products and guidance to the operational and safety communities to mitigate the Top 5 hazards in the NAS and improve the analysis of undesired events to understand the causal and contributing factors leading to such events.

This program is emphasizing reaching out to the operational ATC community to form an alliance with the objective of delivering benefits to users of the NAS through enhanced human performance and reducing the probability of human error in the NAS. The operational community has requested research in the fundamentals of human factors such as controller visual scanning, memory limitations, and information processing. In the domain of technical operations, the program will evaluate the potential use of automation to enhance efficiency of the workforce, improve training effectiveness, and reduce the time to restore failed systems. None of these operational organizations has access to human factors research aside from this program to help them accomplish their operational mission.

The program is improving methods to reduce the cost of training Air Traffic Control Specialists (ATCS). Currently, candidates proceed through a substantial portion of the multi-year training program before a review determines that the candidate is unsuccessful. The program is providing research products to allow early identification of potentially unsuccessful candidates earlier in the 3 year training program. Late washouts increase training costs and deplete staffing levels. Many of these facilities are at a critical stage in staffing and have requested research to determine more effective and faster methods to train developmental and experienced controllers the knowledge and skills needed to operate in these demanding environments. The training research element of our program ensures that research and the subsequent output of these activities supports effective and safe training by improving the On The Job Training Instructor's abilities to teach the complex cognitive skills of an ATCS.

For FY 2016, the program will emphasize the training and safety aspects of the functions performed by air traffic controllers and technical operations (maintainer) personnel. The program will include the creation of human factors standards that can be incorporated directly into the requirements documents and specifications of FAA acquisition programs. We will update human factors guidance for implementing Acquisition Management System (AMS) Policy as new capabilities proceed through the development cycle. Our human factors practitioners will review and provide input to formal AMS policy and procedures that systematically incorporate human factors into agency acquisition activities.

Major activities and accomplishments planned in FY 2016 include:

Increase Human Performance and Safety

- Deliver the prototype of the System Integrity Risk Assessment Process to identify the Top 5 maintenance safety risks in the NAS. Maintenance safety has a close interaction with ATC safety since the systems used by controllers for surveillance and communication are under the control of the technical operations community.
- Deliver the metrics for mitigation effectiveness of the NAS Top 5 safety risks. The FAA has identified the Top 5 risks in the NAS since 2012 and implements mitigations each year. This program develops the methods that will detect and track the effectiveness of these mitigations including the residual level of risk once the programs are implemented.

Training Process Improvements

- Expand the Operational Assessment Program (OAP) to screen controllers requesting transfer to a more complex facility and complete an evaluation of the procedure's transportability, validity, utility, and fairness. The OAP is a new tool to determine if a certified controller has the potential to successfully make the transition to a more complex facility. This tool has the potential to reduce training costs by not spending training resources on candidates not likely to succeed.
- Deliver prototype training standards and training performance measures to decrease the attrition rate at large and complex ATC facilities. There are currently no detailed training performance standards that are applied by all instructors at a facility so that trainees understand performance expectations. The development and use of these standards will reduce cost and increase success.
- Identify the degree to which prior ATC job experience and ATC training influence training success at the first assigned field facility. New-hire trainees with prior ATC experience have been assigned to complex facilities

with an expectation that they will have a higher probability of success, which has not materialized. To minimize training costs we need to examine this relationship.

Human Centered Design

- Applied and Translational Human Factors Research. FAA human factors experts in laboratories will apply human factors knowledge previously developed under the program to the engineering and development of FAA systems, facilities, procedures, and airspace. The program will support major FAA initiatives in the en route, terminal approach control, airport traffic control tower, and traffic flow management domains. The accomplishments of the work will include specifications and requirements documents and human factors-oriented test procedures.
- Controller Performance with Unmanned Aircraft Systems (UASs). FAA human factors experts in laboratories will support the UAS Matrix team to ensure that its research, simulations, and recommendations adequately consider human factors issues related to controllers. The work will include the development of metrics and data collection techniques relevant to controllers managing UAS traffic. The accomplishments of the work will be human factors recommendations for UAS-related technology, procedures, or policies.
- Controller Performance with Space Vehicle Operations (SVO). FAA human factors experts in our laboratories program will work to ensure that SVO-related research, development, and engineering efforts adequately consider human factors issues relating to controllers. The work will include the development of metrics and data collection techniques relevant to controllers managing space vehicle traffic. The accomplishments of the work will be human factors recommendations for SVO-related technology, procedures, or policies.
- Deliver a Graphical User Interface (GUI) Style Guide to increase consistency in the design of GUIs used in future Technical Operations systems.

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

The ATC/TO Human Factors research program is primarily driven by requirements from the ATO to meet their research needs. Sponsoring organizations generate human factors research requirements: 1) for developing human factors standards, guidance, and recommendations to be applied during system design; 2) to identify needs involving human error hazard identification, loss of separation errors, and runway incursion prevention; and 3) for research products that help them to reduce the cost and time to train controllers.

FAA knows this program works because:

- The Front Line Manager Quick Reference Guide is being used as course material in the FAA Academy and other FAA management courses and is now undergoing a content refresh to include operational leadership in ATC. This research product fills a void in the resource material regarding technical training for Front Line Managers.
- The Human Factors Design Standard developed by this program is a robust document containing human factors design criteria that is cited in every FAA acquisition contract that has a human interface.
- The results of our controller fatigue research are being implemented by the FAA fatigue risk management group to assure that safety is not compromised as a result of scheduling pressures.
- The prototype ATC workstations developed under the program are used by major ATC acquisition programs whenever they develop requirements or specifications for human-machine interfaces.
- Senior managers and executives are increasing their demand for human factors research products at a time our resources are declining.

Goals for FY 2016 Funding:

- By FY 2017, develop prototype training requirements and methods to improve On-The-Job-Training (OJT) Instructor effectiveness and safety. This package will include hands-on simulator scenario-based training to assure that instructors maintain vigilance and identify emerging hazards and intervene in time to prevent a loss of separation. Many losses of separation incidents take place while OJT is being conducted and the instructor did not intervene in time.

- By FY 2018, develop a tool to help front line managers identify when controllers are overloaded and in danger of missing critical situations that may lead to a loss of separation. Such a tool would help managers determine when to decombine sectors due to the presence of factors that contribute to the loss of separation.
- By FY 2017, develop automation guidelines for the AMS that leverages lessons learned from flight deck automation. The guidance must start with the service analysis and concept formulation phases. These phases must then feed forward to assure that not only technology, but the workforce characteristics, staffing levels, training plans and safety provisions yield a package that delivers the promised benefits to the flying public.

One of the critical elements of this program relates to the human performance aspects of safety in the NAS. A review of the FAA ATC "Top 5" safety concerns shows that all the issues involve controller performance. Decisions on the acquisition of new systems to enhance safety and the application of new or modified procedures to reduce the likelihood of human error should be based on human performance research that is the output of this program.

What Benefits Will Be Provided To The American Public Through This Request?

Service Quality - The basic services provided by the ATO involve the safe and efficient flow of traffic in the NAS through the effort of our staff. The people in the system are the most important component of the NAS which is a "human-centered enterprise." This Human Factors research program provides products to enhance the quality of this service through the successful integration of the human into the total system. Systems, including controls and displays used by controllers, must support the tasks of our controllers so they can deliver the services including the promised enhancements (i.e., benefits) in a safe manner.

Cost Reduction - The major costs in the ATO are personnel costs. This research program provides products to increase the probability of success in training to reduce the cost of the initial process of training and certification. We have shown that our products can substantially reduce training costs and increase the probability of success of ATC candidates.

Better Safety - The dominant feature of safety hazards in the NAS is human error. While the NAS is safe, we must continually improve safety and remain vigilant. The top 5 hazards in the NAS are all associated with human performance. This program improves human performance by reducing the likelihood of human error and increasing the probability that our controllers and maintainers will successfully recover from undesired events.

Detailed Justification for
A11.j Aeromedical Research

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Aeromedical Research – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.j Aeromedical Research	$7,000,000	$8,300,000	$10,255,000	+$1,955,000

What is this Program and Why is it Necessary?

The Aeromedical Research program develops new and innovative ways to support FAA regulatory and advisory missions to improve the safety of humans in civilian aerospace operations. Research personnel at the Civil Aerospace Medical Institute (CAMI) supporting this program discover methods and recommend strategies to enhance the safety, security, health, and optimum performance of the most important aspect of the National Airspace System (NAS), the human operator and the public which she/he serves. CAMI is the only federal entity that performs this work on behalf of the U.S. The aerospace medical research program has been formulated to keep abreast of emerging human safety risk issues such as those brought by (1) the aging pilot population and changes in their health condition; (2) advances in pharmacology, therapeutic tools, and surgical procedures, and (3) improved aircraft materials, equipment, cabin configurations, life support systems, and evacuation assistive devices– all of which may affect survival from an aircraft accident. The program has also been designed to address the complexity of software, technology, and systems integration practices as these continue to evolve. For example, advances in computational biology, modeling & simulation (M&S), and tools to facilitate the integration of very large data sets containing disparate information will lead to improved knowledge management and decision-making processes in aerospace medicine.

CAMI 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 and biochemistry research laboratories serve as the primary national site for aviation toxicology-research and testing; the functional genomics research laboratory is the pioneer in biomarker research pertinent to aviation safety; the radiobiology research laboratory is considered a world primary source of information regarding radiation safety in aviation; and the bioinformatics research laboratory houses the only repository of integrated civil aeromedical information that predates safety management system concepts. CAMI 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. For example, the cabin safety, biodynamics, and aerospace physiology research personnel are key contributors to the development of national and international aviation safety equipment standards and survival procedures; and the medical research laboratory maintains numerous unique databases and information systems that facilitate the immediate aeromedical review of aircraft accidents.

The human component of the aviation system is simultaneously the strongest and the weakest link in aerospace safety. Thus, the Aeromedical Research program conducts research to maximize the strengths of the human link and minimize inherent human weaknesses to prevent accidents and improve human safety and health in both commercial and general aviation operations.

The Aeromedical Research program will conduct aeromedical research pertaining to the human aspect of protection and survival from exposure to hazardous conditions relative to civil aerospace operations.

Major activities and accomplishments planned in FY 2016 include:

Civil Aerospace Medical Institute (CAMI) Aeromedical Research Program

CAMI Aerospace Medical Systems Analysis

- Aeromedical certification strategies in response to emergent prosthetic technology development addressing the impact of advanced prosthetic devices on medical certification processes. Results from this research will include (a) an accurate inventory of current and emergent prosthetic devices, (b) guidance regarding flight operations with these devices, including their function relative to aircraft systems (e.g., avionics); and (c) proposed processes and protocols for testing new prosthetic devices.
- Aeromedical certification and Aviation Medical Examiner (AME) training strategies regarding Statement of Demonstrated Ability (SODA) waivers addressing whether traditional procedures are adequate in the modern flight environment. Results from this research will include details of the epidemiology for SODAs, the mishap history for various SODAs, whether any mishaps are related to the SODA condition, and whether there a significant association of SODAs with mishaps compared to the overall pilot population.
- Aeromedical certification and AME training strategies concerning medically related NTSB events as these are related (or not) to antecedent medical certification records. Results from this research will assist the FAA in aeromedical review of aviation accidents which cause is assigned to human factors due to pilot error, physiologic insult, prohibited medications, or disqualifying pathologies.

CAMI Accident Investigation & Prevention

- A forensic toxicology laboratory methodology to perform analysis of opiates in postmortem fluids and tissues using ultra performance liquid chromatography/mass spectrometry and safety strategies to address the prevalence of opiates found in civil aviation pilots involved in fatal aviation accidents. Results from this research will assist the FAA and the NTSB in accident investigations, enhance the drug abatement objectives of the Office of Aerospace Medicine (AAM), and refine the existing knowledge-base for human performance under the influence of opiates.
- Aeromedical certification, AME training, and aeromedical accident investigation strategies to address the prevalence of anti-epileptics found in civil aviation pilots involved in fatal aviation accidents. Results from this research will assist the FAA and the NTSB in accident investigations, enhance the drug abatement objectives of AAM, and refine the existing knowledge-base for human performance under the influence of anti-epileptics.
- A molecular biology methodology to purify ribonucleic acid (RNA) from accident victim blood and tissue samples and evaluate such samples via Quantitative Reverse Transcriptase – Polymerase Chain Reaction (QRT-PCR) so as to assess the within-tissue similarity of expression patterns across genes between live subjects and the victims' samples. Results of this research will determine the suitability of aviation accident victim samples for gene expression testing.

CAMI Crash Survival

- Mathematical prediction of emergency evacuation performance, helicopter evacuation and validation. The results of this research will identify and specify technological improvements and guidance materials, as well as potential new regulatory requirements addressing safety features of helicopters, particularly as these refer to emergency evacuation and survival applicable to both civilian and military operations.
- Evaluation of the physical limits of applicability and the ability of the ATDs to predict occupant injury. Anthropomorphic test device (ATD) construction and instrumentation is optimized for the loading direction the ATD is intended to evaluate. The optimization of these ATDs limits the ability of the ATD to predict occupant injury in an impact direction different from the design basis. With the introduction of herring bone configurations in transport category aircraft, there is a need to evaluate oblique angles; however, no ATD has been designed to specifically evaluate these angles. Physical testing of advanced ATDs in a typical transport category aircraft pod seat may damage the ATDs, suggesting that the most efficient means to evaluate the existing ATDs is through numerical models. During this research effort, multiple virtual ATDs will be simulated in typical pod seats. The results of this research will determine the effectiveness of Virtual ATDs in Oblique Aviation Loading Scenarios.

CAMI Aerospace Physiology

- Establish the physiological requirements for preemptive breathing gas composition. Currently, FAA regulations require at least one pilot of commercial airliners flying above 40,000 feet to have their aviators mask in place. Based on the requirements of the Society of Automotive Engineers (SAE) standard AS 8027 (crew member oxygen regulators, demand), the regulator is actually delivering around 40% O2 instead of the ambient 20.9% at cabin cruise altitudes. This preemptive schedule is based on data showing if the 1st breath taken after a rapid decompression to 40,000 feet is not at least 40% O2, unconsciousness will ensue regardless of the O2 content of the 2nd breath. There is interest in lowering the 40% requirement because of fuel costs associated with carrying the oxygen needed for this level of preemptive protection. The 40% value came from older data, and provided a margin of safety that everyone was comfortable with. Recent work mainly involves modeling, and a convincing case for a specific value less than 40% has been elusive. The effort is to provide new data on the cognitive and physiological effects of lowering the preemptive breathing oxygen content.
- Determine the effects of various shielding materials (e.g., aluminum, graphite, polyethylene) on effective radiation dose on humans. The recent shift in emphasis from "point estimates" to 95% confidence intervals adds significantly to the challenge in designing human space missions. This research effort will deal with allowable doses, levels of radiation doses in space, and effects of various forms of shielding.

CAMI Fire and Cabin Safety

Injury Criteria for Obliquely Oriented Seats

- Reduce injuries and fatalities during survivable aircraft crashes by ensuring that occupants of obliquely oriented seats are afforded the same level of protection currently provided to occupants of conventional seats. Determine the injury mechanisms and human impact tolerance levels and methods of predicting occupant injuries in obliquely facing seats during a survivable crash. Develop techniques to use advanced occupant models to accurately simulate human response to impact and predict potential injuries for all impact vectors and occupant sizes. Determine equivalent Anthropomorphic Test Dummies for certification testing for all orientations and test configurations.

System Level Crashworthiness Injury Criteria and Certification Methodology

- Improved injury criteria that directly assess the ability of a person to egress an aircraft following an accident, resulting in reduced injuries and fatalities.

Evacuation Equipment/Aids

- Use the results of the studies and equipment technology identified to develop additional guidance material and possibly new regulatory requirements. Initial implementation in the form of operational advice (SAFO, INFO etc.) can also be used to encourage early adoption of enhanced evacuation systems.

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

Research program outcomes include:

- 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
- 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

Goals for FY 2016 Funding:

- Improving 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

What benefits will be provided to the American Public through this request?

Aeromedical research output serves as the knowledge base for Physicians, Physiologists, Human Factors and other Engineers, Psychologists, Educators, and numerous other academia, industry, and government professionals in the U.S. and abroad who are concerned with the National Aerospace System and the safety of humans in world aerospace operations.

Aeromedical research and expertise is required to gain knowledge, validate information, interpret its analysis, provide conclusions, and facilitate the execution of the resulting recommendations as required in the form of advisory material and regulatory documents. This expertise is fundamental to the continued technical and scientific discovery that would assure the future of the FAA as a world leader in human safety in aerospace operations. As such, it is critical to the regulatory mission of the FAA to maintain and enhance its in-house aeromedical research program, unique in the nation for civilian aviation operations, and a model sought by international civil aviation authorities. Indeed, while academic research priorities are subject to the temporary nature of their mission and industry research activities are necessarily subject to corporate concerns relative to remaining competitive and realizing financial profit, the FAA aerospace medical research program (a) promotes collaborative scientific discovery, (b) allows for long-term high-risk research goals, and (c) ensures independent science and technology assessments in support of the regulatory mission of the FAA.

Detailed Justification for
A11.k Weather Program

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Weather Program – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.k Weather Program	$14,200,000	$14,847,000	$18,253,000	+3,406,000

What Is This Program And Why Is It Necessary?

The FAA's Weather Program performs applied research intended to mitigate the impact of weather on the NAS. Weather Program projects and initiatives:

- Support achievement of specific NextGen weather Operational Improvements as described in NextGen Implementation Plan.
- Mitigate weather related NAS safety and/or traffic flow efficiency issues with a line of sight to operations and existing and planned ATM systems supporting operations.
- Support the evolution of legacy weather capabilities that meet the weather information needs of today's NAS users into the capabilities that fulfill the NextGen weather vision. This work is conducted in collaboration with the FAA's designated weather provider, the National Weather Service (NWS).

Weather Program's applied research focuses on advancing the state of weather information such that it can be exploited for integration into NextGen decision-support tools that are designed to mitigate the impact of weather on the NAS. This advanced weather information is expected to enhance NAS safety and capacity by supporting better operational planning and decision-making by operational users including air traffic managers, flight dispatchers, and pilots. In the near and midterm, some research will support tools and methodologies used by NWS forecasters to improve the accuracy and relevancy of legacy weather products and services still mandated by FAA regulatory guidance and/or international agreement.

It is important to note that the Weather Program manages its portfolio of projects with an underlying philosophy that all initiatives, short or long term, benefitting commercial or general aviation, advancing science or facilitating integration into NAS decision tools, are ultimately supporting the achievement of the NextGen weather vision.

To ensure Weather Program initiatives are relevant and effective, research to develop and validate weather performance requirements is needed. Modeling, simulation, and other innovative techniques are planned to answer questions about the accuracy, timeliness, and presentation of weather information for use in air traffic and operational decisions.

The Weather Program leverages research activities with members of industry, academia, and other government agencies through interagency agreements, university grants, and Memorandums of Agreement. The Weather Program partners with the NOAA Earth System Research Laboratory (ESRL) and the NOAA National Centers for Environmental Prediction (NCEP) Environmental Modeling Center to develop high resolution, rapidly updating models that have and continue to be implemented operationally into NOAA/NWS operations. These modeling efforts result in enhanced diagnosis and forecasts of weather hazardous to aviation, including en route turbulence, convective weather, ground and in-flight icing and more. Future model development and implementation efforts in partnership with NOAA are planned to address these hazardous aviation weather phenomena on a global scale which will include coverage of oceanic airspace operations. Weather Program radar technique development efforts, in partnership with the NOAA National Severe Storms Laboratory (NSSL), have developed radar applications implemented onto NexRad that are enhancing in-flight icing, turbulence, and convective weather forecast capabilities. The Weather Program in partnership with NSSL has developed a multi-radar multi-sensor capability (NWS operational implementation in FY 2014) that provides high resolution three-dimensional (3-D) radar grids for advanced weather detection and aviation forecast applications.

Weather Program icing efforts have developed in-flight and ground diagnosis and forecast capabilities, including the capability to differentiate between freezing rain and freezing drizzle. These results are being used in current research efforts to develop a terminal area ground and in-flight capability to provide icing and precipitation type information for use by air traffic management. These efforts are being coordinated and leveraged with radar technique development at NOAA NSSL as well as the NASA Glenn Research Center (GRC) Icing Remote Sensing System program.

Weather Program turbulence research efforts have developed en-route CONUS turbulence forecast capabilities. These efforts have been coordinated with the radar technique development efforts at NOAA NSSL. Planned efforts will address the expansion of the turbulence capabilities over the Alaskan domain.

Additionally, using much of the research outlined above, the FAA is coordinating and leveraging with NOAA/NWS to develop a consistent set of gridded weather information for use in evolving NextGen ATM decisions and decision support tools.

In FY 2016, major accomplishments planned include:

Aviation Weather Forecasting

- In-Flight Icing
    - Complete development of combined Alaska Icing Forecast and Diagnosis capability.
    - Participate in National Science Foundation sponsored field program in Pacific Northwest to support development of enhanced icing forecast and diagnosis capability that includes liquid water content, drop size and temperature.
- Model Development and Enhancement
    - Implement regional ensemble data assimilation at NWS supporting improved aviation hazard forecasts especially convection.
- Turbulence
    - Complete development of Alaska turbulence forecast capability.
- Convective Weather
    - Complete development, quality assessment and user evaluation of Offshore Precipitation Capability (OPC).
- Ceiling and Visibility
    - Begin development, in collaboration with NWS, of an enhanced ceiling and visibility (C&V) analysis product for CONUS incorporating Alaska C&V analysis scientific advances.
- Volcanic Ash
    - Complete evaluation of the use of a prototype common platform for posting volcanic ash products from multiple Volcanic Ash Advisory Centers (VAAC).
    - Complete initial prototype volcanic ash reverse modeling capability.
- Quality Assessment
    - Complete Turbulence Forecast for Alaska, OPC, and Consolidated Storm Prediction for Aviation (CoSpa) assessments.
- Advanced Weather Radar Techniques
    - Create a 3-D in-flight hazards grid from selected regions and events using the Multi-Radar Multi-Sensor (MRMS) capability.
- Aviation Weather Demonstration and Evaluation Services
    - Conduct final user assessment of an Offshore Precipitation Capability. Conduct various user assessments of advanced aviation weather forecast algorithms (or products).

- Wind Compression for NY Metro Terminals
  - Develop process for using an algorithm that forecasts the onset and cessation of wind compression conditions in an operational setting, considering benefits vs. current process, ease of use and utility of Human-Over-The-Loop.
- NAS Weather Information Requirements to be met by NWS
  - Deliver initial validated performance requirements to National Weather Service for specific NextGen capabilities (e.g. CATM, TBO) with direct weather dependencies.
  - Improve and enhance modeling and simulation techniques to validate performance requirements for both direct and indirect weather dependencies.

Aviation Safety Weather Research and Development

- Terminal Area Icing Weather Information (TAIWIN) for NextGen
  - Complete first version of TAIWIN algorithm
- Mitigating the Ice Crystal Weather Threat to Aircraft Turbine Engines
  - Update and evaluate the algorithm for prediction of high ice water content areas.
  - Characterization of high ice water content ice crystal conditions appropriate for facility testing.
- Validation of Performance of Onboard Eddy Dissipation Rate (EDR) Systems for Turbulence and Wake Applications
  - Validate onboard EDR reports.
  - Development of improved techniques for EDR vertical profiles for Wake prediction within terminal areas.
  - Validate improved onboard EDR performance standard for wake prediction in the terminal area.
- Using Data Linked Aircraft Sensed Weather Information to Determine Probability of Icing Conditions Aloft
  - Develop a technique to use aircraft-based downlinked data correlated with a high probability to known icing conditions aloft to alert general aviation (GA) users to areas of icing conditions

The Weather Program will continue to develop and enhance forecast capabilities and weather translation techniques to meet emerging NextGen requirements and operational improvements (OIs). This will include applied research in naturally occurring atmospheric hazards including turbulence, convective activity, icing, and restricted ceiling/visibility. Additional forecast capabilities to address convectively-induced turbulence will be developed to enhance en route safety and capacity. Alaska in-flight icing diagnosis and forecast capabilities and oceanic convective weather forecast needs for NextGen will also be developed. FAA national and international partnerships will continue in addressing mitigation of ice crystal weather threats to aircraft turbine engines.

Weather has been clearly identified as a having a significant impact on NAS efficiency and is clearly a factor in general aviation accidents. The NextGen Implementation Plan identifies improvements in the areas of weather detection and forecasting as well as dissemination. The Weather Program supports NextGen Operational Improvements and FAA Strategic goals (FY 2014-2018) related to efficiency, capacity, safety, and environmental impacts. It facilitates transition of legacy weather requirements and products to meet emerging NextGen needs. Weather is frequently cited as a primary or secondary cause in accidents and injuries (per the NTSB, turbulence is the leading cause of inflight injuries) and the GA fatality rate in weather related accidents, on average is 75% (GA accounts for 88% of weather related accidents). There was more than 1 million air carrier delay hours in 2012 due to weather resulting in more than $200 million in delay costs. Continued evolution of improved forecasting algorithms with applicability to achieving higher aviation safety and capacity during hazardous weather is needed. The Weather Program also supports the need to provide high quality weather observations and forecasts, often in conjunction with the NWS, uniquely designed to allow for rapid and effective decision making by air traffic management, dispatchers and pilots to proactively select safe and optimal routes. Weather program initiatives whether benefitting commercial or general aviation, advancing science, or facilitating integration into NAS decision support tools, are ultimately supporting the achievement of the NextGen weather vision.

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

Funding the Weather Program at the requested level would enable it to move forward effectively and provide capabilities needed to meet NAS safety and capacity requirements. Research areas that would be supported include:
Turbulence - There were more than 4,000 encounters of severe turbulence throughout the NAS in 2012 resulting in more than $1M in aircraft damage, and passenger and flight crew injuries as well as decreased capacity. Completion of an Alaska turbulence forecasting capability for all flight levels would be supported and is anticipated to reduce aircraft encounters with turbulence over Alaska.

In-flight Icing - The in-flight icing accident rate for GA and air taxi operations in Alaska is four times higher than in the continental United States (based on the accident rate/million hours of operations) and results in more than $1M per year in fatalities, injuries, and aircraft damage. Completion of forecast and diagnosis capabilities for Alaska would be supported. These capabilities are anticipated to reduce the high rate of fatalities, injuries, and aircraft damage due to Alaska in-flight icing conditions.

Convective Weather - Convective weather is the leading cause of weather delays in the NAS (75%). Avoidable delays due to thunderstorms provide a $16 billion (FY 2009 dollars) benefits pool for a 20-year life cycle. The budget request would support the Off-Shore Precipitation Capability algorithm user evaluation and subsequent operational transition. This capability is critical to enhanced offshore flight efficiency thru improved ATM decision making.

Volcanic Ash - Assessment of a common platform for volcanic ash products across multiple Volcanic Ash Advisory Centers and developing an initial reverse modeling capability in coordination with NOAA and ICAO, critical to the development of improved warning and forecast tools for enhanced safety and capacity, would be supported. This capability will decrease the safety risk to enroute aircraft during a volcanic eruption and increase efficiency and capacity by minimizing restricted airspace.

C&V – Unexpected low ceilings and restricted visibility conditions are a contributing factor in over 30% of all General Aviation weather-related accidents. An improved national-scale, gridded analysis of C&V conditions across the CONUS incorporating scientific advances from a preceding effort in Alaska will lessen the impact of these conditions. The budget requested supports the development of this enhanced capability which would make available accurate and rapidly-updated information of conditions over data sparse or data void areas between instrumented airfields. This would greatly enhance situational awareness, pre-flight planning, and decision making, reducing the sudden unsafe occurrence of visual flight rule flights into instrument flight rule conditions. This work will be done in specific coordination with the National Weather Service.

Quality Assessment (QA)/Aviation Weather Demonstration and Evaluation (AWDE) – Wx Program research results undergo a rigorous process prior to transition into operations. Two important steps in this process are a QA of weather forecast/analysis performance quality to ensure readiness for research transition and utilizing AWDE services to evaluate research capabilities from a user perspective to determine suitability for operational decision-making. The budget request would support the quality assessment of the turbulence forecast capability for Alaska, the OPC, and CoSPA as well as the final user assessment of the OPC.

Model Development and Enhancement /Advanced Weather Research Techniques – Numerical weather prediction (NWP) model and operational radar data are important inputs to the development of algorithms providing diagnoses and forecasts of turbulence, in-flight icing, convection, and restricted ceilings and visibility. NWP model data provides four-dimensional (three dimensions plus time) depictions of the atmosphere including temperatures, winds, clouds, and precipitation; radar data provides additional information on the characteristics of clouds and precipitation.

The budget request would support the development of regional model ensemble data assimilation resulting in improved aviation hazard forecasts especially convection; as well as a -3-D radar in-flight weather hazards grid.
NAS Weather Information Requirements to be met by NWS - It is critical that the FAA validate NAS weather information functional and performance requirements prior to having the NWS meet these requirements. The budget requested would support the FAA's ability to improve and enhance performance requirements validation modeling and simulation techniques and expedite the subsequent delivery of these requirements to the NWS.

TAIWIN - A new certification rule for supercooled large drop (SLD) conditions, which includes freezing rain and freezing drizzle, recently took effect. The information currently available on SLD in the terminal area is not sufficient for efficient and safe operations in the terminal area by aircraft certified under the new rule. It is necessary for pilots to have reliable information on the intensity of the icing conditions not only at the ground but aloft, and this would benefit from further utilization of remote sensing capability in the terminal area which TAIWIN is planned to provide. The budget request would support the development of an algorithm that will enhance the efficiency and safety of operations and consequently impact the efficiency and safety of operations under the new rule.

Goals for FY 2016 Funding:

- By 2016, develop validated performance requirements for delivery to NWS for specific NextGen capabilities.
- By 2016, in collaboration with the FAA Office of Aviation Safety, perform comprehensive service analyses on known or emerging safety hazards including mitigating the ice crystal weather threat to aircraft turbine engines as well as select operations in icing conditions.
- By 2016, develop a global-scale probabilistic convection guidance to support strategic planning of transoceanic flights.
- By 2018, develop suite of diagnosis and forecast capabilities (in-flight icing, turbulence, restricted ceiling and visibility) for Alaska.
- By 2018, improve volcanic ash dispersion and transport models that will provide time critical and accurate information.
- By 2020, develop and enhance automated guidance for NWS production processes associated with FAA-mandated aviation weather products and services. Promote derivation of legacy required products from this guidance.

What Benefits Will Be Provided To The American Public Through This Request?

This request will enable the Weather Program to continue to develop and enhance forecast capabilities that will benefit the American public. This will include applied research in naturally occurring atmospheric hazards including turbulence, convective activity, icing, and restricted ceiling and visibility. As these capabilities are transitioned onto new or existing FAA platforms and systems, or by transition to NWS platforms or procedures that deliver aviation weather services required by FAA regulation benefits to the American public will accrue. These benefits will include:

- Increased GA safety in Alaska, as focused efforts will target enhancements to in-flight icing, turbulence, and restricted ceilings and visibility diagnosis and forecasts.
- Enhancements to convective weather forecasts that will minimize gate to gate delays.
- Enhancements to turbulence analyses and forecasts to increase passenger comfort as well as safety.
- Enhancements to icing analyses and forecasts to increase safety and decrease flight times especially for GA and commuter passengers.

Detailed Justification for
A11.l Unmanned Aircraft Systems Research

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Unmanned Aircraft Systems Research – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.l Unmanned Aircraft Systems Research	$8,644,000	$14,974,000	$9,635,000	-$5,339,000

What Is This Program And Why Is It Necessary?

The Unmanned Aircraft Systems (UAS) Research program supports FAA efforts in implementing the Next Generation Air Transportation System (NextGen) 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.

Safe, efficient, and timely 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 often use new or novel technologies to achieve unique operational capabilities that challenge the expectations of current NAS users. These unique capabilities have demonstrated potential to address commercial applications as well as scientific research needs. 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 UAS weighing less than 100 pounds may be capable of operating in Class A airspace and the integration of a significant volume of UAS air traffic could potentially disrupt normal aircraft traffic flow and induce unknown safety hazards.

Research activities within the UAS Research program will generate technical information to support development of policies, guidance materials, and advisory circulars on using new or novel technologies to demonstrate regulatory compliance while operating UAS in the NAS. UAS-specific technical issues, such as detect and avoid, datalink aircraft control and communications with air traffic control, and emergency response requirements, will also require research. UAS will also be integral to NextGen development and will help validate UAS CONOPS integration requirements and meet UAS Roadmap goals.

FY 2016 funding will support the UAS program to conduct research on UAS technologies which directly impact the safety of the NAS. The FY 2016 portfolio of work will be focused on sense (detect) and avoid, control and communications, system safety criteria, modeling and simulation requirements, and research that will support the safe, efficient, and timely integration of UAS in the NAS within the 14 CFR regulatory framework. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major activities and accomplishments planned in FY 2016 include:

Sense and Avoid (SAA) System Certification Obstacles

- Deliver a draft Technical Report detailing 14 CFR 91 compliance issues and propose evidence used to show compliance.

Sense and Avoid System Multi-sensor Surveillance Data Fusion Strategies

- Identify a representative mix of surveillance sensors and data fusion strategies to be considered in next phase of research, building on previous work on recommended data fusion strategies.

- Determine the most optimal sensor fusion strategy from those that were evaluated, documenting the rationale for the choice.
- Document the significant costs and benefits of each fusion strategy for each of the two SAA functions in an FAA Technical Report.
- Document the method used to choose the optimum surveillance sensor fusion strategy and the optimum strategy chosen in an FAA Technical Report.

UAS System Safety Criteria

- Develop safety characteristics (e.g., mass, speed, fuel, etc.) posing significant risks during collisions with other aircraft and/or collisions with people on the ground.
- Document research in a draft technical report, including a justification for thresholds for any of these characteristics to pose increased risks.
- Incorporate sponsor comments regarding additional documentation or explanation of research as documented in draft report in a final research report.

Collect and Analyze UAS Safety Data from the Test Sites

- Gather and analyze UAS test site data to document key issues related to the safe, efficient, and timely integration of UAS in the National Airspace System. This data is needed to identify and address gaps and challenge areas for the development of products needed for UAS integration.

Integration of ACAS-X Into SAA for UAS

- Develop metrics, methods, and analytical models to evaluate effects of functional independence between self-separation and collision avoidance.
- Conduct simulation(s) to develop and validate concepts, displays, and procedures for implementing avoidance maneuvering.
- Document the impact and mechanisms of multi-threat RA coordination in an FAA Technical Report.
- Document the antenna trade space and metrics used for evaluation in and FAA Technical Report.

Certification Test Case to Validate UAS Industry Consensus Standards

- Assess ASTM certification standards developed by committee F-38.

UAS Maintenance, Modification, Repair, Inspection, Training, and Certification Considerations

- Complete database updates and report documenting maintenance programs and practices for participating industry and academic partners.
- Define initial UAS maintenance technician training and certification requirements.
- Complete initial simulations focused on UAS-ATC procedures and consequences for dealing with maintenance-induced failures and emergencies.

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

Research program plans beyond FY 2016 include the continued collection and analysis of UAS safety data from the test sites, completion of antenna performance research for ACAS-X, completion of technical reports on multi-sensor surveillance data fusion, completion of the safety data analysis tools for ATO safety oversight use, development and documentation of maintenance technician training and implementation requirements and continued collection and analysis of maintenance and maintenance-related accident and incident data. The majority of this work is scheduled for completion by FY 2017, but research relating to maintenance, modification, repair, inspection, training, and related certification requirements is currently planned to continue through FY 2018.

Goals for FY 2016 Funding:

- Align research with the FAA Concept of Operations.
- Align research with the FAA Roadmap.
- Align research and work collaboratively to leverage research efforts with the UAS Center of Excellence, Department of Defense, NASA, and other research groups.

Demand for NAS access is growing from multiple operators including DoD, public use agencies, and the private sector. To standardize the certification processes and ultimately limit restrictions associated with UAS certification, the FAA needs to determine the parameters, operations, and procedures that define acceptable UAS behavior while maintaining the highest level of safety. Many challenges remain that must be overcome before the basis for certification and operations of UAS are standardized and made routine. This includes developing methods to support the integration of UAS into the NAS without causing delays, capacity reduction, or placing the public at risk. Extensive research is required to produce the appropriate safety case evidence.

What Benefits Will Be Provided To The American Public Through This Request?

The safe integration of unmanned aircraft into the NAS is a significant challenge. Current UAS research contributes and informs technical and regulatory standards, policy guidance, and operational procedures on which successful UAS integration depends. These research efforts significantly contribute to addressing the challenges of integrating UAS into the NAS by leveraging studies of UAS operations and associated technologies. Safely integrating UAS into the NAS will open many new opportunities for the use of UAS technologies and services and will increase the confidence of the American Public that these operations are safe and not disruptive to the current NAS.

Detailed Justification for
A11.m NextGen – Alternative Fuels for General Aviation

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – NextGen – Alternative Fuels for General Aviation – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A11.m NextGen – Alternative Fuels for General Aviation	$6,000,000	$6,000,000	$5,833,000	-$167,000

What Is This Program And Why Is It Necessary?

Approximately 167,000 general aviation (GA) aircraft in the United States and 230,000 worldwide rely on 100LL avgas for safe operation. 100LL is also the only remaining transportation fuel in the United States that contains the additive tetraethyl lead (TEL). TEL creates the very high octane levels required to prevent detonation (engine knock) in high power aircraft engines. Operation with inadequate fuel octane can result in engine failure and aircraft accidents. Previous research attempted to find a drop-in (no impact to the existing fleet) unleaded replacement fuel for 100LL. Potential use of replacement fuels of new compositions poses a significant challenge to maintaining the safety of the legacy fleet. The impact on performance, operability, and compatibility with fuel system materials must be carefully evaluated before approving an alternative fuel.

Petitions and potential litigation from environmental organizations regarding avgas containing lead are pressuring the EPA to consider regulatory actions to eliminate or reduce lead emissions from aircraft. Similar regulatory actions are being considered around the world. In response to rapidly increasing concerns expressed by the GA community, the FAA Administrator chartered the Unleaded Aviation Transition Aviation Rulemaking Committee (UAT ARC) which issued their findings in a final report dated February 17, 2012. The report can be found at the following address: http://www.faa.gov/about/initiatives/avgas/archive/2012-10-05/.

The UAT ARC identified issues that they felt must be considered in any effort to transition the aviation industry to an unleaded avgas. Two key issues are:

- An unleaded replacement fuel that meets the needs of the entire fleet does not currently exist.
- No FAA policy or test procedures exist to enable fleet-wide assessment and certification of a replacement unleaded fuel.

The UAT ARC Final Report provided 5 key recommendations and 14 additional recommendations to facilitate the transition to a fleet-wide replacement avgas. Three of the five UAT ARC recommendations related to research with those three items being:

1. Centralized testing of candidate unleaded fuels at the FAA William J. Hughes Technical Center funded by government and industry with in-kind contributions - Centralized assessment and testing would generate standardized qualification and certification data that can be used by the fuel developer/sponsor to support both ASTM specification development and FAA fleet-wide certification eliminating the need for redundant testing.
2. Establishment of a solicitation and selection process for candidate unleaded aviation gasolines for the centralized fuel testing program - This process should include a FAA review board with the technical expertise necessary to evaluate the feasibility of candidate fuels.
3. Establishment of a collaborative industry-government initiative referred to as the Piston Aviation Fuels Initiative (PAFI) to implement the UAT ARC recommendations in this report to facilitate the development and deployment of an unleaded AVGAS with the least impact on the existing piston-engine aircraft fleet - The overall objective of this initiative is to identify candidate unleaded aviation gasolines, to provide for the

generation of qualification and certification data on those fuels, and to support fleet-wide certification of the most promising fuels.

These recommendations led to a defined process for the fuel transition called the Piston Aircraft Fuel Initiative (PAFI). The FAA and industry have joined to form the PAFI Steering Group (PSG) for the purpose of facilitating, coordinating, expediting, promoting, and overseeing the recommendations of the UAT ARC Final Report. The role of the PSG includes providing supporting data and coordinating the activities of member organizations in support of the PAFI program.

The PAFI process defines a framework to evaluate potential candidate fuels in two distinct phases. The FAA Technical Center released a solicitation to fuel producers to entice fuel producers into the PAFI process. The solicitation closed July 1, 2014 and ten formulations were submitted by fuel producers. The Technical Evaluation committee selected which of these fuels would enter the Phase 1 test program by September 1, 2014.

The PAFI process separates the testing into two phases, with each phase having a preparatory and a project stage. In Phase 1, up to ten fuels that enter the process via the solicitation will be tested by the FAA Technical Center for laboratory, rig, and fit-for–purpose (FFP) properties. Some of the current laboratory methods are not applicable to new fuels, and additional fit-for-purpose (FFP) issues arise with use of potential unleaded replacement fuels. To evaluate all candidate fuels appropriately, standardized test procedures will be used to evaluate these laboratory and FFP issues. The standardized fit-for-purpose (FFP) properties, test methods, and procedures developed for specific candidate fuels will consist of current ASTM D910 specification laboratory test methods, other ASTM test methods, and, program developed specific fuel-related laboratory tests, material compatibility, toxicology, and rig tests. In Phase 2, in-depth engine and airframe testing will be conducted by the FAA Technical Center on the best candidate fuels. Under Phase 2, standardized engine and aircraft test methods for candidate test fuels will be developed and test support equipment will be established by the FAA Technical Center to test the best candidate fuels.

Research will investigate fuel toxicological issues and exhaust emissions. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major activities and accomplishments planned in FY 2016 include:

- Complete Phase 1 laboratory and rig, fit-for-purpose, fuel testing, and baseline engine performance/detonation testing
- Develop Phase 2 engine and aircraft performance and operability test methods
- Establish Phase 2 engine and aircraft test resources
- Begin Phase 2 engine and aircraft testing

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

The FAA funding requested in this program was the minimum level necessary to address the recommendations of the UAT ARC final report, to provide the necessary support to the PAFI initiative, and to comply with section 910 of the 2012 FAA Modernization and Reform Act. The latter requires the FAA to conduct research and development to facilitate the transition to unleaded aviation fuel for piston engine aircraft.

This requested funding is necessary to meet the PAFI timetable to transition the fleet to an unleaded avgas. FAA participation is critical to the PAFI initiative. The success of the industry program to develop and deploy an unleaded avgas with the least impact on the existing fleet depends heavily on the FAA successfully completing the research.

Goals for FY 2016 Funding:

- By FY 2017, develop Phase 2 Engine and Aircraft performance and operability standard test procedures.
- By early FY 2017, establish Phase 2 engine and aircraft test resources.
- By early FY 2019, complete all Phase 2 engine and aircraft testing on candidate unleaded fuels.

What Benefits Will Be Provided To The American Public Through This Request?

The FAA is the sole certification authority for the United States aviation community. This research program identifies, develops, and delivers safety research products and knowledge that respond to the regulatory and oversight needs of the Federal Aviation Administration (FAA) and ultimately reduce the aviation accident fatality rate. Research includes resolution of identified threats to aviation safety, preparation for the use of new technologies, and investigation of continued airworthiness issues.

General aviation is a significant and integral part of the U.S. economy creating millions of jobs and making a positive impact on the U.S. balance of trade. Directly or indirectly, GA accounted for over 1.25 million high-skill, high-wage jobs in professional services and manufacturing in 2005 (with collective earnings exceeding $53 billion) and contributed over $150 billion to the U.S. economy. This economic bonanza is at risk unless the GA fleet transitions to a safe unleaded fuel.

This research program provides critical knowledge (through screening and testing) to assure the continued operational safety of aircraft using a new unleaded fuel. Successful transition to an unleaded fuel will improve the environment by eliminating lead from aviation sources and help sustain a vibrant segment of the nation's economy.

Detailed Justification for
A12.a NextGen – Wake Turbulence

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – NextGen - Wake Turbulence Program – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A12.a NextGen - Wake Turbulence	$9,000,000	$8,541,000	$8,680,000	+$139,000

What Is This Program And Why Is It Necessary?

The NextGen – Wake Turbulence Program supports the DOT Strategic Goal of Economic Competitiveness. It is addressing the problem that air traffic control (ATC) wake mitigation standards, procedures and processes, while safe, are overly constricting the nation's airspace and airport runway throughput capacity. The last full review of wake separation standards used by air traffic control occurred over 20 years ago in the early 1990's. At the beginning of this program, ATC wake mitigation procedures and processes had not changed significantly since the 1990's. However, 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. Flight delays occur at the Core airports during inclement weather events largely because air carriers' flight schedules assume good weather. The 20 year old wake separation standards and procedures provided safe separation of aircraft from each other's wakes. However, wake research had already shown that more capacity and throughput efficient wake mitigation arrival, departure and en route procedures/processes could be developed for the NextGen mid- and far-term ATC operations. Based on the research from this program, wake separation standards have been modified by ATC Orders 7110.308, 7110.316 and Notice 7110.608. The implementation of these orders have provided envisioned runway throughput capacity enhancements as measured by decreased departure runway queues, increased airport arrival rates and cost savings by major air carriers. These gains in runway throughput capacity are initial, and additional throughput capacity gains can be obtained by developing wake separation standards that adjust to the atmospheric conditions and the flight performance of the generating and following aircraft.

This program provides the enabling research to reach the NextGen objective of accommodating increased number of flights during periods of peak demand for access to airport runways and airspace while keeping the safety of these flights equal to or safer than the safety of flights in today's NAS. The program is providing solutions for near term operational needs such as "What ATC wake separations should we apply behind the new A350 aircraft?" and "What can we do to alleviate delays at San Francisco when a runway is closed for upgrade?" The program is also developing wake mitigation process and procedure concepts and enabling technology that will allow tailored "wake safe" separations between aircraft that will allow higher runway and airspace throughput.

The basis for the progress this R,E&D program has made in determining safe but more capacity efficient wake separation standards and their application has been the ability to track and measure wakes generated by aircraft both near the ground and higher up on the approach and departure paths. Prior to CY 2000, wake measuring instrumentation consisted of wind lines, acoustic Radar (SODAR), and continuous wave Laser Radar (LIDAR), each having serious limitations in terms of height and transit of wakes that could be measured. The FAA's research and development investment in the pulsed LIDAR technology resulted in LIDAR systems that could track and measure aircraft generated wakes over several kilometers away. The basis for the Wake Turbulence Mitigation for Departures decision support tool operating procedures has been safety analyses supported by collected wake transport and decay data. The wake data collection sets were also instrumental in providing the safety validation for the capacity enabling wake separation standards changes for the Boeing 757 aircraft, the harmonization of Heavy/Large aircraft weight boundary for wake separation standards, and most recently, the capacity efficient wake separation standards set for the Boeing 787 and 747-8 series aircraft.

Additionally, analysis of ground based collected wake transport and decay data sets and use of wake transport models allows this data to be used in determining the wake safety viability of new wake mitigation instrument flight rules approach procedures as applied to an airport' s closely spaced parallel runways. In FY 2012, the Safety Risk Management Document was completed that allows the use of the ATC Order 7110.308 procedure at San Francisco International Airport and Newark Liberty International Airport. The data sets were also the basis for making the wake mitigation separation reductions that are currently being implemented by the Wake Turbulence Re-categorization (Wake Re-Cat) F&E program – yielding for some Core airports a benefit of double digit increase in runway throughput capacity and significant reduction in fuel consumed in the airport's terminal airspace.

Aircraft generated wakes are not visible and do not lend themselves to be sufficiently detected by today's ground based and air based surveillance systems to allow NextGen far-term advanced reliable "see and avoid" type of wake mitigation procedures. Instead, real time wake transport and decay models are being developed to give "predicted" wake location and strength in place of the "observed" wake transport and decay.

The NextGen mid- and far-term wake models require accurate real time and predicted weather conditions along the flight path. To meet this need, the NextGen - Wake Turbulence R,E&D program is developing requirements for the transmission of aircraft observed weather information to the ground (NextGen 2018 time frame) and to other aircraft (NextGen 2020+ time frame). The program is also developing arrival and departure corridor weather prediction algorithms that will use the aircraft observed weather information as well as information from the NWS observation and forecast products to determine safe but capacity efficient dynamic required minimum wake spacing between aircraft. Information concerning the crosswind prediction capability is being used to determine the potential capacity benefit of an ATC decision support tool that would allow controllers to apply reduced wake mitigation separations between aircraft on approach to and departure from a single runway when there is sufficient crosswind to blow the wakes out of the path of the following aircraft.

The NextGen mid- and far-term models will also require "validation" wake generation data sets for the various types of aircraft that fly in the NAS. Additionally, the standards being developed consider the potential wake hazard in terms of how the aircraft at a certain phase of flight would respond to an encounter of a wake of a certain "strength and size." To address this need, the program is developing an aircraft system (aircraft and crew) wake encounter response model and is collecting data concerning the frequency of wake encounters in today's NAS.

Outputs of this research program, that do not require and changes to the NAS infrastructure, go directly into operational use such as separation standards for new aircraft (A380, 747-800, 787) and modification of jet blast mitigation procedures at JFK. Other outputs will require follow-on F&E programs to translate the concepts of applying technology and wake science into subsystem components of ATC automation systems and aircraft avionics. These outputs will positively move the following metrics used in measuring the System Capacity of the NAS:

- Average daily airport capacity for the Core airports
- Average taxi-time at Core airports
- NAS on-time arrival rate at Core airports
- Throughput (operations) at Core airports

Major activities and accomplishments planned in FY 2016 include:

- Continue development of feasible application of dynamic wake separations in ATC (NextGen and SESAR).
- Determine required wake separations for new the Boeing 737 Max series aircraft.
- Develop changes to ATC Orders to incorporate wake separation standards for the Airbus A32.0 Neo and Bombardier C series aircrafts.
- Enhance wake transport and decay analysis data extraction software applied to existing wake track databases.
- Continue large scale flight data recorder screenings for potential medium to low level wake encounter events.
- Apply probabilistic wake encounter model to proposed NextGen terminal and en-route airspace designs – wake risk assessments.
- Enhance wind prediction capabilities for wake ATC decision support tool applications.
- Continue development of wake data collection sensor suite.

- Enhance the Wake Turbulence Mitigation for Departures (WTMD) decision support tool Wind Forecast Algorithm for use with the Wake Turbulence Mitigation for Single Runway decision support tool application.

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

This research addresses the needs of the FAA Air Traffic Organization and works with the agency's Aviation Safety Organization to ensure new capacity-efficient procedures and technology solutions are safe. The program also works to ensure that the airports and air routes targeted for their implementation have critical needs to reduce airport throughput capacity constraints and air route congestion. The research program works with controllers, airlines, pilots, and aircraft manufacturers to include their recommendations and ensure training and implementation issues are addressed in the program's research from the start. Customers include pilots, air traffic control personnel, air carrier operations, and airport operations. Stakeholders include the commercial pilot unions, FAA unions, other International Civil Aviation Organization (ICAO) air navigation service providers, and aircraft manufacturers.

The NextGen – Wake Turbulence research addresses both the FAA's near term need (capacity enhancing wake mitigation procedures/processes) for enhancing current operations and developing wake mitigation solutions that will be required as FAA transitions to trajectory based and flexible terminal operations, being developed by the NextGen Separation Management and Improved Multiple Runway Operations portfolios . The FY 2016 Goals are:

- By 2020, develop prototype procedures, processes, and applications of NextGen era capabilities that remove the wake encounter hazard mitigation constraint on airport runway throughput capacity.
- By 2020, maintain and enhance (if required) measurement, modeling and analysis capabilities to evaluate new aircraft designs and new uses of existing aircraft in terms of wake hazard generated and capability of surviving a wake encounter.

What Benefits Will Be Provided To The American Public Through This Request?

Investing in the NextGen - Wake Turbulence program provides the research and development for incremental airport throughput capacity increases and the wake mitigation processes and procedures that will be required to gain maximum capacity benefit from the NextGen far-term enhancements to the nation's air traffic control system. More airport throughput translates into lower operating costs for air carriers and the ability to expand their business. For passengers, more throughput capacity translates into reduced flight delays, especially a reduction in flight delays associated with weather events. The solutions being developed by this research program do not require air carriers to invest in additional equipment or airports to construct additional runways to gain the throughput capacity increases.

Detailed Justification for
A12.b NextGen - Air Ground Integration Human Factors

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – NextGen - Air Ground Integration Human Factors – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A12.b NextGen – Air Ground Integration Human Factors	$11,329,000	$9,697,000	$8,875,000	-$822,000

What Is This Program And Why Is It Necessary?

The research program develops human factors scientific and technical information to address human performance related to error and automation; avionics, new technologies, and procedures; and air carrier training. As part of this effort, research addresses coordination among pilots and air navigation service providers (air traffic controllers), human system integration, and error management strategies to implement NextGen capabilities. The results of research are intended to support the development of standards, procedures, training, policy, and other guidance material required to implement the operational improvements anticipated by NextGen.

NextGen involves implementation of new complex systems and flight crew procedures. The NextGen - Air Ground Integration Human Factors program supports the FAA Aviation Safety (AVS) 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 flight deck automation and air ground digital data communications technologies.

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, route clearances and negotiations, reroute requests, transfer of voice frequency channels, exchange of near term hazardous weather information, and flight crew reports for appropriately equipped aircraft. Specific research plans are developed in coordination with FAA stakeholders including those in the 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 offices within the NextGen organization (ANG).

The 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 research program supports the AVS 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 RNAV and required navigation performance (RNP), and NextGen capabilities such as those derived from the use of ADS-B.

The FY 2016 research program develops human factors scientific and technical information to support the development of standards, procedures, training, policy, and other guidance material addressing human factors in ADS-B/CDTI enabled applications, data communications, NextGen advanced instrument procedures, flight deck automation, and low visibility operations using advanced vision systems.

The human factors research on flight crew error will advance scientific and technical information to enable successful implementation of the new human error regulation, 14 CFR 25.1302, *Installed Systems and Equipment for Use by the Flightcrew*, and will provide recommended guidance that is intended to aid Aircraft Certification personnel in their evaluation of automated functions against certification requirements. Likewise, research on pilot roles in human-automation interaction will inform guidance updates for flight deck information display requirements.

Air carrier training research will focus on NextGen flight crew and dispatcher competencies including tasks, skills, knowledge and will identify flight crew performance requirements to address operational applications. Research will also address the development of flight crew procedures and provide recommendations for suitable approaches for developing procedures enabling NextGen capabilities.

Avionics, New Technologies, and Procedures human factors research will lead to recommendations allowing FAA to continue to deliver operational benefits for users of advanced vision system technologies and ADS-B/CDTI NextGen applications, data communications, and advanced RNAV/RNP instrument procedures under NextGen Performance Based Navigation initiatives.

Major activities and accomplishments planned in FY 2016 include:

Error and Automation

- Develop research methods to address issues related to system complexity/authority.
- Provide recommendations to mitigations knowledge and skill loss due to increased automation.

Air Carrier Training

- Provide validated training recommendations for improved pilot monitoring.
- Identify recommended training and checking guidelines for pilots in NextGen, including potential updates to Practical Test Standards.

Avionics, New Technologies, and Procedures

- Document human factors considerations for procedure designers.
- Perform gap analysis of current guidance and draft research plan for operational issues related to flight deck controls.
- Provide recommendations for integration of ADS-B/CDTI alerting and traffic situation awareness for airborne/ground.
- Provide recommendations for integration of EFB/PED/tablet technologies with NextGen applications/operations.
- Develop methods for operational issues and identification of HF performance issues in low visibility operations.
- Recommendations for a DataComm message set that reconciles the format for current and future messages.

Unmanned Aircraft Systems (UAS)

- Preliminary analysis of NextGen operations on UAS pilot operations and procedures

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

Research supports development of policy, standards and guidance required to design, approve, and operate NextGen equipment and procedures. Research results in updates to standards for pilot certification and training requirements as a result of new NextGen capabilities. Additionally, this research will include integrated demonstrations of NextGen procedures and equipment in the context of ongoing NextGen - Air Ground Integration Human Factors research.

The NextGen - Air Ground Integration Human Factors program supports the Department of Transportation (DOT) strategic goal of Safety and addresses flight deck and air traffic service provider integration for each operational improvement or NextGen application considered, with a focus on those issues that primarily affect the pilot side of the air-ground integration challenge. Through use of simulation, and demonstration, the program assesses interoperability of tools, develops design guidance, determines training requirements, and verifies procedures to support certification, flight standards, and Air Traffic Organization (ATO) service units for ensuring safe, efficient and effective human system integration in transition of NextGen capabilities.

Goals for FY 2016 Funding:

- By FY 2019, achieve fatal accident reductions caused by pilot error by developing guidance for the design of standard operating procedures (SOPs) and operational policy for flight path management with respect to the integration of automation.
- By FY 2020, reduce pilot error due to new implementation of NextGen operations by establishing and validating the flightcrew procedures and training and checking requirements in response to phased implementation of NextGen technologies.
- By FY 2020, provide evaluation criteria, minimum requirements, recommendations, and best practices related to human factors/pilot interface issues for NextGen technologies and applications.

This research provides human factors recommendations using scientific and technical information to assist Aircraft Certification Service and Flight Standards Service personnel in their evaluation of new technology and operational procedures that are necessary to achieve flight deck and integrated air-ground capabilities supporting NextGen applications.

What Benefits Will Be Provided To The American Public Through This Request?

A U.S. Congress, Office of Technology Assessment report titled "Safe Skies for Tomorrow" concluded that long-term improvements in aviation safety will come from human factors solutions and that such solutions are established through consistent, long-term support for human factors research and development, analysis, and the application of human factors information. Human performance is often the largest contributor to system variability, so the implementation of advanced systems and the implementation of new procedures associated with NextGen will challenge the human components of the aviation system. Reviews of accidents and incidents have identified that human factors and human performance is a major factor in two thirds to three quarters of all civil aviation accidents. Specifically, research is required to ensure that system design, procedures, and training support the flightcrew functions, responsibilities, information needs, and interactions necessary for successful implementation of NextGen operational improvements which often involve multiple new technologies operating in parallel.

Detailed Justification for
A12.c NextGen – Weather Technology in the Cockpit

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – NextGen - Weather Technology in the Cockpit – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A12.c NextGen - Weather Technology in the Cockpit	$4,000,000	$4,048,000	$4,116,000	+$68,000

What Is This Program And Why Is It Necessary?

The NextGen - Weather Technology in the Cockpit (WTIC) program defines the minimum weather service[1] needed to support sound pilot decision making in the cockpit and to provide cockpit decision support tools (such as the Flight Management System) with meteorological (MET) information that is ready for direct integration to support operations in the transformed National Airspace System (NAS). The WTIC program will determine and recommend standards and guidance for a Part 121/135 and a Part 91 minimum weather service. The program will define the necessary MET information, the associated parameters of the information (i.e., accuracy, latency, update rates), and presentation elements to safely and efficiently incorporate it into collaborative decision making (CDM) relative to adverse weather decisions and performance based navigation. The WTIC program in defining a recommended Part 91 minimum weather service will resolve or minimize previously-identified and WTIC-identified general aviation (GA) safety risks.

The minimum weather services, including the resulting standards and guidance, recommended by the WTIC program will enable NextGen weather-related goals including reducing weather delays via increasing capacity and efficiency under adverse weather conditions, enhancing air traffic management (ATM) and aircraft re-routing flexibility to avoid adverse weather, reducing safety risks that have the potential of lowering the number of weather-related accidents and incidents, and reduction of emissions through lower fuel consumption resulting from optimized routing and rerouting during adverse weather. In addition, WTIC will develop functional and performance requirements to support performance based navigation operations far-term concepts.

The WTIC Program conducts demonstrations and evaluations for service and benefits quantification of new concepts and MET technologies for possible applications in NextGen. Also, the WTIC program will work closely with multiple RTCA special committees and other industry and stakeholder committees to further the program objectives as well as the development of industry and government minimum systems standards. Demonstrations and flight evaluations will also be conducted to verify minimum weather service recommendations for airworthiness standards or recommended practices.

The NAS mid-term concept of operations and numerous NextGen operational improvements have identified a need for additional or higher quality MET information in the cockpit or integrated with decision support tools. This MET information will enable NextGen operations and performance based navigation to achieve planned benefits in adverse weather conditions.

For GA operations, the WTIC program is performing research to identify gaps of MET information in the cockpit that were causal factors in previously reported accidents or incidents and gaps of MET information in the cockpit that have potential of being a causal factor in a future GA accident or incident. The WTIC program is developing recommendations to resolve or reduce these MET information gaps to potentially reduce the weather-related GA accident, fatality, and incident rates.

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[1] The term "minimum weather service" as used here is defined as the minimum weather information needed in cockpits along with the associated parameters of that information, such as reliability, accuracy, update rates, and spatial resolution. The minimum weather service will also include rendering recommendations to reduce the likelihood of interpretation errors.

The WTIC program research will develop minimum standards and recommended guidance on the adoption of cockpit, ground, and communication technologies, practices, and procedures to enhance common situational awareness. Common situational awareness will be enhanced by reducing latency in cockpit MET information, standardizing MET information presentations, and recommending an efficient architecture to improve dissemination of MET information for uplink, downlink, and crosslink so that ground and air users will have access to the same information to support efficient collaborative decision making. The resolution or reduction of operational shortfalls attributable to MET information in the cockpit gaps by defining a minimum weather service supports NextGen goals for improved NAS efficiency and FAA goals to eliminate safety risks with the potential of being causal factors in future GA accidents.

Specific gaps and shortfalls being addressed by WTIC research are:

- A lack of consistent MET information rendering in cockpits and of common weather situational awareness with air traffic managers that may be causing inconsistent adverse weather decision making due to varying interpretations of weather conditions.
- Inadequate pilot training on MET information, its use, limitations, and new MET technology.
- Inefficiencies in weather related decision-making that may be due to the lack of appropriate and optimized MET information in the cockpit or deficient cockpit MET information specifications (accuracy, latency, required quality of service, etc.).
- Quantification of MET information bandwidth needs to support industry's development of a recommended architecture for disseminating MET information.
- Reducing unnecessary air space avoidance and associated capacity reductions resulting from turbulence reports which currently lack quantified and objective turbulence measures.
- The GA accident rate attributed to inadvertent flight from VFR into IMC conditions or to GA pilots not maintaining safe separation from adverse weather.

WTIC also supports the goal to reduce greenhouse emissions by reducing fuel consumption resulting from increased NAS capacity and enhancing adverse weather decision making to enable more efficient routing and rerouting during adverse weather conditions.

Major activities and accomplishments planned in FY 2016 include:

Identify Causal Factors for General Aviation (GA) Weather-Related Accident Rate

- Complete detailed analyses on evolving trends in GA weather-related accidents to identify shortfalls associated with advanced cockpit meteorological (MET) technology and enhanced MET information.
- Determine feasibility of reducing or resolving safety risks associated with previously identified gaps of MET information in the cockpit that were deferred based on prioritization.
- Develop and produce metrics to assess the benefits of previous WTIC recommendations to enhance GA safety.

Identify and Resolve GA Pilot Training Shortfalls

- For cockpit based NEXRAD technology and information, produce scenario-based GA pilot MET-training courseware and internet training modules that are compatible with independent and instructor led training, and an associated set of comprehensive MET questions for the pilot written exam.

Identify Current and NextGen Operational Inefficiencies Attributable to Gaps in MET Information in the Cockpit

- Complete WTIC Far Term Concept of Operations (ConOps).
- Derive Mid-Term research requirements from Mid-Term WTIC ConOps.
- Complete far-term industry perspective to align WTIC research with industry's long range visions and philosophies and to identify needs for new or updated FAA standards.

- Complete demonstration of fully completed Bayesian Flight Mode Classifier's capabilities to predict changes in flight behavior near convective weather.
- Develop preliminary assessment of shortfalls of MET technology to support NextGen operations and the recommendations for a minimum weather service.
- Identify potential Use Cases for enhanced cockpit MET automation and perform feasibility and benefits assessments on range of automation alternatives.

Recommend a Minimum Weather Service for Part 121/135 and Part 91 Aircraft

- Complete verifications of selected alerting functions.
- Complete demonstration plan and initiate demonstration of draft minimum weather service recommendations and data link standards to support oceanic and remote region flight operations.
- Develop final minimum weather service recommendations for uplinking enhanced wind information based on previously completed verification demonstration.
- Propose mobile MET application information content, capabilities, and selected human factors elements to enhance GA safety.
- Identify cloud technology and crowd sourcing techniques of MET information to support implementation of the minimum weather services.
- Develop architecture and minimum standards recommendations for presenting uplinked or cross linked MET information on a legacy display or electronic flight bag (EFB) to provide a strategic forward looking composite weather presentation.
- Complete trade studies of concepts for presenting probabilistic and uncertainty information in the cockpit.
- Develop human factors design guidance and standards for rendering enhanced MET information on general aviation (GA) cockpit displays. As a result of the design guidance, there is reduced variability in pilot interpretations of the cockpit MET information and more consistent pilot decision making.

In FY 2016, the WTIC program will continue to perform research to identify GA and Part 121/135 safety risks and Part 121/135 operational inefficiencies that are attributable to gaps of MET information in the cockpit. Based on the gaps identified, preliminary assessments on the feasibility of reducing or eliminating the gaps will be performed.

In addition, WTIC research will continue to develop recommendations for a Part 121/135 minimum weather service and recommendations for a Part 91 minimum weather service. Minimum weather service research in FY 2016 will include:

- Trade studies to assess a range of alternatives to resolve or eliminate previously identified gaps.
- Verification demonstrations of previously selected alternatives from completed trade studies.
- Development of preliminary minimum weather service recommendations.

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

The NextGen - WTIC Program supports the Department of Transportation (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. This will be done through the development of recommendations for a GA Minimum Weather Service and a Part 121/135 Minimum Weather Service.

Goals for FY 2016 Funding:

- By FY 2017, identify GA Safety Risks-Identify cockpit MET information or MET technology gaps that have the potential to be a causal factor in a future accident or incident. Identified gaps will be resolved by the development of minimum weather service attributes in future years.
- By FY 2019, finalize GA minimum weather service attributes for mobile MET applications and GA alerting. Develop preliminary GA minimum weather service attributes for probabilistic weather in the cockpit and for presentation of uplinked and cross-linked MET information on legacy displays. These minimum weather service attributes successfully resolve their associated gaps.
- By FY 2017, complete GA pilot MET-training courseware and internet training modules, and associated questions for the pilot written exam.
- By 2020, identify cockpit MET information or MET technology gaps that are attributable to operational inefficiencies in the NAS (areas to be investigated listed in FY16 activities and accomplishments section above). These gaps will be resolved by the development of Part 121/135 minimum weather service attributes in future years.
- By 2019, develop finalized Part 121/135 minimum weather service attributes for enhanced wind information and preliminary attributes for Part 121/135 adverse weather alerting functions. These minimum weather service attributes successfully resolve their associated gaps and operational shortfalls.

The requested funding will provide sufficient inputs to the standards and guidance documents necessary to implement the minimum weather service that is needed to enable NextGen operational improvements and concepts of operation. It also provides a level of funding that supports developing information necessary for industry's technology development and aircraft equipage decisions.

One of the main objectives of the WTIC program is to provide for a common MET situational awareness between the air and ground. WTIC is a cross cutting research program that makes every effort to ensure research is relevant to a variety of stakeholders both internally to the FAA and external to the government.

What Benefits Will Be Provided To The American Public Through This Request?

Adverse weather continues to be one of the major causes for GA accidents, incidents, and fatalities, and of inefficiencies in NAS operations for commercial airlines. To enable safer GA operations, the WTIC program will recommend a cockpit GA minimum weather service that resolves safety-related MET information and MET technology gaps. The resolution of these safety-related gaps should result in the American Public seeing a reduction in the GA accident, incident, and fatality rates. For commercial aviation, the WTIC program will recommend a Part 121/135 minimum weather service to enable effective pilot collaboration in adverse weather decision making which should result in the American Public having shorter or less flight delays attributable to adverse weather conditions. In addition, the enhanced efficiency should also result in reduced greenhouse emissions.

A12.d Commercial Space Transportation Safety

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – Commercial Space Transportation Safety – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
Commercial Space Transportation Safety	$0	$0	$3,000,000	+$3,000,000

What Is This Program And Why Is It Necessary?

The primary mission of the Commercial Space Transportation Office (AST) is to regulate commercial space launch and reentry operations, only to the extent necessary to ensure compliance with international obligations of the U.S. and to protect the public health and safety, safety of property, and national security and foreign policy interests of the United States. Additionally, AST encourages, facilitates, and promotes commercial space launches and reentries by the private sector. Safety, however, is clearly AST's top priority. To that end, research must be done to ensure that the FAA is at the forefront of the industry's endeavors. The FAA requests RE&D funding to enable research that advances critical areas related to space-flight missions that affect the navigable airspace.

AST was established in 1984 by Executive Order and subsequently authorized by the Commercial Space Launch Act to provide a one-stop-shop for overseeing commercial space transportation activities. The issuance of the 2010 National Space Policy (NSP), the 2013 National Space Transportation Policy, and the Commercial Space Launch Act (as modified by the Space Launch Liability Indemnification Extension Act in 2014) has begun to address challenges associated with a growing range of commercial space transportation applications and activities, including such diverse areas as the introduction of commercial human spaceflight (for research and space tourism) and cargo and crew transportation to the International Space Station. In addition, while maintaining its clear regulatory role to protect public safety, Congress has placed a moratorium on AST's authority to issue regulations to protect space flight vehicle occupant safety until October 1, 2015. However, Congress did task AST in the CSLA to "encourage, facilitate, and promote the continuous improvement of the safety of launch vehicles designed to carry humans". The research proposed supports both AST's public safety mission and this later mandate.

Recognizing the importance of integrating commercial space operations into the NAS, the FAA Administrator has included the need to integrate new users (i.e., UAS and Commercial Space Transportation) within his Strategic Initiatives. Further, the establishment of processes and procedures for integration of space vehicle operations has also been included in the agency's operational success increase (OSI) measures for 2015 under the corporate priority for Benefits through Technology and Infrastructure. Proposed research will also advance this initiative.

Major activities and accomplishments planned in FY 2016 include both research conducted by the Center of Excellence for Commercial Space Transportation (COE CST) and additional research used to mature the COE CST concepts and address other key areas for commercial space operations and potential regulation. Of the requested FY 2016 funding, $1,000,000 would be allocated to the COE CST, with the remaining $2,000,000 allocated to additional research to mature the COE CST concepts. Post-COE research will focus on safe and efficient integration of increased commercial space launch and reentry activity into the NAS, advanced safety assessment methods, advanced vehicle safety methodologies, and human spaceflight safety.

Research to facilitate safe and efficient integration includes:

- Improved integration of spaceports that are located in the vicinity of major airports or complex airspace, which will work in tandem with AST's current authority to license spaceports.
- Improved management of space vehicle trajectories and airspace integration for return to land-based sites to decrease the amount of airspace closed to regular air traffic control operations.
- Development and validation of noise models for commercial space launch operations at inland launch sites, including spaceports co-located with airports.

- Improved methods for collision avoidance analysis for more efficient launch and reentry planning and NAS integration, and increased understanding of the issues affecting the safety of launch and reentry operations, developed under the COE CST, will be analyzed and matured for use in practice by the FAA's AST.

Advanced safety assessment methods include:

- Advanced modeling concepts, such as whole atmospheric modeling, explosive debris generation, dispersion and mitigation in the airspace, and uncertainty modeling, to assure public safety while improving the efficiency of air-space integration and the associated operations.
- Continued research into aircraft vulnerability to space-vehicle-breakup debris, including model development and refinement to reduce over-conservatism applied to airspace "keep out" areas used to protect against a launch or reentry vehicle failure.
- Improved fragmentation models of composite propellant tanks will be developed to define public safety standoff distances.
- Advanced study of break-up characteristics of space vehicles, such as hybrids or other new concepts currently under consideration.
- Development of improved analytic and computational models to enhance the AST risk tools, such as the Risk Estimator for Suborbital Launch Vehicles (RESOLVe).
- Exploration of advanced space flight data mining capabilities to inform safety assessments and identify emerging public safety issues.

Advanced vehicle safety technologies:

- Improved understanding of proposed autonomous flight safety systems and exploration of mitigation factors to address their potential vulnerabilities.
- Assessing the use of integrated vehicle health monitoring technologies, including reentry breakup recorders.

Human spaceflight and physiological safety factors to improve the recently published best practices associated with commercial human spaceflight, to include:

- Understanding of crew safety systems proposed for suborbital space flight vehicles, including systems to monitor the cabin environment and support safety actions in the event of contingencies.
- Even though FAA aeromedical studies currently are limited to crew health, this program proposes collecting voluntary physiological data collection from both human spaceflight participants and crew, including those participants who may possess common disease states (such as high blood pressure, diabetes, lower back injury, respiratory disease, etc.), to identify potential areas of concern and additional focus.

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

The U.S. commercial space launch industry is expanding at an unprecedented rate as space tourism activities develop and NASA begins to rely on the commercial sector for space transportation requirements (Report GAO-10-286T available at http://www.gao.gov/new.items/d10286t.pdf). NASA's Cargo Resupply Services contract, suborbital Flight Opportunities Program, and the Commercial Crew Program all require direct AST coordination and engagement with NASA prior to the actual AST licensing activities. Research and development (R&D) enables AST to evaluate the industry's innovative safety solutions and ensure their effectiveness in a timely manner. FAA is continuing to see a growing number of innovative products and operational concepts from the industry. FAA needs a viable R&D program to ensure we are positioned to accommodate this growth and innovation. In addition, FAA needs a more robust R&D program to fully leverage and mature the innovative early-stage research that is being done in the COE CST, so that this work can be transitioned into FAA's systems, procedures, and regulatory framework.

All of these changes require that AST evolve at the same rapid pace that is occurring in the industry. In doing so and in order to manage the success of the commercial space program, AST must develop and execute a significant number of relevant technical policies, procedures, and studies for enhancing the safety and performance of space operations and its integration into the NAS.

Goals for FY 2016 Funding:

FY 2016 funding will support AST by conducting research on technologies addressing emerging safety issues. This important research will allow AST to keep pace with the dynamic commercial space transportation industry.

- Goal 1 - By 2018, publish an advanced study of break-up characteristics for advanced space-flight vehicles that will support ensuring public safety.
- Goal 2 - By 2018, promote the safe management of human space flight (tourism) including gathering physiological data from human spaceflight participants.
- Goal 3 - By 2017, assess various vehicle technologies used and proposed to ensure that each move forward in the industry is done with safety in mind, including requirements identification for new surveillance and vehicle health and status monitoring concepts for launch and reentry to improve safety and airspace integration.

What Benefits Will Be Provided To The American Public Through This Request?

AST has consistently conducted license and permit application evaluations resulting in determinations made within the statutorily mandated time limit to ensure the continued safety of the public. This record has been maintained while experiencing significant growth in the number of space launch systems, operators, and spaceports. A viable research program will position the FAA to have increasingly timely guidance and regulations, and improve our responsiveness to this emerging sector; similarly, the industry would benefit from improved techniques, practices, and technologies that result from a strong FAA commercial space R&D program.

Detailed Justification for
A13.a Environment and Energy

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – Environment and Energy – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A13.a Environment and Energy	$14,600,000	$14,921,000	$15,061,000	+140,000

What Is This Program And Why Is It Necessary?

The Environment and Energy program is advancing our understanding of the impacts of aviation on the environment while providing analysis to support the development of solutions to mitigate those impacts. At the core of the program is the development and use of an integrated aviation environmental tool suite. This tool suite is built upon a sound scientific understanding, which is also being developed as a part of this program, of aviation noise and emissions as well as their environmental, health and welfare impacts. The program is using these models and knowledge to inform decision making on policies and technology development relating to aviation's energy use and environmental impacts.

Despite the technological advancements achieved during the last 40 years, aircraft noise still affects people living near airports, and aircraft emissions continue to be an issue at local, regional, and global scales. 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 are a serious long-term environmental issue facing the aviation industry. Aside from their associated health and welfare impacts, noise and 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. The environmental impacts from aviation could restrict capacity growth and prevent the realization of the mobility and environmental benefits envisioned by NextGen.

Noise is the most immediately objectionable impact of aviation, and an impact demanding considerable Federal resources (e.g., AIP grant set aside of up to $300 million annually). Potentially outdated research underpins determinations of aircraft noise impacts, land use compatibility guidelines, and federally funded noise mitigation. Additional noise research effort is needed to reflect public sensitivity to 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.

To efficiently mitigate the environmental health and welfare impacts associated with aviation, policymakers need to understand the potential environmental impacts of aviation and to have these impacts quantified. The research funded by this program will ensure issues are identified; impacts measured; and appropriate mitigation measures instituted. There are also important interrelationships and trade-offs among impacts due to noise, emissions and energy that need to be understood and quantified when developing environmental mitigation strategies. The development of an interdisciplinary approach that considers the interdependencies among energy use, aircraft noise, and various air pollutant emissions is a key element for this research program. The goal is to develop a more complete understanding of the complex interdependencies that exist among aircraft noise, fuel burn, and emissions as well as their health and welfare impacts and to translate this knowledge into an integrated environmental modeling framework that is used to evaluate policy and technological options to mitigate the environmental impacts and energy use from aviation.

The Environment and Energy program is providing the necessary knowledge and tools to evaluate all of the options being considered by the aviation community to mitigate environmental impacts of aviation: operational procedures; aircraft and engine technologies; alternative fuels, improved operational procedures, and environmental policies and standards. These could all enable an increase in capacity while reducing environmental impacts thus ensuring we have an aviation system that is a model for sustainable growth.

Major activities and accomplishments planned in FY 2016 include:

Aviation Noise

- Advance analytical methods for estimating noise from all phases of flight and the impacts of noise on social welfare and health
- Update guidance and policies in support of current noise standards and to improve the certification processes.

Aviation Emissions

- Develop measurement / sampling protocols and expand database for aircraft engine emissions.
- Advance analytical methods for estimating emissions from all phases of flight and their impacts on climate change and air quality.
- Update guidance and policies in support of current aircraft standards and to improve the certification process.

Analytical Tool Development

- Refine the publicly-available Aviation Environmental Design Tool (AEDT), which can perform integrated fuel burn, noise, and emissions analyses from airport to global scales.
- Refine the ability of the Aviation environmental Portfolio Management Tool (APMT) for regional to global environmental analyses.
- Develop and refine methods that can evaluate the impacts of new aircraft technologies, alternative jet fuels, operational procedures, standards and policy measures within the integrated environmental tool suite.

Environmental Analyses

- Conduct analyses to support the development of future International Civil Aviation Organization (ICAO) environmental standards and a global market based measure for international aviation.
- Evaluate technological solutions that could mitigate aviation noise and emissions and their health and welfare impacts.

Additionally, funding will provide for engineering, technical, and management support of overall research activities.

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

The E&E program helps achieve NextGen goals to increase mobility by reducing environmental impacts of aviation in absolute terms, including those relating to community noise, air quality and global climate change. This program provides the fundamental knowledge and tools that support the NextGen Implementation Plan. The efforts within the E&E program complement activities to reduce the environmental impacts of aviation through aircraft technology, alternative fuels, and operations as well as environmental operational assessments and environmental management systems development that are being carried out under NextGen investments.

Goals for FY 2016 Funding:

- Advance scientific understanding of aviation noise and emissions and their environmental, health and welfare impacts to inform decision-making and enable solution development.
- Develop engine exhaust emissions and noise measurement protocols and expand databases for aircraft engine emissions and noise certification.
- Develop, implement, and use integrated aviation environmental tool suite to evaluate energy and environmental impacts of aviation and potential mitigation options.
- Analyze environmental and economic impacts, trade-offs and cost-benefit assessment of both domestic and international policy options and scenarios.

This program funds activities that support the US leadership position on international environmental negotiations for standard setting and policy making. These include, but are not limited to, the development and release and subsequent support of AEDT for integrated noise, emissions, and fuel burn analysis; analyses to inform the development of a global market based measure for international aviation; and sampling and measurement program for aircraft particulate matter (PM) emissions. The program expands our understanding of source level aircraft noise and emissions as well as their impacts which will in turn inform the development of environmental mitigation solutions.

What Benefits Will Be Provided To The American Public Through This Request?

This request would continue the successful research that has been carried out by the Environment and Energy program. This funding would continue efforts to advance our scientific understanding of the environmental impacts of aviation, developing tools to quantify these impacts, and then using the tools to inform policy making regarding the environmental impacts of aviation. Much of the research in this program to improve the underlying science is carried out via the Aviation Sustainability Center (ASCENT), a leading aviation cooperative research organization, with a broad portfolio of contributions. ASCENT is building on the success of the PARTNER Center of Excellence (http://web.mit.edu/aeroastro/partner/) as highlighted in their 10 year Symposium (http://web.mit.edu/aeroastro/partner/reports/public-symposium-2013.pdf).

The program has enabled the development of AEDT to quantify the integrated fuel burn, noise, and emissions consequences of aviation as well as APMT to convert these consequences into impacts on the community. AEDT version 2a was released in March 2012 and is now the FAA's standard regional noise model replacing the Noise Integrated Routing System (NIRS). Funds from this program would ensure the continued development and maintenance of AEDT.

During the ICAO CAEP/8 and CAEP/9 meetings, which took place in 2010 and 2013, respectively, AEDT and APMT were used to inform the U.S. positions on the internationally negotiated NOx and noise stringencies, respectively. These funds would ensure the U.S. has the scientific information to make informed decisions on a carbon dioxide standard, a particulate matter standard, and a global market based measure for aviation; all of which are currently being developed in ICAO CAEP. Each of these could have a multi-billion dollar impact on the aviation industry and on the health and welfare of the American Public.

Detailed Justification for
A13.b NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics

What Is The Request And What Funds Are Currently Spent On The Program?

FY 2016 – NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A13.b NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics	$26,979,000	$23,014,000	$23,823,000	+$809,000

What Is This Program And Why Is It Necessary?

The program is developing solutions to reduce the environmental impacts associated with aviation noise and exhaust emissions, and increasing energy efficiency and availability. Collaborating with industry, the program will accelerate the maturation of 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 overcome barriers to the adoption of alternative jet 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 emissions 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 impacts into improved metrics that can be used to better assess and mitigate aviation's contribution.

The NextGen environmental strategy to overcome these challenges 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 air traffic management (ATM) technologies, alternative fuels, and policies to achieve near-term and long-term solutions. The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program supports research to develop new aircraft technologies and sustainable fuels and to develop metrics to quantify NextGen 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 to enable mobility. The main focus of this R&D effort is the Continuous Lower Emissions, Energy and Noise (CLEEN) program. The CLEEN program is focused on technology maturation to reduce current levels of aircraft noise, emissions that degrade air quality, GHG emissions, and energy use while also advancing sustainable alternative fuels for aviation use.

The ASTM International approval of alternative jet fuels is a critical requirement for the commercial scale production and deployment of fuels. The current process of certifying alternative jet fuels requires extensive resources and time including large volumes of fuel costing on the order of $10 million per fuel type approval. Standardized combustor test rig and improved modeling capabilities are needed to predict impacts of alternative jet fuels on the engine operability and to streamline the certification/qualification process of alternative jet fuels that will save costs and time in future fuel approvals and improve the overall throughput.

Several scientific uncertainties concerning aviation energy issues and aviation environmental impacts, particularly on climate, still exist. For instance, there are large uncertainties in our present understanding of the magnitude of climate impacts due to aviation non-CO_2 emissions. Understanding the relative impacts of different emission (including impacts of emissions produced during cruise on surface air quality) is also vital.

Much of the alternative jet fuels effort and research that is advancing our understanding of the impacts of aviation on climate change is carried out via the Aviation Sustainability Center (ASCENT), a leading aviation cooperative research organization, with a broad portfolio of contributions. ASCENT is building on the success of the PARTNER Center of Excellence (http://web.mit.edu/aeroastro/partner/) as highlighted in their 10 year Symposium (http://web.mit.edu/aeroastro/partner/reports/public-symposium-2013.pdf).

In FY 2016, the NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program will continue to advance system design, integration, and testing of CLEEN aircraft technologies for accelerated progress towards flight demonstration and system-wide assessments within the second phase of the CLEEN program. For alternative fuels, activities will focus on safety, operability, performance, and environmental assessments for qualification of renewable alternative fuels to secure ASTM International approval and to streamline the approval process. Activities will also be conducted to assess production capacity and fleet infusion of 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. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major activities and accomplishments planned in FY 2016 include:

Technology Maturation

- Continue the second round of CLEEN activities (CLEEN II) to demonstrate aircraft and engine technologies that can reduce energy use, emissions, and noise.
- Assess the environmental benefits of CLEEN II airframe and engine technologies.

Alternative Jet Fuels

- Evaluate novel future 'drop-in' alternative jet fuels to ensure their compatibility with existing aircraft and fueling infrastructure.
- Evaluate the environmental and economic sustainability of future 'drop-in' alternative jet fuels.
- Standardize combustor test rig and develop improved modeling methods under the National Jet Fuels Combustion Program to streamline alternative jet fuel certification/qualification process
- Support coordination in alternative jet fuel development across industry, governments, and academia.

Metrics, Goals, and Targets

- Refine the estimates of aircraft contribution to climate change and develop metrics using the latest methods and knowledge.

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

The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program helps achieve NextGen goals to increase mobility by reducing environmental impacts of aviation in absolute terms, including those relating to community noise, air quality and global climate change. The program is focused on maturing aircraft technologies that can reduce aircraft noise, emissions that degrade air quality, greenhouse gas emissions, and energy use and advancing alternative jet fuels.

The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program supports the Department of Transportation (DOT) strategic goal of Environmental Sustainability by increasing the use of environmentally sustainable practices in the transportation sector. Those practices will improve capital projects that include environmental management systems, context sensitive solutions, or use a sustainable transportation project evaluation to manage the environmental impacts of construction and operations.

Objectives for FY 2016 Funding:

- By FY 2020, via the CLEEN Program, demonstrate certifiable aircraft and engine technology that reduces noise levels, landing and takeoff cycle (LTO) nitrogen oxide emissions, and fuel burn. Activities starting in

FY 2016 and subsequent year activities will cumulatively help reach this goal through multiple CLEEN Program technologies.

- By FY 2018, overcome barriers to the development and deployment of sustainable "drop-in" alternative jet fuels. Activities starting in FY 2016 and subsequent year activities will cumulatively help meet the U.S. government aspirational goal of enabling 1 billion gallons of alternative jet fuel use by aviation.
- By FY 2020, improve the quantification of aviation environmental impacts to enable solution development. Activities starting in FY 2016 and subsequent year activities will cumulatively support the above listed goals as well as other NextGen initiatives.

This program has had considerable success in transitioning technologies that will reduce the environmental impact of aviation and sustained funding will ensure that these successes continue.

In the area of alternative jet fuels, this program has directly contributed to the certification by ASTM International of alternative jet fuels made using Fischer-Tropsch (F-T) synthesis, the Hydroprocessed Esters and Fatty Acids (HEFA) fuel and sugar fermentation processes. It has also funded the development of research that quantified the life cycle greenhouse gas emissions benefit of alternative jet fuels made from these processes. This research was subsequently used by the EPA as a part of their rulemaking to include HEFA fuels within their Renewable Fuel Standard (RFS) Program. Finally, this program also provides funding to the Commercial Aviation Alternative Fuels Initiative (CAAFI), which is focusing the efforts of commercial aviation to engage the emerging alternative fuels industry. It enables its diverse participants - representing all the leading stakeholders in the field of aviation - to build relationships, share and collect data, identify resources, and direct research, development and deployment of alternative jet fuels.

In the area of technology maturation, the CLEEN Program, which is a key component of the NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics Program, has worked with partners in industry to mature numerous technologies from concept validation to being ready for industry adoption and incorporation into the fleet. These include a ceramic matrix composite core exhaust nozzle for reduced fuel burn and noise, an advanced lean burn combustor for reduced landing and takeoff nitrogen oxide emissions, and high temperature engine core components that will enable more efficient engine design. Additionally, the CLEEN Program has demonstrated wing adaptive trailing edge technology through flight testing, demonstrating aerodynamic benefits that will lead to fuel burn savings and potentially aircraft noise reduction. Efforts continue in CLEEN's development of technologies to enhance the benefits of an ultrahigh bypass ratio geared turbofan architecture through continued fan model wind tunnel testing which could provide noise, emissions and fuel burn benefits. Finally, CLEEN has completed wind tunnel testing to mature the blade designs for open rotor engine architectures, which hold large fuel burn reduction potential. These successful maturation and demonstration efforts have moved each of these technologies closer to successful transition into commercial products that will provide environmental benefit in the fleet.

What Benefits Will Be Provided To The American Public Through This Request?

This program would enable continued success in the CLEEN Program, the Commercial Aviation Alternative Fuels Initiative (CAAFI) and ASCENT in maturing aircraft and engine technologies and in developing alternative jet fuels. With continued funding, the second phase of the CLEEN program will be able to partner with industry to mature technologies with the result being a fleet of aircraft with lower noise, emissions and fuel burn. The work to develop alternative jet fuels and to streamline the approval process for commercial deployment will also continue and help to ensure that aviation has a sustainable source of energy.

By reducing the environmental impact of aviation through new technologies and alternative fuels, this funding helps to ensure the continued growth of aviation while also reducing the impacts of aviation noise and emissions on airport communities as well as on the public at large. By removing barriers to the deployment of alternative jet fuels, this program would support the development of a new industry thus providing economic development as well as environmental benefit. These are all substantial benefits to the American Public.

Detailed Justification for
A14.a System Planning and Resource Management

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – System Planning and Resource Management – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A14.a System Planning and Resource Management	$2,200,000	$2,100,000	$2,377,000	+$277,000

What Is This Program And Why Is It Necessary?

This activity produces the National Aviation Research Plan (NARP), an annual strategic plan for FAA R&D; administers the Congressionally mandated (P.L. 100-591 Section 6 Advisory Committee) R,E&D Advisory Committee (REDAC); and provides program advocacy and outreach.

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.

This program provides the support for the FAA to formulate their annual R,E&D portfolio and submit the mandatory plan for the FAA research and development to Congress each year.

FAA will continue supporting the work of the REDAC in its task to advise the Administrator on the R&D portfolio. In particular, it will seek the counsel and guidance of the committee for the FY 2017 R&D portfolio, review the proposed FY 2017 portfolio prior to submission of the budget requirements to the DOT, and seek the committee's guidance during the execution of the R&D portfolio. The agency will publish, as required by Congress, the NARP and submit it to Congress concurrent with the FY 2016 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. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major activities and accomplishments planned in FY 2016 include:

R &D Portfolio Development

- Prepare the FY 2018 R,E&D budget submission.
- Manage FAA's R,E&D portfolio to meet efficiency goals.
- Obtain REDAC recommendations on planned R&D investments for FY 2018.
- Support the REDAC in its preparation of other reports, as requested by the FAA.
- Deliver the 2016 National Aviation Research Plan (NARP) to Congress with the President's FY 2017 Budget Request.

Research Collaboration

- Conduct the 2016 International Conference on Research in Air Transportation (ICRAT)
- Begin planning for the 2017 International ATM R&D Seminar.

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

The System Planning and Resource Management program supports the Department of Transportation (DOT) strategic goal of Economic Competitiveness in maintaining cost control and audit on R&D budget portfolio.

Goals for FY 2016 Funding:

- Maintain an RE&D management workforce of no more than 10 percent of the total RE&D workforce, each year through FY 2019.
- Control expenditures of the REDAC to less than 1/10 of one percent of the total RE&D budget, each year through FY 2019.

What Benefits Will Be Provided To The American Public Through This Request?

This program provides the support for the FAA to formulate their annual RE&D portfolio and submit the mandatory planning documents for the FAA research and develop to Congress each year. Through the management of the FAA REDAC, this program facilitates an independent, expert review of the FAA's R&D portfolio that provides meaningful recommendations for the FAA to refine and improve their portfolio. This results in a more effective research program that will benefit the public by making aviation safer and smarter and enhancing the United States global leadership in aviation.

Detailed Justification for
A14.b William J. Hughes Technical Center Laboratory Facility

What Is The Request And What Funds Are Currently Spent on the Program?

FY 2016 – William J. Hughes Technical Center Laboratory Facility – Budget Request

Program Activity	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015 Enacted
A14.b William J. Hughes Technical Center Laboratory	$3,440,000	$3,410,000	$3,445,000	+$35,000

What Is This Program And Why Is It Necessary?

This program sustains research facilities located at the 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 the simulation facilities, the flight program's airborne laboratories and the Human Factors Laboratory.

R&D programs require specialized facilities to emulate and evaluate field conditions. Researchers measure baseline human performance using existing ATC configurations and changes in performance when new systems or procedures are introduced to evaluate human factors issues. These laboratories include integrated cockpits and ATC workstation capabilities (simulated and real) to evaluate the system and human components that can only be addressed in a full mission end-to-end simulation environment. Airborne and navigation projects require flying laboratories, aircraft used for research and development, which are specially instrumented and reconfigurable to support a variety of projects. Human factors projects require flexible, high-fidelity laboratories to perform full-mission, human-in-the-loop simulations.

The R&D laboratories are fully integrated with the WJHTC field support laboratories. This allows for an extremely high fidelity environment supporting R&D of the current day, NextGen, and transitioning current to future, for example mixed equipage and adjacent site deployment.

It is necessary to modify, upgrade, and sustain the R&D laboratory infrastructure and provide support services to support the R&D program goals.

The Simulation Branch supports development and test programs at the WJHTC by generating realistic traffic for engineering, operational, and human factors evaluations of NAS equipment, procedures, and operations. The Target Generation Facility (TGF) simulates air traffic equipment including the radar and interfacility interfaces for end-to-end gate-to-gate configuration controlled test capability. TGF generated targets can operate under pilot control or prescribed paths depending on study needs. Simulation pilots are provided by the Simulation Branch and include a cadre of current and retired airline and commercial pilots. The Simulation Branch also maintains several cockpit simulators of transport category and general aviation aircraft. At present, simulators for the B-737-800, A-321, Embraer 175, and two general aviation aircraft are operational. All cockpit simulators are integrated with TGF and are capable of acting as interactive targets in NAS simulations.

The Flight Program Branch accepts flight test missions from various research, development, test, and evaluation (RDT&E) Agency programs. These efforts include aircraft modifications, testing equipment integration, aircraft maintenance, data collection, detailed flight test planning, and mission risk analysis; along with actual flight tests.

The FAA R&D Flight Program serves many customers throughout the FAA and encompasses aircraft operations, aircraft maintenance, aircraft engineering and modifications, and aircraft tracking. The program currently operates, modifies, and maintains six aircraft that act as airborne laboratories. These aircraft are operated under Federal Aviation Regulations (FAR) 91 and maintained by an in-house FAA certificated repair station. The R&D Flight

Program is equipped to perform flight test anywhere in the United States and can and has, under the appropriate circumstances, conducted flight tests anywhere in the world.

The R&D Flight Program continues to support the multiple programs, including, but not limited to: ADS-B, Global Positioning System (GPS), GPS-SBAS, GPS-GBAS, Unmanned Aircraft Systems (UAS), Aircraft Surveillance, Navigation, Communications, and Safety.

The mission of the R&D Human Factors Laboratory (RDHFL) is to perform research to acquire a better understanding of the part that a human plays in current and future aviation systems. This research environment is specifically designed to measure and assess human performance and workload. Additionally, the RDHFL investigates how new technologies should be integrated into air traffic control (ATC) and airway facilities (AF) systems. The cost of funding human factors research during the design and development phase of a project is offset by the significant reduction in cost during implementation.

The RDHFL supports a number of NextGen projects in many areas of research including NextGen TRACON (Human Factors Division), En Route Data Comm (Data Comm Program Office), Modular NextGen TRACON Facilities (NextGen Facilities Program), Separation Management (Advanced Operational Concepts Division), and Tower ground surveillance (Human Factors Division). Funding provides for the engineering, technical, and management support to sustain existing capabilities and also develop and integrate new capabilities in support of research activities.

Major activities and accomplishments planned in FY 2016 include:

Simulation Facilities

- TGF will continue supporting the ongoing research for UAS in the NAS and further refinement of simulated UAS failure modes, at least one UAS flight model will be developed.
- Rotorcraft modeling will be developed for traffic flow research in areas such as New York City where rotorcraft has a major impact for ATC operations.
- TGF will provide the laboratory capability to support Commercial Space Vehicle research. This includes additional space vehicle models, additional support for sub-orbital surveillance data exchange and support for CSV procedures.
- Achieve a fully integrated weather and traffic simulation capability on the simulators' window visual systems, on the avionics weather displays, and is manifested as turbulence in the simulator motion bases. Traffic will be displayed on all visual systems including TCAS (TIS) avionics and depicted on Air Traffic Situation Displays.

Flight Program's Airborne Laboratories

- The Flight Program will provide the appropriate flying laboratory to meet the needs of our flight test customer. In doing so, the flight program will provide: (1) trained flight crew, (2) maintained aircraft, and (3) fueled aircraft; at the location required for testing for the period of time requested.

Concepts and Systems Integration – Human Factors Laboratory

- Provide sustainment of existing laboratory infrastructure, both hardware and software, in support of human factors research.
- Support human factors research activities through the development and testing of new controller functionality. Some of these activities could include
  - Evaluating Computer Human Interface (CHI) redesigns (ie: ERAM, STARS, etc)
  - Measuring impacts of introducing new capabilities on controllers displays (ie: Conflict probe on the RSide, Datacom interface, etc)
  - Evaluating the automation fidelity to increase the effectiveness of its use to controllers.

- Support research activities that look to resolve human factors issues in existing systems. These have included studies of color and sound and human factors issues with added functionality (i.e.: Fusion tracking introduced a singular update rate in STARS whereby the controllers noticed a steady, periodic pulse of the display which interrupted their visual scanning effectiveness)

- Support data collection and analysis of NextGen human factors issues via Human-In-The-Loop simulation activities. These could include:
    - o Simulations which explore the effectiveness of new DataComm Computer Human Interface prototypes
    - o Activities related to enhanced Separation Management features.

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

The William J. Hughes Technical Center (WJHTC) Laboratory Facility program supports research facilities located at the WJHTC. These facilities consist of the Target Generation Facility, the Cockpit Simulation Facility, the Flight Program's Airborne Laboratories, and the Research and Development Human Factors Laboratory.

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. The funding provides for project support, engineering support, aircraft fuel costs, pilot certification and training and software hardware licenses for support tools.

The William J. Hughes Technical Center Laboratory Facility program supports the Department of Transportation (DOT) strategic goals of Safety, Economic Competitiveness, and Environmental Sustainability. These strategic goals are supported through integration of the WJHTC R&D Laboratory Facilities by sustaining programs such as UAS, Weathers Systems, etc.

Goals for FY 2016 Funding:

Simulation Facilities

- By 2016, achieve an integrated weather and traffic simulation capability in the Cockpit Simulation Facility.
- By 2016, provide non-transport category flight models and dynamics in the Target Generation Facility.

Flight Program's Airborne Laboratories

- By 2016, the Flight Program will strive to maintain an aircraft availability of greater than eighty percent.

Concepts and Systems Integration – Human Factors Laboratory

- By 2016, update the R&D Human Factors Laboratory's simulation software to include new functionality added to fielded NAS systems, such as STARS and ERAM, to sustain current capabilities and to support Human in the Loop simulations.
- Develop and integrate NextGen capabilities into existing laboratory infrastructure in support of Human-In-The-Loop simulations.

Additionally the flight program requires both routine and non-routine maintenance of its aircrafts to support the NextGen flight test missions. The flight program continuously provides support to many NextGen programs including ADSB and the alternative fuels for general aviation research program and the maintenance of these aircrafts is necessary. If R&D funds to the flight program are reduced, the flight program will be unable to support many NextGen critical programs.

What Benefits Will Be Provided To The American Public Through This Request?

Simulation Facilities

The capability developed by the Simulation Branch will enable the research of complex problems due to weather, UAS, and Commercial Space Flight in a controlled laboratory environment. The fully integrated facilities will enable research from the ground and airborne elements for a complete simulation capability. The capital investment will be offset by the cost savings of performing this research in simulation rather than the use of live aircraft. Moreover, the safety of simulation will allow the study of the extremes that would not be possible in live flight conditions.

Flight Program's Airborne Laboratories

The Flight Program provides airborne flight tests in support of research, development, test and evaluation of all NAS related systems, especially Surveillance, Navigation, Communications, and Safety.

Concepts and Systems Integration – Human Factors Laboratory

The benefit of doing proactive human factors research on proposed changes to the NAS is to identify human performance issues early in the concept development phase. Human factors related issues resolved prior to implementation result in cost savings and ensure that the agency's safety standards for air traffic control operations are met.

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3D. GRANTS-IN-AID FOR AIRPORTS

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, $3,500,000,000, 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 $2,900,000,000 in fiscal year 2016, 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, Provided further, That notwithstanding any other provision of law, of funds limited under this heading, not more than $107,100,000 shall be obligated for administration, not less than $15,000,000 shall be available for the Airport Cooperative Research Program, and not less than $31,000,000 shall be available for Airport Technology Research.

Program and Financing
(in millions of dollars)

Identification code: 69-8106-0-7-402	FY 2014 Actual	FY 2015 Enacted	FY 2016 Estimate
Obligations by program activity:			
Direct Program:			
0001 Grants-in-aid for airports	3,308	3,192	2,747
0002 Personnel and related expenses	106	107	107
0003 Airport technology research	29	30	31
0005 Small community air service	6	6	. . . .
0006 Airport Cooperative Research	15	15	15
0100 Total direct program	3,464	3,350	2,900
0799 Total direct obligations	3,464	3,350	2,900
0801 Reimbursable program	. . . .	. . . 1	1
0900 Total new obligations	3,464	3,351	2,901
Budgetary Resources:			
1000 Unobligated balance carried forward, Oct 1	15	145	145
1001 Discretionary unobligated balance brought fwd, Oct 1	15	1	. . . .
1020 Adjustment of unobligated balance brought fwd, Oct 1	-2	. . . .	. . . .
1021 Recoveries of prior year unpaid obligations	115	. . . .	. . . .
1050 Unobligated balance (total)	128	145	145
Budget Authority:			
Appropriations, discretionary:			
1101 Appropriation (special or trust fund)	3,200	3,200	3,500
1137 Appropriation applied to liquidate contract authority	-3,200	-3,200	-3,500
1160 Appropriation (total discretionary)	. . . .	. . . .	. . . .
Contract authority, discretionary:			
1600 Contract authority (P.L. 112-95)	3,350	3,480	3,350
1600 Contract authority (49 USC 48112)	130	130	. . . .
1620 Contract authority and/or unobligated balance of contract authority permanently reduced	. . . .	-260	. . . .
1640 Contract authority, mandatory (total)	3,480	3,350	3,350
Spending authority from offsetting coll., Discretionary:			
1700 Collected	1	1	1
1750 Spending authority from offsetting coll., disc (total)	1	1	1
1900 Budget authority (total)	3,481	3,351	3,351
1930 Total Budgetary Resources Available	3,609	3,496	3,496
Memorandum (non-add) entries:			
1941 Unexpired unobligated balance, end of year	145	145	595
Change in obligated balances:			
Obligated balance, state of year (net):			
3000 Unpaid obligations, brought forward, Oct 1	5,117	5,209	4,759
3001 Adjustment of unobligated balance brought fwd, Oct 1	2	. . . .	. . . .
3010 Obligations incurred, unexpired accounts	3,464	3,351	2,901
3020 Outlays (gross)	-3,259	-3,801	-3,580
3040 Recoveries of prior year unpaid obligations, unexpired	-115	. . . .	. . . .
Obligated balance, end of year (net):			
3050 Unpaid obligations, end of year	5,209	4,759	4,080
Memorandum (non-add) entries:			
3100 Obligated balance, start of year	5,119	5,209	4,759
3200 Obligated balance, end of year	5,209	4,759	4,080
Budget authority and outlays, net:			
Discretionary:			
4000 Budget authority, gross	1	1	1
Outlays, gross:			
4010 Outlays from new discretionary authority	354	672	592
4011 Outlays from discretionary balances	2,905	3,129	2,988

4020	Outlays, gross (total)	3,259	3,801	3,580
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4033	Non-federal sources	-1	-1	-1
	Mandatory:			
4090	Budget authority, gross	3,480	3,350	3,350
4180	Budget authority, net (total)	3,480	3,350	3,350
4190	Outlays, net (total)	3,258	3,800	3,579
	Memorandum (non-add) entries:			
5052	Obligated balance, SOY: contract authority	3,464	3,742	3,892
5053	Obligated balance, EOY: contract authority	3,742	3,892	3,742
5061	Limitation on obligations (Transportation Trust Funds)	3,352	3,350	2,900

Subchapter I of chapter 471, title 49, U.S. Code provides for airport improvement grants, including those emphasizing capacity development, safety and security needs; and chapter 475 of title 49 provides for grants for aircraft noise compatibility planning and programs. The FY 2016 budget request proposes to lower funding for the airport grants program to $2.9 billion, offset in part by eliminating passenger and cargo entitlement funding for large 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 all commercial service airports to increase the non-Federal Passenger Facility Charge, thereby giving airports greater flexibility to generate their own revenue. The combination of these changes to the AIP and PFC programs will allow airports to effectively transition to a reduced AIP level without hindering their ability to meet existing capital needs of the national airport system.

Object Classification
(in millions of dollars)

Identification code: 69-8106-0-7-402		FY 2014 Actual	FY 2015 Enacted	FY 2016 Request
	Direct obligations:			
	Personnel compensation			
1111	Full-time permanent	63	66	67
1113	Other than full-time permanent	1	1	1
1115	Other personnel compensation	1	1	1
1119	Total personnel compensation	65	68	69
1121	Civilian personnel benefits	19	21	21
1210	Travel and transportation of persons	3	3	3
1232	Rental payments to others	1	1	1
1251	Advisory and assistance services	24	23	23
1252	Other services from non-fed sources	4	4	4
1254	Operation and maintenance of facilities	22	21	22
1257	Operation and maintenance of equipment	7	7	7
1260	Supplies and materials	1	1	1
1310	Equipment	2	1	1
1320	Land and Structures	. . . .	1	1
1410	Grants, subsidies, and contributions	3,311	3,193	2.747
1940	Financial Transfers	5	6	. . . .
1990	Subtotal, direct obligations	3,464	3,350	2,900
2990	Reimbursable obligations	. . . .	1	1
9999	Total new obligations	3,464	3,351	2,901

Employment Summary

Identification code: 69-8106-0-7-402		FY 2014 Actual	FY 2015 Enacted	FY 2016 Request
1001	Direct: Civilian full-time equivalent employment	564	608	609
2001	Reimbursable: Civilian full-time equivalent employment	. . . .	1	1

GRANTS-IN-AID FOR AIRPORTS
(Legislative proposal, not subject to PAYGO)

Program and Financing
(in millions of dollars)

Identification code: 69-8106-2-7-402	FY 2014 Actual	FY 2015 Enacted	FY 2016 Estimate
Budgetary Resources:			
Budget authority:			
Contract authority, mandatory:			
1600 Contract Authority	....	....	-450
1640 Contract authority, mandatory (total)	....	....	-450
1930 Total budgetary resources available	....	....	-450
Memorandum (non-add) entries:			
1941 Unexpired unobligated balance, end of year	....	....	-450
Budgetary Resources and outlays, net:			
Discretionary:			
Offsets against gross budget authority and outlays:			
Offsetting collections (collected) from:			
Mandatory:			
4090 Budget authority, gross	....	....	-450
4160 Budget authority, net (mandatory)	....	....	-450
4180 Budget authority, net (total)	....	....	-450
Memorandum (non-add) entries:			
5053 Unexpired unobligated balance, end of year	....	....	-450

EXHIBIT III-1

GRANTS-IN-AID FOR AIRPORTS
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	FY 2014 ACTUAL	FY 2015 ENACTED	FY 2016 REQUEST	CHANGE FY 2016-2015
Grants-in-Aid for Airports	3,193,900	3,192,650	2,746,900	-445,750
Personnel & Related Expenses	106,600	107,100	107,100	0
Airport Technology Research	29,500	29,750	31,000	1,250
Airport Cooperative Research	15,000	15,000	15,000	0
Small Community Air Service	5,000	5,500	0	-5,500
TOTAL	**3,350,000**	**3,350,000**	**2,900,000**	**-450,000**
FTEs				
Direct Funded	605	608	609	1
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.

EXHIBIT III-1a

GRANTS-IN-AID FOR AIRPORTS
SUMMARY ANALYSIS OF CHANGE FROM FY 2015 TO FY 2016
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

ITEM	Change from FY 2015 to FY 2016 ($000)	Change from FY 2015 to FY 2016 FTE
FY 2015 BASE	**3,350,000**	**608**
Annualization of FY 2015 Pay Raise	220	
Pay Inflation	859	
Non-pay inflation	637	
Annualization of FY 2015 Hires	-	
One additional compensable day	338	
Increase to Government contribution to FERS	269	
Decrease to working capital fund contribution	(791)	
SUBTOTAL, ADJUSTMENTS TO BASE	**1,532**	**0**
PROGRAM REDUCTIONS		
Grants	(445,750)	
Reduced contract activity in Admin	(1,046)	
Reduction in Airport Cooperative Research program contracts	(155)	
Small Community Air Services	(5,500)	
SUBTOTAL, PROGRAM REDUCTIONS	**(452,451)**	**0**
NEW OR EXPANDED PROGRAMS		
Requesting one additional FTP in Airport Technology Research program (0.5 FTE)	75	1
Increase to contracts for Airport Technology Research program environmental research	844	0
SUBTOTAL, NEW OR EXPANDED PROGRAMS	**919**	**1**
TOTAL FY 2016 REQUEST	**2,900,000**	**609**

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Executive Summary: Grants-in-Aid for Airports

What Is The Request And What Funds are Currently Spent on the Program?

For FY 2016, FAA requests $2.7 billion to fund the Grants-in-Aid for Airports program, also known as the Airport Improvement Program (AIP). The Budget focuses the traditional Federal grants to support smaller commercial and general aviation airports that do not have access to additional revenue or other outside sources of capital. At the same time, the budget proposes to increase the non-Federal Passenger Facility Charge (PFC) limit from $4.50 to $8.00 and eliminates passenger and cargo entitlement funding for large hub airports but maintains discretionary eligibility. The Budget proposal would allow all commercial service airports to increase the Passenger Facility Charge, thereby giving airports greater flexibility to generate their own capital funding sources. The grants-in-aid program enables FAA to advance important safety, capacity, efficiency, and environmental improvements at more than 506 airports supporting commercial service and more than 2,827 general aviation airports that provide critical functions at the national, regional, and local level.

What Is this Program and Why is it Necessary?

The AIP provides grants to local and state airport authorities to help ensure the safety, capacity, efficiency, and environmental stewardship 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.

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 506 commercial service airports. In addition to the scheduled passenger and cargo service, the airport system serves a diverse range of functions at approximately 2,827 general aviation airports that support emergency medical services and disaster response, flight training, law enforcement support, agricultural activities, and business/corporate activities. The proposed AIP funding level will provide sufficient funding for virtually all high-priority safety, security, preservation, capacity, and environmental projects.

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 (ACIP) is the 5-year development needs identified in the NPIAS. The latest NPIAS, which was published in September 2014, identified over $33.5 billion in capital needs over the 5-year period from 2015-2019. The FAA funds capital projects that support system safety, capacity, and environmental projects and the highest priority needs in the NPIAS. The NPIAS reflects a 21 percent decrease from the preceding NPIAS report (published in September 2012 and covering the 5-year period from 2013-2017).

At the requested AIP funding level in 2016, based on current law the FAA would be able to fund capital needs that support system safety, capacity, and environmental projects. This depends upon the assumption that the formulas in the Authorization are permitted to take effect when the funding level is below $3,200,000,000. Should adjustments be made to preserve formula calculations similar to a program that is more than $3,200,000,000, it would have a detrimental impact to the amount of AIP Discretionary funds available. Subsequently, this would hinder FAA's ability to fund the highest priority needs in the NPIAS. The proposed approach is to reduce the funding level responsibly, by allowing the formula changes to take effect as currently written in law.

What Benefits will be Provided to the American Public Through This Request?

The FAA has a very high level of confidence in the effectiveness of the program. The investment of AIP funds in the national system of airports improves the safety and enhances the capacity and sustainability 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, capacity, efficiency, and environmental responsibility. Through the AIP, the FAA helps ensure there is a safe and reliable system of airports to support the needs of the traveling public, as well as basic community needs such as emergency medical services and disaster response, flight training, law enforcement support, agricultural activities, and business/corporate activities.

GRANTS-IN-AID FOR AIRPORTS

Grants-in-Aid for Airports (AATF)
($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2015 Enacted	**3,192,650**	**0**	**0**
Adjustments to Base	**0**	**0**	**0**
Program Level with PFC reforms			
1. Grants-in-Aid for Airports	(445,750)		
Increases/Decreases	**(445,750)**	**0**	**0**
FY 2016 Request	**2,746,900**	**0**	**0**

Detailed Justification for Grants-in-Aid for Airports

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

FY 2016 Grants-in-Aid for Airports Budget Request ($000)

Program / Component	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from FY 2015
Grants-in-Aid for Airports, (AATF)	$3,193,900	$3,192,650	$2,746,900	-$445,750

For FY 2016, FAA requests $2.746 billion to fund the Grants-in-Aid for Airports program (AIP). This is a decrease of $446 million (.014 percent) from the FY 2015 level.

The Budget focuses the traditional Federal grants to support medium hub, smaller commercial service, and general aviation airports that have more limited access to additional revenue or other outside sources of capital. The proposed increase to the non-Federal Passenger Facility Charge (PFC) limit from $4.50 to $8.00 and eliminated passenger and cargo entitlement funding for large hub airports with maintained discretionary eligibility coincides with this focus. The Budget proposal allows all commercial service airports to increase the Passenger Facility Charge, thereby giving airports greater flexibility to generate their own capital funding sources. The grants-in-aid program enables FAA to advance important safety, capacity, efficiency and environmental improvements at more than 500 airports supporting commercial service and more than 2,800 general aviation airports that provide critical functions at the national, regional and local level.

The request allows the agency to continue supporting the following key initiatives:

- Final phase of funding to improve Runway Safety Areas (RSA) that do not conform to FAA standards;
- Reduce the risk of runway incursions by reconfiguring taxiways, perimeter service roads and other facilities;
- Preserve or enhance the safety of critical airfield and other airport infrastructure at airports nationwide;
- Continue to conduct wildlife hazard assessments and develop wildlife hazard management plans;
- Implement Safety Management Systems;
- 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 and water quality improvements;
- Support airport sustainability programs and projects; and
- Continue to support airport security improvements where applicable.

The FAA continues to award AIP grants that enable airports to conform to our RSA standards. The agency's long-term goal is to eliminate airport conditions that contribute to accidents and enhance the margin of operating safety by improving RSAs. By the start of FY 2016, we will have brought 97 percent of the AIP funded RSAs and 52 percent of the F&E funded RSAs at certificated airports up to meet standards or to the extent it is practicable to meet the standard. Our goal remains to complete all AIP funded RSA improvements by December of 2015 and the F&E funded RSA improvements by the end of 2018. We are also working closely with the FAA units administering the F&E budget to relocate FAA-owned Navigational Aid Systems (NAVAIDS) from RSAs or making them frangible.

AIP will continue to support funding for capacity and efficiency enhancements throughout the system, including the full range of commercial service (primary) airports and smaller (non-primary) airports nationwide. AIP will accomplish this by providing financial and technical support to regional and metropolitan system plans, airport master plans and environmental reviews, and by directing funding toward the construction and preservation of runways, runway extensions, and airfield reconfigurations. We will also strive to increase the safety, security, and capacity of the global civil aerospace system in an environmentally sound manner.

AIP funds will continue supporting environmental mitigation and sustainability 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) and Zero Emission Vehicle (ZEV) programs.
- Water quality improvement projects including wetlands mitigation and drainage improvements such as glycol containment and treatment systems where required.

Additional environmental AIP activities include supporting sustainability initiatives including:

- Energy efficiency projects;
- Recycling, waste reduction, and reuse studies;
- Integrating sustainability into airport planning; and
- Airport environmental management systems (EMS).

In FY 2016, the Office of Airports (ARP) will continue to implement environmental streamlining provisions for capacity enhancement projects at congested airports, aviation safety projects, and aviation security projects as specified by Congress in 49 U.S.C. 47171 et seq. Commissioning of new commercial service runways is dependent on the timely completion of environmental reviews.

Funding will be used to mitigate significant aviation noise impacts through the purchase and relocation of residences and businesses, soundproofing residential homes or buildings used for educational or medical purposes, and purchase and installation of noise barriers or monitoring systems.

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 2016 will support the following key outputs and outcomes:

- Improved 18 AIP funded RSAs and 82 F&E funded RSAs to increase the margin of operating safety in the event of runway excursions;
- Reconfigured taxiways, perimeter service roads and other facilities reduce the risk of runway incursions;
- Conduct wildlife hazard assessments and develop wildlife hazard management plans;
- Implement Safety Management Systems (SMS) by funding airport SMS manuals and implementation plans;
- Reconstructed and rehabilitated runways, taxiways and aprons will preserve the nation's critical aviation infrastructure and prevent the risk of foreign object debris damage to aircraft from cracked or broken pavement surfaces; and
- Air quality improvement and noise mitigation projects that reduce air and noise pollution.
- Incorporation of sustainability as a core function of airport planning.

What Is This Program and Why is it Necessary?

The Grants-in-Aid for Airports program supports the Department of Transportation's (DOT) State-of-Good Repair goal, contributing toward the outcome of an 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.

State of Good Repair

The AIP 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 3,333 airports included in the NPIAS are maintained in excellent, good or fair condition. In FY 2014, 966 of the 984 commercial service and primary runways were maintained in excellent, good, or fair condition.

Safety

The AIP provides grants to local and state airport authorities to help ensure the safety, capacity and efficiency of U.S. airports. Through the AIP, the agency funds a range of activities to assist in airport development, preservation of critical facilities, economic competitiveness, and environmental sustainability. The AIP also supports 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 make improvements that help reduce runway incursions caused by vehicle/pedestrian deviations or by pilot error due to confusing geometry; to accelerate improvements to RSAs that do not meet current standards; and other similarly high priority projects.

Economic Competitiveness

The AIP supports the DOT Economic Competitiveness through the following outcomes:

- Maximum economic returns on transportation policies and investments; and
- A competitive air transportation system responsive to consumer needs.

By funding airport infrastructure projects that provide access to the National Aviation System in order to maintain a competitive air transportation system responsive to consumer needs, AIP contributes to economic competitiveness. For example, the AIP directs funding investments toward capacity development projects at airports ranging from the largest and most congested airline hubs serving some of the largest metropolitan areas to smaller urban areas and down to airports that enable critical access for emergency medical services to isolated communities.

Environmental Sustainability

The AIP supports the DOT Environmental Sustainability goal, "Reduction in transportation-related air, water and noise 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 Environmental Protection Agency-designated nonattainment areas; to support sustainability planning; support airport sustainability initiatives and developing sustainability best practices; implement Environmental Management Systems to ensure that FAA operations protect the environment and meet statutory and regulatory environmental requirements; and reduce the number of people exposed to significant noise. The FAA will also be taking steps to address water quality, energy efficiency, solid-waste recycling and other enhancements to environmental sustainability.

Anticipated accomplishments for the AIP grant program in 2016 include:

- Improve the approximately 19 remaining RSAs by December 2015;
- Fund infrastructure development projects to meet airport safety and design standards;
- Ensure that 93 percent of runways at more than 3,333 airports in the NPIAS are maintained in excellent, good or fair condition;
- Fund all approved Runway Safety Action Team (RSAT) recommendations identified in the ACIP;
- Fund capacity projects identified in the ACIP;
- Fund continued support of the Military Airport Program;
- Fund Voluntary Airport Low Emission (VALE) and Zero-Emission Vehicle (ZEV) program initiatives to improve air quality by helping airports reduce emissions from mobile and stationary ground sources; and

- Incorporate sustainability principles into airport master planning and continue funding sustainable airport master planning
- Fund eligible energy efficiency projects.
- Fund airport recycling plans as an element of airport master plans or master plan updates.

The aviation system plays a critical role in the success, strength, and growth of the U.S. economy. Approximately 610,576 active pilots, 209,034 general aviation aircraft, and 6,727 air carrier jets rely upon the U.S. airport system. The economic impacts of the air traffic control system are well-documented in FAA's report on "The Economic Impact of Civil Aviation on the US Economy," published in June 2014. It states that, in 2012, aviation accounted for 5.4% of our gross domestic product (GDP), contributed $1.5 trillion in total economic activity, and supported 11.8 million jobs.

Airport infrastructure, particularly airfield facilities, is exposed to constant heavy use and harsh environmental conditions. Runways, taxiways, and aprons are designed to withstand the heavy equipment that operates on them, but even 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 NPIAS. These public use airports support scheduled air carrier service at approximately 506 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 2,800 general aviation airports. These airports support emergency medical services and disaster response, flight training, law enforcement support, agricultural activities, and business/corporate activities.

The 63 Large and Medium hub airports account for about 88 percent of all passenger enplanements. While weather is a major source of delay, substantial congestion is also the result of inadequate infrastructure capacity at several airports that have been consistently delay-prone. With the critical support of AIP, constructing new or extended runways, taxiways, and airfield reconfiguration continues to be an importantpart of efforts to improve the operational efficiency of the NAS. Since FY 2000, 16 new runways, 4 runway extensions, and 2 airfield reconfiguration have opened allowing more than 2 million additional annual operations.

AIP supports vital technical and financial assistance for planning, environmental analysis, and construction/rehabilitation of runways, taxiways, and aprons as well as other measures to expand and make more efficient use of airports. The AIP funding plan will reflect a special emphasis to increase capacity and improve the airport arrival efficiency rate. AIP funding of the following airport projects contributes to these projects:

- Construct, rehabilitate or overlay existing runways, taxiways, and aprons;
- Extend runways, taxiways, and aprons;
- Construct/improve terminal buildings;
- Acquire and install visual approach aids;
- Acquire and install Instrument Landing Systems (ILS);
- Acquire and install weather-reporting equipment;
- Bring pavement and other facilities up to design standards; and
- Construct new airports/heliports.

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

Every other year, FAA is required to develop a five-year prospective analysis of capital needs and submit it to Congress as part of the NPIAS. The capital projects included in the NPIAS consistently exceed the annual available funding for the AIP. Projects are routinely broken into smaller phases or deferred to a future year until funding can be identified. The latest NPIAS, published in September 2014, identified over $33.5 billion in estimated capital needs over the 5-year period from 2015-2019.

At the requested level of AIP funding, and assuming the existing statutory provisions are allowed to function as currently written in the law, the FAA would be able to fund capital needs that support system safety, capacity, environmental projects, and the highest priority needs in the NPIAS. Should this not occur, the primary impact would be on AIP Discretionary funds—the funding category over which FAA has the greatest degree of control to address the highest priority system needs. Any reduction would impact FAA's ability to fund the highest priority needs in the NPIAS.

What Benefits will be Provided to the American Public Through This Request?

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 NAS has direct benefits, improving the safety and capacity of the system. The AIP program also assists airports to become more environmentally friendly and reduces the impact of airport activities on its communities.

<u>Safety</u>
We have several metrics that show the AIP investment is improving or maintaining safety. For example, we have a target to maintain 93 percent of the runway pavement in excellent, good, or fair condition for the paved runways in the National Plan of Integrated Airport Systems through 2016. Periodic maintenance of runways, particularly resurfacing, has proven a cost effective way to delay the need for major runway rehabilitation. The FAA funds a broad range of capital infrastructure development at most NPIAS airports; however, airports are generally responsible for funding periodic and ongoing maintenance. More significant rehabilitation, resurfacing or reconstruction projects may be funded through a variety of funding sources, including AIP grants, PFC revenues, airport revenues and/or other funding sources. Deferred or delayed maintenance creates an increased risk of damage to aircraft and is a safety concern for the travelling public, increasing both the scope and cost of eventual rehabilitation or reconstruction.

The installation of the enhanced taxiway centerline marking, the use of end-around taxiways, and improvements in surface geometry all are addressing the need to maintain a focus on reducing runway incursions. The investment in improving RSAs and installing Engineered Materials Arresting Systems (EMAS) beds has also shown to be effective in safely stopping aircraft when they overrun the runway. EMAS installations have already enabled nine successful overrun arrestments with minimal or no damage to the aircraft, and no injuries to over 240 total occupants. The latest arrestment came at Palm Beach International, Florida in October 2013 when an overrunning Cessna Citation was safely stopped.

<u>Economic Competitiveness</u>
Since FY 2000, 25 airfield projects have opened at 21 busy hub airports . These include 16 new runways, 3 taxiways, 4 runway extensions, 2 airfield reconfigurations. The projects have provided these airports with the potential to accommodate more than 2 million additional annual operations and decrease average delay per operation by about 5 minutes.

Environmental Sustainability

AIP funds have assisted airports to become more environmentally friendly. AIP funds assist airport owners to improve land use compatibility near airports through the acquisition of non-compatible residences and sound insulation of residences, schools, and hospitals. From 2005 through 2013, approximately 136,000 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 invested $133 million in VALE clean airport technology, funding 66 VALE projects through the AIP program from 2005 through 2014. In 2015, FAA expects to fund 8-10 additional VALE projects totaling approximately $20 million. Over the long-run, VALE initiatives will reduce ozone forming pollutants (Nitrous Oxides and Volatile Organic Compounds) at airports by 10,000 tons. The smog-reducing benefits of VALE projects are equivalent to removing over 31,000 cars and trucks from the road each year for the next decade. In the long run, the ZEV program will provide air quality benefits by providing funds for airports to purchase zero emission vehicles.

Explanation of Funding Changes for Grants-in-Aid for Airports

	Dollars ($000)	FTE
Grants-in-aid for Airports (Net change from FY 2015 Request)	**-445,750**	**0**
Overview: For FY 2016, the Associate Administrator for Airports requests $2.7 billion to meet the mission of planning and developing a safe and efficient national airport system. This represents a decrease of $445,750 thousand from the FY 2015 level.		
Discretionary Adjustments		
Grants-in-Aid for Airports The $2.7 billion requested for AIP will enable FAA to meet all national priorities for safety, security, capacity, and environmental mitigation across all size airports. The Budget focuses the traditional Federal grants to support Medium hub, smaller commercial service and general aviation airports that have more limited access to additional revenue or other outside sources of capital. At the same time, the budget continues to support increased Passenger Facility Charge (PFC) limit from $4.50 to $8.00 and eliminated entitlement funding for large hub airports with limited discretionary eligibility. Thereby, the Budget envisions giving the large hub airports greater flexibility to generate their own revenue and providing a PFC increase to all other commercial service airports as well.	-445,750	0

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GRANTS-IN-AID FOR AIRPORTS

Personnel and Related Expenses

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2015 Enacted	**107,100**	**583**	**583.0**
Adjustments to Base			
1. Annualization of FY 2015 pay raise	209		
2. Pay Inflation	815		
3. Non-pay Inflation	235		
4. FY 2016 Increase to Government contribution to FERS	258		
5. One additional compensable day	320		
Total Adjustments to Base	**1,837**	**0**	**0.0**
Other Adjustments			
1. Reduced contribution to working capital fund	(791)	0	
2. Reduced contract activity to offset adjustments to base	(1,046)	0	
Total Other Adjustments	**-1,837**	**0**	**0.0**
New or Expanded Programs			
Total Discretionary Increases	**0**	**0**	**0.0**
FY 2016 Request	**107,100**	**583**	**583.0**

Detailed Justification for Personnel and Related Expenses

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

FY 2016 Personnel and Related Expenses Budget Request ($000)

Program / Component	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from 2015
Personnel and Related Expenses	$106,600	$107,100	$107,100	$0

For FY 2016, the Associate Administrator for Airports requests $107.1 million, 583 positions and 583 FTEs to cover the administrative expenses for the ARP, an increase/decrease of $0 thousand over the FY 2015 Request. 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.

What Is The Program and Why is it Necessary?

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 (maintaining the percentage of airport runways in excellent, good, or fair condition); Safety goal (Reduction in transportation related injuries and fatalities), Economic Competitiveness goal (Maximum economic returns on transportation policies and investments and Competitive air transportation system responsive to consumer needs); and Environmental Sustainability goal (Reduction in transportation-related air, water and noise pollution and impacts on ecosystems).

ARP is responsible for the regulatory oversight and inspection of certificated commercial service airports. In FY 2016, 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 will also complete the special emphasis program to complete improvements to RSAs that do not meet current standards by December 2015. 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, non-primary 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. In FY 2014, ARP expects to issue approximately 2,000 new AIP grants to airport sponsors and continues to administer the AIP to ensure the timely and efficient use of federal funds. ARP would also continue to administer the Passenger Facility Charge (PFC) program, which involves a significant existing workload that we anticipate will increase even further if the proposed PFC increase is approved. We will also strive to increase the safety, security, and capacity of the global civil aerospace system in an environmentally sound manner.

Anticipated 2016 accomplishments include:

- Administer the AIP by issuing new grants and continuing to administer existing grants at airports nationwide in support of safety, capacity, efficiency and environmental objectives;
- Administer the PFC program by monitoring the consultation process, reviewing applications and amendments for projects at commercial service airports nationwide in support of safety, capacity, efficiency and environmental objectives;
- Publish 6 Advisory Circular (AC) updates;

- Continue publishing and updating guidance on environmental sustainability initiatives;
- Fund remainder of RSA Improvements to be completed by December 2015;
- Continue implementation of Airport SMS;
- Continue to support airports in conducting Wildlife Hazard Assessments and Wildlife Management Plans;
- Develop plans for improving airports with nonstandard geometry such as taxiway separation;
- Limit serious Runway Incursions by vehicles or pedestrians (category A and B) to 3 or less;
- Continue implementation of 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.
- Manage and execute the Part 150 (noise compatibility) program.

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, Passenger Facility Charge (PFC) program administration, 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 planning, performance and technical training for headquarters and field operations.

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

The FY 2016 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.

From 2000 through 2008, the number of airports receiving AIP grants (as well as PFC applications and amendment approvals) significantly increased while staffing levels remained constant. 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 self-certify compliance with grant assurances. The program is carefully monitoring compliance audits, user complaints, and sponsor action which have led to corrective action in some cases.

Many airports that were built decades ago (before current safety standards were established) have confusing geometry intersections with runways or other taxiways that can lead to loss of pilot situational awareness, and result in runway incursions. Often these confusing intersections have multiple taxiways involved. There are also instances where taxiways do not have the required separation from runways, increasing the risks associated with surface operations. Contract support will be obtained to analyze confusing taxiway geometry, prioritize hotspots, and develop cost estimates for mitigating confusing geometry. Specifically, the contract funds used in FY 2015 will be used to develop an inventory of airports that have confusing or non-standard taxiways, and to prioritize those airports according to risk level. Subsequently, work will begin in FY 2016 to address the issues with confusing and non-standard taxiways supported in large part by AIP grants.

The cost for the analysis was based on the workload to identify and inventory confusing and non-standard taxiways, develop databases, and analyze taxiway risk at approximately 5,000 public use airports (recognizing that AIP grants may be considered only for the 3,330 airports included in the NPIAS). Continuing contractor support will be required to develop improvement plans and schedules for all the projects, and to track and report on progress. This project will be a long term effort (ten or more years) to improve taxiways and eliminate hot spots where runway incursions occur.

What Benefits will be Provided to the American Public Through This Request?

ARP has established a number of measures to monitor and optimize performance and efficiency. For example, we track the labor cost to administer the AIP and PFC programs. 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 monitor runway incursions caused by vehicle or pedestrian deviations to determine trends and root causes. VPDs have remained flat the past two years, but we believe this continued focus on VPDs has contributed to preventing their numbers from rising. 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).

Explanation of Funding Changes for Personnel & Related Expenses

	Dollars ($000)	FTE
Personnel and Related Expenses (Net change from FY 2015 Enacted)	**0**	**0**
Overview: For FY 2016, the Associate Administrator for Airports requests $107.1 million 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/decrease of $0 thousand from the FY 2015 enacted level.		
Adjustments to Base		
Annualization of the FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	209	
FY 2016 Pay Inflation: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	815	
FY 2016 Non-Pay Inflation: This increase is for the FY 2016 percent GDP price index (year over year) of 1 percent. This is based on the most recent economic assumptions.	235	
FY 2016 Increase to Government Contribution to FERS: This increase is required to accommodate costs associated with government-wide increases to the government contribution to the FERS retirement plan.	258	
FY 2016 Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	320	
Other Changes		
Working Capital Fund: This cost adjustment is requested to support the Department of Transportation's (DOT) Working Capital Fund (WCF) profile. Adjustments are being made to best align each office's resources within their expected WCF costs.	-791	
Reduction in contracts to cover base adjustments: This is a reduction to support contracts.	-1,046	

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GRANTS-IN-AID FOR AIRPORTS

Airport Technology Research

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2015 Enacted	**29,750**	**23**	**23.0**
Adjustments to Base			
1. Annualization of FY 2015 Pay Raises	9		
2. Pay Inflation	36		
3. Non-pay Inflation	260		
4. FY 2016 Increase to Government contribution to FERS	10		
5. One additional compensatory day	14		
Total Adjustments to Base	**331**	**0**	**0.0**
Discretionary Increases/ Decreases			
1. One additional FTP (1/2 FTE)	75	1	0.5
2. Increase in Contracts for environmental study	844		
Total Discretionary Adjustments	**919**	**1**	**0.5**
FY 2016 Request	**31,000**	**24**	**23.5**

Detailed Justification for Airport Technology Research

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

FY 2016 Airport Technology Research Budget Request ($000)

Program / Component	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from 2015
Airport Technology Research	$29,500	$29,750	$31,000	$1,250

For FY 2016, the Associate Administrator for Airports requests $31 million, 24 positions and 23.5 FTE to fund the Airport Technology Research program. This is required to support the execution and management of a program that has 25 sub-programs and almost 100 on-going complex projects.

Public demand for a quieter and cleaner environment is putting increasing pressures on our national system of airports that undermine their ability to expand and to accommodate modernization initiatives that will enhance safety, capacity and efficiency. Aircraft noise is one of the principal environmental obstacles to optimizing airport system capacity and reducing congestion and delays at the largest and busiest airports. In addition, about 30 percent of U.S. commercial service airports are in either non-attainment areas or maintenance areas for national air quality standards. Air quality issues are increasingly a major impediment in being able to undertake significant infrastructure projects in a timely and cost-effective manner, and initiatives that help reduce operational emissions can play a key role in enabling time-sensitive capital projects.

In FY 2016, we are requesting an increase of $1.0 million for airport environmental research and one engineering position (0.5 FTE). This funding and the engineer position will support research to explore ways to reduce noise and emissions impacts that constrain airport growth and operational flexibility. Research projects include explorations of the climb and descent phases of flight to identify new opportunities to reduce noise and emissions in the airport environs. Finding ways to reduce these impacts through operational and flight procedure improvements will help relieve environmental pressures and constraints on airports and could also reduce the need for certain types of environmental mitigation funding. This funding would also help support a multi-year analysis and interagency coordination effort related to the national airport community noise survey, including updated evaluation of human perceptions of aircraft noise and associated technical issues that may help the FAA and other stakeholders continue to improve the management of noise compatibility issues Over the last few years, ATR has become more involved in airport environmental issues including airport noise, effects of firefighting foam on the environment, bio-fuels, wildlife mitigation techniques, reduced electrical consumption for airport lighting systems, and greener airport paving technologies. In FY16, this FTE will provide proper oversight of these ongoing environmental-related research projects and the new research efforts that are expected to be started in FY16.

In FY 2016, a new effort in the area of software and database development will also be started that will primarily focus on taking all of the Airport Pavement related software programs and converting them to Windows Presentation Foundation format from their current VB6 platform. This effort will include approximately 6 programs, including: COMFAA 3.0, FAARFIELD 1.4, ProGroove, ProFAA, BAKFAA 7 ProVAL and FAA PAVEAIR. Once all these programs are upgraded as windows based systems, then software systems will be developed where each program will be able to share the required data between them. This will provide the end users a suite of FAA software tools that can be run off the internet, from one location. This effort will also include updating all Airport Pavement and Airport Safety related websites to meet current format requirements and ensure compliance with FAA standards. In addition, this effort will also include integration of all ATR developed data bases (bird strike, FOD detection, Airport Pavement management systems) into one location to ensure compliance with FAA standards, to improve the overall functionality of the data bases, and promote public access and sharing of the data. At the present time, these databases are hosted in several different locations, using different interfaces. This request will support 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, aircraft noise annoyance data and sleep disturbance around airport, problematic runway geometry, heated pavements, and visual guidance. The results of this research are used in updating Advisory Circulars, manuals, and technical specifications that airports rely on when expending AIP grant funds. We will also continue the program to conduct noise measurements across airport communities and concurrent public surveys and sleep disturbance studies to collect data that will be used to guide national aviation noise policy, determinations of community impacts from aircraft noise, federal land use compatibility guidelines around airports, and noise mitigation funding.

The table below summarizes the research activities funded by this request.

Advanced Airport Pavement Design	300
Airport Environmental Research	1,000
Pavement Design & Evaluation Methodology	3,000
National Airport Dynamic Tests	2,900
Airport Pavement Test Vehicle	800
Field Instrumentation & Testing	600
Improved Paving Materials and Lab	1,750
Non-Destructive Pavement Testing	1,450
Software & Database Development	550
Airport Planning	550
Airport Design	850
Operation of New Large Aircraft (NLA)	600
Composite Materials Firefighting	750
Airport Wildlife Hazards Abatement	2,500
Airport Visual Guidance/Runway Incursion Reduction	2,400
Airport Technology Research Taxiway	900
Aircraft Braking Friction	500
Innovative Measurement Techniques	1,210
Heated Pavements	650
Aircraft Noise Annoyance Data and Sleep Disturbance	750
Surface Operations	600
Airport Rescue and Fire Fighting	900
Problematic Runway Geometry	1000
Runway Simulator	400
Data Mining Database	500
Subtotal--Contracts	**27,410**
FTE's/Other Misc	3,590
TOTAL	**31,000**

The FY 2016 request reflects completion of several projects, continuation of most projects, and modification in the research direction as necessary.

Funding in FY 2016 will support the following key outputs and outcomes:

- Release of an improved version of FAARFIELD. FAARFIELD 1.4 will have improved life prediction models for both concrete and asphalt pavements and automated subgrade compaction requirements;

- Complete data analysis of the first 3 years of data collected from mid and large hub airports for the extended pavement life program.

- Continue the refinement of a searchable airport pavement database to provide pavement engineers with a national airport pavement registry to assess how pavements constructed of specific thickness and materials and exposed to known climate and traffic loads performed over the life of the pavement;

- Continue the development of a Life Cycle Cost Analysis (LCCA) airport pavement standard to be used for all phases of pavement life. The pavement engineer will have the capability to evaluate the pavement construction and maintenance costs over the life of the pavement as part of the initial pavement design;

- Continue the research of airport pavement technologies to develop a procedure to use the technologies to provide airport managers and pavement engineers a dependable method to assess the condition of the pavement from the surface to the subgrade and estimate the remaining pavement life;

- Continue research into geometric gradients and sight distance on runways to review and modify for inclusion into Advisory Circulars as necessary. Improved runway intersection design grading criteria will be developed based on the collected longitudinal and transverse profiles;

- Complete the research study into the effects of high tire pressures on the pavement surface using the High Temperature Pavement Test Facility (HTPTF), and also develop pavement mix design procedures to produce mixes that can withstand very high tire inflation pressures;

- Complete the first round of testing for warm mix asphalts using the High Temperature Pavement Test Facility (HTPTF);

- Continue to upgrade of FAA PAVEAIR by integrating it with other FAA software programs;

- Continue to upgrade the FAA NextGen pavement materials research lab;

- Continue to evaluate green technologies for use in airfield pavements;

- Develop green material specifications for use in airfield pavements;

- Continue study of emerging technologies for detecting and deterring hazardous wildlife species on or near airports;

- Continue to implement habitat modification strategies for reducing and controlling hazardous wildlife species at airports;

- Initiate a new program to conduct airport environmental research that will focus on the environmental impacts of new airport pavement and airport safety related developments, and also focus on new techniques for mitigating environmental issues like noise, emissions, storm water runoff, wildlife compatibility, land use, etc. During FY15, ATR will continue working with the Office of Environment and Energy (AEE) and the REDAC Subcommittee on Environment and Energy to identify specific research requirements that will be initiated in FY16.

- Continue to conduct research on new technologies and techniques that can improve airport lighting, signs, and markings to help improve situational awareness and help reduce surface incidents, accidents, and incursions while improving capacity;

- Continue major effort on the pavement life extension project, started in FY 2013, as a core activity doubling the expected life of runway pavements at large hub airports from current standard of 20 years to 40 years;

- Continue rehabilitation of the decommissioned Taxiway C at Cape May County Airport as part of an effort to construct a one-of-a-kind test bed that will be used by ATR to evaluate numerous airport pavement and airport safety technologies. Under an agreement with the airport authority, this taxiway is being constructed to provide the FAA with a full scale test area to install and evaluate new pavement mixes, paint markings, lighting fixtures, pavement grooves, etc. This refurbishment includes not only replacement of the pavement with new mixes to test; it also includes new electrical infrastructure, lighting cans, drainage, etc. As a courtesy to the Cap May Airport and the Airport Authority, the taxiway will be open for use to the public when testing is not being performed. As part of the initial installation, four different pavement types are being constructed in the taxiway including: typical P-401 hot mix asphalt, P-401 hot mix asphalt with polymer modified binder, warm mix asphalt and stone matrix asphalt. These different asphalt mixes with be fully instrumented and monitored over the life of the pavement to study and analyze the effects on the environment of hot mix asphalt pavements. Plans also include the installation of a new prototype LED lighting infrastructure that will be evaluated as a possible replacement to today's less-efficient constant-current lighting systems.

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- Complete surveying airport communities to collect noise annoyance and sleep disturbance data;
- Analyze the aircraft noise annoyance and sleep disturbance data and create new dose-response curves for annoyance;
- Continue to collect data for taxiway centerline deviation for airplanes in design group I and analyze data collected for airplanes in design group II;
- Continue to maintain the airport safety database and update the mitigation plan for the top 5 risk areas;
- Continue research to identify low cost ground surveillance sensors that can be integrated together to provide a low cost surveillance solution to airport operators.
- Continue research into the performance of aircraft Anti-Skid Brake Systems (ASBS) on contaminated runway surfaces. This research will include utilizing the ASBS Simulation Lab, Braking Research Aircraft testing on contaminated runway surfaces, and Boeing 737-800 Full-Motion Simulator testing. The anticipated product from this research will be development of Mathematical Models capable of processing performance data from operating aircraft, landing on contaminated runways, for prediction of landing distances of follow-on aircraft;
- Continue research into development of technology for effectively heating of airport runway and taxiway surfaces to prevent snow and ice accumulation. This research will include continued evaluation of alternative power sources (e.g. geothermal and solar) and methods of heat transfer. The anticipated product from this research will be development of feasible and practical alternatives for heating of airport runways and taxiways for prevention of snow and ice accumulation;
- Continue to improve aircraft rescue and firefighting tactics to combat fires involving aircraft with multiple passenger decks carrying up to 800 passengers. The product of this research will be a simulation model for predicting fuel dispersion in survivable accidents and improved firefighting agent discharge technologies. Provide improved Aircraft Rescue and Fire Fighting (ARFF) training material for firefighting tactics for the unique characteristics of cargo aircraft fires. The data from the full-scale live fire testing of cargo aircraft will be utilized to update the existing FAA produced training DVDs and Advisory Circulars.
- Continue research to investigate state-of-the-art firefighting technologies, including high pressure and ultra-high pressure firefighting systems, to determine if they offer any operational and performance benefits over traditional fire-fighting systems.

What Is The Program and Why Is It Necessary?

Safety

The research conducted within the Airport Safety Technology Research Program directly supports FAA's Advisory Circular system, which is the principal means by which FAA communicates with the nation's airport planners, designers, operators, and equipment manufacturers. These Advisory Circulars (commonly referred to as AC's) present the standards used in the design, construction, installation, maintenance, and operation of airports and airport equipment. Additionally, the AC provides current advice on airport operational and safety topics. To date, the research conducted within the Airport Safety Technology Research Program has provided the necessary technical data to support hundreds of ACs that have been published on a wide range of technical subjects. These technical subjects include airport design standards, visual guidance aids such as lighting marking, or navigational aids, airport rescue and firefighting equipment and procedures, pavement surface conditions, wildlife mitigation and detection, airport capacity enhancements, pavement friction, and snow and ice mitigation. Some examples of the research include:

- **Foreign Object Debris** (FOD) detection research efforts will be conducted to evaluate new detection technologies, conduct a FOD characterization study, and also develop a national FOD database that can be used to track safety issues related to FOD.

- **Taxiway Deviation** research efforts will continue to better understand the ability of large aircraft to operate on airports that are only designed to handle smaller aircrafts.

- **Cargo Aircraft Interior Fire Suppression** research program will develop better tactical guidance for ARFF departments responding to interior fire emergencies on cargo aircraft. This will be accomplished through full-scale, live fire testing of various Unit Load Devices (ULDs) types and configurations in aircraft main deck and lower deck holds.

- **Advanced Composite Material Cutting** is a project to determine the effectiveness of the fire service rescue saw and a variety of available blades on traditional and new commercial aircraft skin materials. With this shift toward advanced material structures over traditional aluminum structures the tools firefighters use must be evaluated to ensure they will continue to be as effective as they are now.

- **New Airfield Lighting Infrastructure** is an effort focused on identifying an efficient and standardized airfield lighting infrastructure that supports the operation of new light sources including Light Emitting Diodes (LEDs). The new system architecture will provide potential resolutions to issues that have arisen with the implementation of the LED fixtures in the current airfield lighting infrastructure.

- **Low Cost Surface Surveillance Framework** is a research effort initiated to assess the efficacy of using localized surveillance sensors to provide real-time situational awareness of aircraft and vehicle movements in the non-movement area at airports without the use of Surface Movement Radars (SMR). This effort is focused on how these systems can be employed to enhance operational capability and safety.

- **Heated Pavements Initiative** promises that if runway surfaces can be efficiently and economically heated, the buildup of snow can be avoided, thereby eliminating the need for snow removal operations. Promising methods include geothermal heat exchangers, solar energy, nano-technology, and other innovative techniques to generate heat.

- **Airport Noise and Sleep Annoyance** research has been initiated to expand the scope of an airport noise and sleep annoyance study to either validate or update long-established standards that the FAA uses to determine the noise levels around an airport at which the public perceives that the noise from aircraft becomes a nuisance.

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 firefighting 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 74 runway ends at 47 airports and have safely stopped overrunning aircraft in at least 9 separate instances. The FAA has plans to install 14 additional EMAS systems at another 8 U.S. Airports.

State of Good Repair

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 NAPTF and HTPTF 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** 2.0 is a program designed to be used with falling-weight deflectometer (FWD) equipment as part of a pavement evaluation program. BAKFAA reads the data from a variety of FWD devices and returns back calculated layer properties. The computational engine in BAKFAA is LEAF (Layered Elastic Analysis – FAA). LEAF is built into FAARFIELD, but can also be downloaded and run separately under BAKFAA. The FAA has made the Visual BasicTM source code for BAKFAA and LEAF available for programmers to run LEAF from their own applications.

- **FAA PAVEAIR** is a web-based airport pavement management system that provides users with historic current information about airport pavement construction, maintenance and management. The program offers users a planning tool capable of modeling airport pavement surface degradation due to external effects such as traffic and the environment. The program can be used with other FAA pavement applications, such as BAKFAA and COMFAA, to give users input to determine repair scheduling and strategies. It has been developed for installation and use on a stand-alone personal computer, a private network, an intranet and the internet. An implementation of the internet version of FAA PAVEAIR is hosted and supported on a server at the William J. Hughes Technical Center and is accessible from the FAA PAVEAIR website.

- **High Tire Pressure Testing (HTPT)** - NAPTF has completed three cycles of testing the effects of tire pressure on asphalt pavement in conjunction with the Airport Technology group of Boeing Commercial Airplanes. The full scale tests determined that by increasing tire pressure from 210 psi (1.45 MPa) to 245 psi (1.66 MPa) had an insignificant effect on the amount of rutting caused by trafficking at two different wheel loads on two different asphalt mixes but increasing wheel load caused a significant increase in rutting on asphalt pavements. This testing is helping to support a revised tire pressure classification for ICAO standards.

- **Design of Pavements for 40-year Life** project – The current 20-year design life for pavements is specified in FAA AC. In order to support the potential extension of pavement life, the R&D effort will modify the existing pavement design program, FAARFIELD, to accommodate the new pavement life standard. This modification will include better modeling of pavement remaining life, quantification of design reliability based on available pavement management data, estimation of fatigue life, and revised procedures for reporting PCN.

- **"Green" Pavement Technology** research will examine several technologies, such as warm mix asphalt, recycled asphalt pavement mixes and asphalt mixes with recycled asphalt shingles. The results will offer long-lasting and low-cost pavements.

Environmental Sustainability

In FY 2016, FAA will complete its investigation of 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. FAA will also advance guidance related to energy reduction and solid-waste recycling programs.

Environmental Research: In FY 2016 we will start a new long term airport environmental research program.

Anticipated 2016 accomplishments include:

- Complete evaluation to determine feasibility of implementing bird radar displays in Air Traffic Control towers;
- Continue collection of taxiway deviation data at a design group I airport;
- Complete collection of taxiway deviation data at design group II airports;
- Complete research program on cargo aircraft interior fire suppression to include full-scale live fire testing;
- Complete Advanced Composite Material Cutting study;
- Complete evaluation of proposed new lighting infrastructure utilizing the Airport Technology Research Taxiway;
- Conduct demonstration of baseline Low Cost Surface Surveillance Framework project;
- Complete runway roughness study;
- 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 design and programs (PROFAA, FAARFIELD, BAKFAA, LEDFAA and FAA PAVEAIR);
- Continue development of increasing pavement design life from 20 to 40 years for large hub airports;
- Complete full-scale tests of crack mitigating layer on reflective cracking test rig at the NAPTF;
- Complete upgrade of all FAA Pavement software to windows presentation foundation so all programs will be web-based systems;
- Development of a web-based application for FAA PAVEAIR as a suite of FAA analysis tools (PROFAA, FAARFIELD, BAKFAA, LEDFAA);

- Continue full scale testing of "green" paving materials with Accelerated Pavement Test (APT) machine;
- Complete first round of pavement tests at the High Temperature Pavement Test Facility (HTPTF);
- Continue the population of the airport pavement data warehouse;
- Continue the development of the LCCA airport pavement standard and incorporate into the pavement data warehouse;
- Continue to assess airport pavement technologies to estimate remaining pavement life;
- Complete in-service testing of New LED lighting circuits at a large and a small airport;
- Continue evaluation of new linear LED lighting fixtures at a medium size airport.

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 2016. A reduction in funding would mean decreased contract support and would defer or cancel some project activities.

What Benefits will be Provided to the American Public Through This Request?

The research initiatives supported by this funding are crucial to continued maintenance and enhancement of safety for the traveling public; accessibility and competitive access for communities of every size throughout the nation; and environmental sustainability which benefits both the traveling public (by enabling airports to be well-positioned to support critical infrastructure projects) and neighboring communities (by helping airports minimize their environmental effects on surrounding areas).

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 an FAA 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, based on research and evaluation we issued performance specifications for bird radars and FOD detection systems.

Explanation of Funding Changes for Airport Technology Research (ATR)

	Dollars ($000)	FTE
Airport Technology Research (Net change from FY 2015 Request)	**1,250**	**.5**
Overview: For FY 2016, the Associate Administrator for Airports requests $31 million, 24 positions and 23.5 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 AIP grant funds.		
Adjustments to Base		
Annualization of the FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	9	
FY 2016 Pay Inflation: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	36	
FY 2016 Non-Pay Inflation: This increase is for the FY 2016 percent GDP price index (year over year) of 1 percent. This is based on the most recent economic assumptions.	260	
FY 2016 Increase to Government Contribution to FERS: This increase is required to accommodate costs associated with government-wide increases to the government contribution to the FERS retirement plan.	10	
FY 2016 Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	14	
Discretionary Adjustments		
One half of one FTE: New engineering position to support research for noise mitigation and impacts of emissions on environment.	75	.5
Contract Support: The funding increase provides for additional resources to manage contracts for an airport environmental research initiative. This research will explore ways to reduce noise and emissions impacts that constrain airport growth and operational flexibility through exploration of the climb and descent phases of flight. This funding would also help support a multi-year analysis and interagency coordination effort related to the national airport community noise survey.	919	

GRANTS-IN-AID FOR AIRPORTS

Airport Cooperative Research

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2015 Enacted	**15,000**	**2**	**2.0**
Adjustments to Base			
1. Annualization of FY 2015 pay raise	2		
2. Pay Inflation	8		
3. Non-pay Inflation	142		
4. FY 2016 Increase to Government contribution to FERS*	0		
5. One additional compensable day	3		
Total Adjustments to Base	**155**	**0**	**0.0**
Discretionary Increases/ Decreases			
1. Decrease in contracts	(155)		
Total Discretionary Adjustments	**(155)**	**0**	**0.0**
FY 2016 Request	**15,000**	**2**	**2.0**

* Amount is $495 which rounds to zero.

Detailed Justification for Airport Cooperative Research Program

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

FY 2016 Airport Cooperative Research Program ($000)

Program / Component	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	Difference from 2015
Airport Cooperative Research Program	15,000	15,000	15,000	0

For FY 2016, FAA requests $15 million, 2 positions and 2 FTE. Pay inflation will be absorbed within the requested level.

Funding in FY 2016 will support the following key outputs and outcomes:

- Airport Cooperative Research Program (ACRP) will select approximately 30 research topics to fund in FY 2016. 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.

What Is The Program and Why is it Necessary?

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 (Reduction in transportation-related air, water and noise pollution and impacts 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 ACRP Oversight Committee. The Transportation Research Board (TRB) of the National Academy administers the program. The ACRP Oversight Committee has met every six months to review progress and select additional topics to fund. Over 100 submitted topics will be reviewed at the July 2014 meeting and the most promising topics selected for subsequent contract award. The ACRP Oversight Committee 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:

- Recycling Best Practices
- Guidebook for Treating Airport Storm Water Containing Deicers
- Operational and Business Continuity for Prolonged Airport Disruptions
- Guidebook on Integrating GIS in Emergency Management at Airports
- Safety Risk Management for Airports
- Improving Terminal Design
- Apron Planning and Design Guidebook

Anticipated FY 2016 accomplishments include:

- ACRP awards contracts for the topics selected for funding in FY 2015;

- ACRP Board of Governors will meet to select projects to fund in 2016; and
- TRB will appoint project technical panels for new projects selected in FY 2015.

The ACRP 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 ACRP Oversight Committee consists of airport executives, airport associations, and federal agencies that ensure the projects selected will benefit airports and will not duplicate ongoing federal research.

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

The airport community and the airport associations have been strong supporters of ACRP. Congress approved increasing ACRP in FY 2009 by $5 million to a total of $15 million with the additional money being focused on airport environmental research.

Each year ACRP receives approximately 150 suggested topics for research. Each study costs on average about $300,000. Reducing funds below the $15 million request will result in fewer studies.

What Benefit will be Provided to the American Public Through This Request?

The Airport Cooperative Research Program (ACRP) is a national resource for the airport industry, fulfilling the vital needs of airport practitioners by providing industry driven research at no cost to airports of all sizes across the country and beyond. After eight years in operation, ACRP has engaged thousands of public- and private-sector airport practitioners, academia, consultants, advocates, and students to identify the airport industry's most pressing challenges and fund research to document, mitigate, and create tools to help surmount and avoid those challenges.

We know the program has been effective since the airport community 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 improved the methods of dissemination 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.

ACRP's broad mission is to provide resources to support applied research on a wide variety of issues faced by airport practitioners, including all levels of professional staff within the airport community, from CEOs, airport managers, and executive directors to mid-level managers and nonsupervisory technical and professional staff to trainees, students, and interns. These professionals represent airports, suppliers, public safety agencies, airlines, airport tenants, local and regional government authorities, industry associations, research and consulting firms, and many other stake holders in the airport community. Each of these practitioners has different interests and responsibilities, and each is an integral part of this cooperative research effort. ACRP offers many opportunities for airport practitioners to support and benefit from its work.

In addition to publishing reports on industry-driven research priorities, ACRP works to ensure that these products reach those who need them most. These efforts have reached several thousand stakeholders through e-videos, webinars, workshops, speaker presentations, and publications on applied results.

Explanation of Funding Changes for Airport Cooperative Research Program (ACRP)

	Dollars ($000)	FTE
Airport Cooperative Research Program (Net change from FY 2015 Enacted)	**0**	
Overview: For FY 2016, we maintain the Airport Cooperative Research Program at the FY 2015 level of $15 million. There is a discretionary reduction in contracts to offset the pay and non-pay inflation.		
Adjustments to Base		
Annualization of the FY 2015 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2015 government-wide pay raise of 1.0 percent. The factor used is (0.25) of 1.0 percent.	2	
FY 2016 Pay Inflation: This increase is required to provide for costs associated with base salary increases (January to September) resulting from the proposed government-wide pay raise. The factor used is (0.75) of 1.3 percent.	8	
FY 2016 Non-Pay Inflation: This increase is for the FY 2016 percent GDP price index (year over year) of 1 percent. This is based on the most recent economic assumptions.	142	
FY 2016 Increase to Government Contribution to FERS*: This increase is required to accommodate costs associated with government-wide increases to the government contribution to the FERS retirement plan.	0	
FY 2016 Additional Compensable Day: This increase is for the 262 Compensable days in FY 2016 vs. 261 days in FY 2015.	3	
Discretionary Adjustments		
ACRP Discretionary Decrease in contracts: There is a discretionary reduction in contracts to offset inflationary costs.	-155	

*** Amount is $495 which rounds to zero**

AIRPORT IMPROVEMENT PROGRAM
Grants-in-Aid to Airports Planned Distribution
$000

	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request
Formula Grants			
Primary Airports	836,984	841,214	365,013
Cargo Service Airports	111,787	111,743	96,142
Alaska	21,345	21,345	10,673
States (General Aviation)	638,780	638,530	508,177
Carryover (from Formula Grants)	725,736	701,092	637,274
Subtotal, Formula Grants	2,334,631	2,313,924	1,617,277
Discretionary Grants			
Discretionary Set-Aside: Noise Compatibility	131,478	136,878	264,131
Discretionary Set-Aside: Reliever	2,479	2,581	0
Discretionary Set-Aside: Military Airport Program	15,026	15,643	30,186
C/S/S/N (Capacity/Safety/Security/Noise)	170,001	176,983	345,258
Discretionary -- AATF	56,667	58,994	115,086
Subtotal, Discretionary Grants	375,650	391,080	754,661
Small Airport Fund	483,618	487,646	374,962
Total Grants	**3,193,900**	**3,192,650**	**2,746,900**

Passenger Facility Charge (PFC) Approved Locations
As of February 01, 2014
(Whole Dollars)
PFC APPROVED LOCATIONS

State	Associated City	Airport Name	LOC ID	Hub size	Level	Total Approved	Duration	Start Date	Est. Expir. Date
AL	Birmingham	Birmingham - Shuttlesworth International	BHM	S	$3.00	$24,548,436	6y3m	8/1/1997	11/1/2003
AL	Birmingham	Birmingham - Shuttlesworth International	BHM	S	$3.00	$15,646,592	4y10m	12/1/2003	10/1/2008
AL	Birmingham	Birmingham - Shuttlesworth International	BHM	S	$4.50	$172,582,438	22Y4M	10/1/2008	2/1/2031
AL	Dothan	Dothan Regional	DHN	N	$3.00	$5,515,948	3y6m	2/1/1998	8/1/2001
AL	Dothan	Dothan Regional	DHN	N	$4.50	**	19y4m	8/1/2001	12/1/2020
AL	Huntsville	Huntsville International - Carl T. Jones Field	HSV	S	$3.00	$15,237,907	12y3m	6/1/1992	9/1/2004
AL	Huntsville	Huntsville International - Carl T. Jones Field	HSV	S	$4.50	$48,818,207	19y11m	9/1/2004	8/1/2024
AL	Mobile	Mobile Regional	MOB	N	$3.00	$4,715,747	6y7m	12/1/1997	7/1/2004
AL	Mobile	Mobile Regional	MOB	N	$3.00	$7,481,182	8y2m	3/1/2005	5/1/2013
AL	Mobile	Mobile Regional	MOB	N	$3.00	$3,702,049	4y4m	6/1/2013	10/1/2017
AL	Montgomery	Montgomery Regional (Dannelly Field)	MGM	N	$4.50	$28,599,933	21y8m	5/1/2005	1/1/2027
AL	Muscle Shoals	Northwest Alabama Regional	MSL	GA	$3.00	$267,600	11y4m	6/1/1992	10/1/2003
AL	Muscle Shoals	Northwest Alabama Regional	MSL	GA	$3.00	$54,730	4y5m	12/1/2004	4/1/2009
AL	Muscle Shoals	Northwest Alabama Regional	MSL	GA	$4.50	$261,208	6y	4/1/2009	4/1/2015
AK	Anchorage	Ted Stevens Anchorage International	ANC	M	$3.00	$91,243,173	26y2m	10/1/2000	12/1/2026
AK	Fairbanks	Fairbanks International	FAI	S	$3.00	$5,196,252	3y6m	10/1/2000	4/1/2004
AK	Fairbanks	Fairbanks International	FAI	S	$4.50	**	2y6m	4/1/2004	10/1/2006
AK	Fairbanks	Fairbanks International	FAI	S	$4.50	$33,217,000	20y	10/1/2006	10/1/2026
AK	Juneau	Juneau International	JNU	N	$3.00	$1,549,085	2y4m	10/1/1998	2/1/2001
AK	Juneau	Juneau International	JNU	N	$4.50	$15,211,781	15y9m	8/1/2001	5/1/2017
AK	Ketchikan	Ketchikan International	KTN	N	$3.00	$6,644,400	2y6m	2/1/1999	8/1/2001
AK	Ketchikan	Ketchikan International	KTN	N	$4.50	**	16y8m	8/1/2001	4/1/2018
AK	Sitka	Sitka Rocky Gutierrez	SIT	N	$4.50	$1,365,000	6y2m	7/1/2007	9/1/2013
AS	Pago Pago	Pago Pago International	PPG	N	$3.00	$950,000	4y11m	7/1/1995	6/1/2000
AS	Pago Pago	Pago Pago International	PPG	N	$4.50	$765,000	4y	9/1/2001	9/1/2005
AS	Pago Pago	Pago Pago International	PPG	N	$4.50	$5,848,954	14y6m	6/1/2006	12/1/2020
AZ	Bullhead City	Laughlin/Bullhead International	IFP	N	$2.00	$954,132	4y5m	5/1/2008	10/1/2012
AZ	Bullhead City	Laughlin/Bullhead International	IFP	N	$2.00	$1,477,531	11y	1/1/2014	1/1/2025
AZ	Flagstaff	Flagstaff Pulliam	FLG	N	$3.00	$2,984,285	19y9m	12/1/1992	9/1/2012
AZ	Flagstaff	Flagstaff Pulliam	FLG	N	$4.50	**	2y10m	9/1/2012	7/1/2015
AZ	Mesa	Phoenix-Mesa Gateway	IWA/ AZA	S	$4.50	$53,451,561	14y2m	11/1/2008	1/1/2023
AZ	Peach Springs	Grand Canyon West	1G4/ PGS	N	$3.00	$308,210	2y	9/1/2004	9/1/2006
AZ	Peach Springs	Grand Canyon West	1G4/ PGS	N	$3.00	$9,614,736	15y7m	6/1/2008	1/1/2024
AZ	Phoenix	Phoenix Sky Harbor International	PHX	L	$3.00	$241,106,516	6y	4/1/1996	4/1/2002
AZ	Phoenix	Phoenix Sky Harbor International	PHX	L	$4.50	$2,574,593,277	28y1m	7/1/2002	8/1/2030
AZ	Tucson	Tucson International	TUS	S	$3.00	$100,461,860	8y8m	2/1/1998	10/1/2006
AZ	Tucson	Tucson International	TUS	S	$4.50	**	6y6m	10/1/2006	4/1/2013
AZ	Tucson	Tucson International	TUS	S	$4.50	$44,194,512	4y5m	4/1/2013	9/1/2017
AZ	Yuma	Yuma MCAS/Yuma International	NYL/ YUM	N	$3.00	$2,390,423	12y10m	12/1/1993	10/1/2005

State	Associated City	Airport Name	LOC ID	Hub size	Level	Total Approved	Duration	Start Date	Est. Expir. Date
AZ	Yuma	Yuma MCAS/Yuma International	NYL/ YUM	N	$4.50	**	1y6m	10/1/2005	4/1/2007
AZ	Yuma	Yuma MCAS/Yuma International	NYL/ YUM	N	$4.50	$3,077,035	14y7m	11/1/2007	6/1/2022
AR	Bentonville	Northwest Arkansas Regional	XNA	S	$3.00	$125,025,221	2y4m	12/1/1998	4/1/2001
AR	Bentonville	Northwest Arkansas Regional	XNA	S	$4.50	**	39y2m	4/1/2001	6/1/2040
AR	Fayetteville	Drake Field	FYV	GA	$3.00	$2,221,887	5y	1/1/1996	1/1/2001
AR	Fort Smith	Fort Smith Regional	FSM	N	$3.00	$4,011,641	13y6m	8/1/1994	2/1/2008
AR	Fort Smith	Fort Smith Regional	FSM	N	$4.50	**	1y1m	2/1/2008	3/1/2009
AR	Fort Smith	Fort Smith Regional	FSM	N	$4.50	$3,722,645	10y9m	3/1/2009	12/1/2019
AR	Little Rock	Bill and Hillary Clinton National/ Adams Field	LIT	S	$3.00	$24,383,919	6y4m	5/1/1995	9/1/2001
AR	Little Rock	Bill and Hillary Clinton National/ Adams Field	LIT	S	$4.50	$67,019,237	13y10m	9/1/2001	7/1/2015
AR	Texarkana	Texarkana Regional-Webb Field	TXK	N	$3.00	$649,532	6y7m	2/1/1995	9/1/2001
AR	Texarkana	Texarkana Regional-Webb Field	TXK	N	$4.50	$258,861	3y6m	9/1/2001	3/1/2005
AR	Texarkana	Texarkana Regional-Webb Field	TXK	N	$4.50	$582,742	5y10m	7/1/2008	5/1/2014
CA	Arcata/Eureka	Arcata	ACV	N	$3.00	$169,564	1y1m	2/1/1993	3/1/1994
CA	Arcata/Eureka	Arcata	ACV	N	$3.00	$767,300	3y	11/1/1994	11/1/1997
CA	Arcata/Eureka	Arcata	ACV	N	$3.00	$1,084,184	5y2m	4/1/1998	6/1/2003
CA	Arcata/Eureka	Arcata	ACV	N	$4.50	$619,009	1y9m	6/1/2003	3/1/2005
CA	Arcata/Eureka	Arcata	ACV	N	$4.50	$336,981	3m	7/1/2005	10/1/2005
CA	Arcata/Eureka	Arcata	ACV	N	$4.50	*	4m	12/1/2005	4/1/2006
CA	Arcata/Eureka	Arcata	ACV	N	$4.50	$2,468,475	5y4m	4/1/2006	8/1/2011
CA	Arcata/Eureka	Arcata	ACV	N	$4.50	$1,851,818	4y10m	10/1/2011	8/1/2016
CA	Bakersfield	Meadows Field	BFL	N	$3.00	$1,562,876	6y11m	6/1/1995	5/1/2002
CA	Bakersfield	Meadows Field	BFL	N	$4.50	$10,526,514	18y8m	5/1/2002	1/1/2021
CA	Burbank	Bob Hope	BUR	M	$3.00	$107,029,194	8y7m	9/1/1994	4/1/2003
CA	Burbank	Bob Hope	BUR	M	$4.50	**	4y9m	4/1/2003	1/1/2008
CA	Burbank	Bob Hope	BUR	M	$4.50	$100,588,421	8y7m	1/1/2008	8/1/2016
CA	Burbank	Bob Hope	BUR	M	$3.00	$19,931,292	2y7m	8/1/2016	3/1/2019
CA	Burbank	Bob Hope	BUR	M	$4.50	$3,937,000	7m	3/1/2019	10/1/2019
CA	Carlsbad	McCellan-Palomar	CRQ /CLD	N	$4.50	$4,947,065	34y1m	1/1/2009	2/1/2043
CA	Chico	Chico Municipal	CIC	N	$3.00	$211,117	4y9m	12/1/1993	9/1/1998
CA	Chico	Chico Municipal	CIC	N	$3.00	$19,822	1y8m	6/1/1999	2/1/2001
CA	Chico	Chico Municipal	CIC	N	$3.00	$468,782	8y1m	11/1/2001	12/1/2009
CA	Chico	Chico Municipal	CIC	N	$4.50	$7,569	4y	12/1/2010	12/1/2014
CA	Crescent City	Jack McNamara Field	CEC	N	$3.00	$53,752	1y9m	9/1/1998	6/1/2000
CA	Crescent City	Jack McNamara Field	CEC	N	$3.00	$223,807	2y5m	1/1/2001	6/1/2003
CA	Crescent City	Jack McNamara Field	CEC	N	$4.50	**	3y10m	6/1/2003	4/1/2007
CA	Crescent City	Jack McNamara Field	CEC	N	$4.50	$358,578	7y6m	4/1/2007	10/1/2014
CA	Crescent City	Jack McNamara Field	CEC	N	$4.50	$263,158	6y2m	12/1/2014	2/1/2021
CA	Fresno	Fresno Yosemite International	FAT	S	$3.00	$55,936,482	8y	12/1/1996	12/1/2004
CA	Fresno	Fresno Yosemite International	FAT	S	$4.50	**	15y1m	12/1/2004	1/1/2020
CA	Imperial	Imperial County	IPL	CS	$4.50	$892,781	27y	4/1/2003	4/1/2030
CA	Inyokern	Inyokern	IYK	CS	$3.00	$420,931	10y	3/1/1993	3/1/2003
CA	Inyokern	Inyokern	IYK	CS	$3.00	$51,000	6m	4/1/2004	10/1/2004
CA	Inyokern	Inyokern	IYK	CS	$4.50	$89,999	2y5m	9/1/2006	2/1/2009

State	Associated City	Airport Name	LOC ID	Hub size	Level	Total Approved	Duration	Start Date	Est. Expir. Date
CA	Inyokern	Inyokern	IYK	CS	$4.50	$502,105	10y	3/1/2009	3/1/2019
CA	Long Beach	Long Beach/Daugherty Field	LGB	S	$3.00	$69,493,089	4y9m	8/1/2003	5/1/2008
CA	Long Beach	Long Beach/Daugherty Field	LGB	S	$4.50	**	7y10m	5/1/2008	3/1/2016
CA	Long Beach	Long Beach/Daugherty Field	LGB	S	$4.50	$108,925,688	18y1m	3/1/2016	4/1/2034
CA	Los Angeles	Los Angeles International	LAX	L	$3.00	$166,593,784	2y6m	7/1/1993	1/1/1996
CA	Los Angeles	Los Angeles International	LAX	L	$3.00	$700,000,000	5y5m	2/1/1998	7/1/2003
CA	Los Angeles	Los Angeles International	LAX	L	$4.50	**	2y5m	7/1/2003	12/1/2005
CA	Los Angeles	Los Angeles International	LAX	L	$4.50	$1,637,779,968	13y3m	12/1/2005	3/1/2019
CA	Los Angeles	Los Angeles International	LAX	L	$3.00	$78,467,717	7m	3/1/2019	10/1/2019
CA	Mammoth Lakes	Mammoth Yosemite	MMH	N	$3.00	$0	10y	9/1/1995	9/1/2005
CA	Mammoth Lakes	Mammoth Yosemite	MMH	N	$4.50	$665,010	6y	11/1/2009	11/1/2015
CA	Modesto	Modesto City County-Harry Sham Field	MOD	N	$3.00	$400,757	10y7m	8/1/1994	3/1/2005
CA	Modesto	Modesto City County-Harry Sham Field	MOD	N	$4.50	$689,834	7y4m	8/1/2008	12/1/2015
CA	Monterey	Monterey Regional	MRY	N	$3.00	$5,607,775	9y6m	1/1/1994	7/1/2003
CA	Monterey	Monterey Regional	MRY	N	$4.50	$2,155,077	2y9m	7/1/2003	4/1/2006
CA	Monterey	Monterey Regional	MRY	N	$4.50	$7,164,248	9y	5/1/2006	5/1/2015
CA	Oakland	Metropolitan Oakland International	OAK	M	$3.00	$72,971,180	6y9m	9/1/1992	6/1/1999
CA	Oakland	Metropolitan Oakland International	OAK	M	$3.00	$49,772,681	3y8m	9/1/1999	5/1/2003
CA	Oakland	Metropolitan Oakland International	OAK	M	$4.50	**	4m	5/1/2003	9/1/2003
CA	Oakland	Metropolitan Oakland International	OAK	M	$4.50	$599,852,155	23y4m	9/1/2003	1/1/2027
CA	Oakland	Metropolitan Oakland International	OAK	M	$3.00	$70,259,000	3y1m	1/1/2027	2/1/2030
CA	Ontario	Ontario International	ONT	M	$3.00	$27,333,931	3y5m	7/1/1993	12/1/1996
CA	Ontario	Ontario International	ONT	M	$3.00	$118,454,000	9y4m	7/1/1998	11/1/2007
CA	Ontario	Ontario International	ONT	M	$4.50	$96,648,998	5y2m	11/1/2007	1/1/2013
CA	Ontario	Ontario International	ONT	M	$2.00	**	8y9m	1/1/2013	10/1/2021
CA	Oxnard	Oxnard	OXR	GA	$4.50	$631,115	9y2m	1/1/2002	3/1/2011
CA	Palm Springs	Palm Springs International	PSP	S	$3.00	$88,415,656	9y4m	9/1/1992	1/1/2002
CA	Palm Springs	Palm Springs International	PSP	S	$4.50	**	27y6m	1/1/2002	7/1/2029
CA	Redding	Redding Municipal	RDD	N	$3.00	$1,009,264	5y	4/1/1997	4/1/2002
CA	Redding	Redding Municipal	RDD	N	$4.50	**	8m	4/1/2002	12/1/2002
CA	Redding	Redding Municipal	RDD	N	$4.50	$1,124,987	4y4m	12/1/2002	4/1/2007
CA	Redding	Redding Municipal	RDD	N	$4.50	$1,335,347	10y6m	8/1/2007	2/1/2018
CA	Sacramento	Sacramento International	SMF	M	$3.00	$103,766,639	8y9m	4/1/1993	1/1/2002
CA	Sacramento	Sacramento International	SMF	M	$4.50	**	1y1m	1/1/2002	2/1/2003
CA	Sacramento	Sacramento International	SMF	M	$3.00	$172,897,776	6m	2/1/2003	9/1/2003
CA	Sacramento	Sacramento International	SMF	M	$4.50	**	7y10m	9/1/2003	7/1/2011
CA	Sacramento	Sacramento International	SMF	M	$4.50	$676,588,317	23y4m	7/1/2011	11/1/2034
CA	San Diego	San Diego International	SAN	L	$3.00	$149,301,528	7y10m	10/1/1995	8/1/2003
CA	San Diego	San Diego International	SAN	L	$4.50	$1,363,961,305	34y3m	8/1/2003	11/1/2037
CA	San Francisco	San Francisco International	SFO	L	$4.50	$1,574,887,154	23y	10/1/2001	10/1/2024
CA	San Jose	Norman Y. Mineta San Jose International	SJC	M	$3.00	$165,981,988	8y7m	9/1/1992	4/1/2001
CA	San Jose	Norman Y. Mineta San Jose International	SJC	M	$4.50	**	10m	4/1/2001	2/1/2002
CA	San Jose	Norman Y. Mineta San Jose International	SJC	M	$4.50	$901,950,859	27y3m	2/1/2002	5/1/2029
CA	San Luis Obispo	San Luis County Regional	SBP	N	$3.00	$615,677	2y	2/1/1993	2/1/1995

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CA	San Luis Obispo	San Luis County Regional	SBP	N	$3.00	$7,432,277	7y3m	6/1/1995	9/1/2002
CA	San Luis Obispo	San Luis County Regional	SBP	N	$4.50	**	8y9m	9/1/2002	6/1/2011
CA	San Luis Obispo	San Luis County Regional	SBP	N	$3.00	$1,057,676	3y	6/1/2011	6/1/2014
CA	San Luis Obispo	San Luis County Regional	SBP	N	$4.50	$3,758,461	3y7m	6/1/2014	1/1/2018
CA	Santa Ana	John Wayne Airport -Orange County	SNA	M	$4.50	$321,351,002	15y6m	7/1/2006	1/1/2022
CA	Santa Barbara	Santa Barbara Municipal	SBA	N	$3.00	$8,746,624	4y10m	1/1/1998	11/1/2003
CA	Santa Barbara	Santa Barbara Municipal	SBA	N	$4.50	**	1y6m	11/1/2003	5/1/2005
CA	Santa Barbara	Santa Barbara Municipal	SBA	N	$4.50	$27,641,741	34y2m	5/1/2005	7/1/2039
CA	Santa Maria	Santa Maria Public/Capt G Allan Hancock Field	SMX	N	$4.50	$5,380,346	21y	10/1/2007	10/1/2028
CA	Santa Rosa	Charles M. Schultz - Sonoma County	STS	N	$3.00	$711,232	7y11m	5/1/1993	4/1/2001
CA	Santa Rosa	Charles M. Schultz - Sonoma County	STS	N	$4.50	**	4y	4/1/2001	4/1/2005
CA	Santa Rosa	Charles M. Schultz - Sonoma County	STS	N	$4.50	$1,319,049	4y11m	5/1/2008	4/1/2013
CA	Santa Rosa	Charles M. Schultz - Sonoma County	STS	N	$4.50	$8,464,573	12y9m	7/1/2013	4/1/2026
CA	South Lake Tahoe	Lake Tahoe	TVL	GA	$3.00	$178,896	14y7m	8/1/1992	3/1/2007
CA	Stockton	Stockton Metropolitan	SCK	N	$4.50	$322,665	2y6m	2/1/2007	8/1/2009
CA	Stockton	Stockton Metropolitan	SCK	N	$4.50	$821,814	3y	9/1/2009	9/1/2012
CA	Stockton	Stockton Metropolitan	SCK	N	$4.50	$792,000	2y9m	9/1/2013	6/1/2016
CO	Alamosa	San Luis Valley Regional/Bergman Field	ALS	CS	$3.00	$288,836	27y2m	3/1/1997	5/1/2024
CO	Aspen	Aspen-Pitkin County/Sardy Field	ASE	N	$3.00	$3,869,200	7y10m	7/1/1995	5/1/2003
CO	Aspen	Aspen-Pitkin County/Sardy Field	ASE	N	$4.50	$713,146	1y3m	5/1/2003	8/1/2004
CO	Aspen	Aspen-Pitkin County/Sardy Field	ASE	N	$4.50	$12,371,708	15y8m	1/1/2005	9/1/2020
CO	Colorado Springs	City of Colorado Springs Municipal	COS	S	$3.00	$70,152,689	22y8m	3/1/1993	11/1/2015
CO	Cortez	Cortez Municipal	CEZ	CS	$3.00	$200,078	8y4m	11/1/1999	3/1/2008
CO	Cortez	Cortez Municipal	CEZ	CS	$4.50	$339,072	8y	3/1/2008	3/1/2016
CO	Denver	Denver International	DEN	L	$3.00	$3,137,099,200	8y9m	7/1/1992	4/1/2001
CO	Denver	Denver International	DEN	L	$4.50	**	25y9m	4/1/2001	1/1/2026
CO	Denver	Denver International	DEN	L	$4.50	$80,386,000	3y1m	1/1/2026	2/1/2029
CO	Durango	Durango-La Plata County	DRO	N	$3.00	$534,282	2y6m	2/1/1995	8/1/1997
CO	Durango	Durango-La Plata County	DRO	N	$3.00	$1,289,455	5y6m	9/1/1997	3/1/2003
CO	Durango	Durango-La Plata County	DRO	N	$4.50	$3,130,691	5y10m	6/1/2005	4/1/2011
CO	Durango	Durango-La Plata County	DRO	N	$4.50	$953,500	9m	11/1/2011	8/1/2012
CO	Durango	Durango-La Plata County	DRO	N	$4.50	$10,400,800	2y7m	9/1/2013	4/1/2016
CO	Eagle	Eagle County Regional	EGE	N	$3.00	$8,855,961	7y7m	9/1/1993	4/1/2001
CO	Eagle	Eagle County Regional	EGE	N	$4.50	**	8y2m	4/1/2001	6/1/2009
CO	Eagle	Eagle County Regional	EGE	N	$3.00	$300,000	1m	6/1/2009	7/1/2009
CO	Eagle	Eagle County Regional	EGE	N	$4.50	$13,713,255	15y	7/1/2009	7/1/2024
CO	Fort Collins-Loveland	Fort Collins-Loveland Municipal	FNL	N	$3.00	$307,046	5y7m	10/1/1993	5/1/1999
CO	Fort Collins-Loveland	Fort Collins-Loveland Municipal	FNL	N	$4.50	$1,112,585	7y4m	8/1/2004	12/1/2011
CO	Fort Collins-Loveland	Fort Collins-Loveland Municipal	FNL	N	$4.50	$804,048	3y1m	2/1/2012	3/1/2015
CO	Grand Junction	Grand Junction Regional	GJT	N	$3.00	$4,879,574	13y5m	4/1/1993	9/1/2006
CO	Grand Junction	Grand Junction Regional	GJT	N	$4.50	$15,857,760	17y4m	9/1/2006	1/1/2024
CO	Gunnison	Gunnison-Crested Butte Regional	GUC	N	$3.00	$1,089,036	7y5m	11/1/1993	4/1/2001
CO	Gunnison	Gunnison-Crested Butte Regional	GUC	N	$4.50	$3,125,482	21y9m	4/1/2001	1/1/2023

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CO	Hayden	Yampa Valley	HDN	N	$3.00	$2,190,009	7y8m	11/1/1993	7/1/2001
CO	Hayden	Yampa Valley	HDN	N	$4.50	**	7m	7/1/2001	2/1/2002
CO	Hayden	Yampa Valley	HDN	N	$4.50	$7,179,111	16y5m	2/1/2002	7/1/2018
CO	Montrose	Montrose Regional	MTJ	N	$3.00	$1,422,535	9y9m	11/1/1993	8/1/2003
CO	Montrose	Montrose Regional	MTJ	N	$4.50	$821,694	2y10m	8/1/2003	6/1/2006
CO	Montrose	Montrose Regional	MTJ	N	$4.50	$1,386,487	4y	8/1/2006	8/1/2010
CO	Montrose	Montrose Regional	MTJ	N	$4.50	$2,046,975	5y1m	11/1/2010	12/1/2015
CO	Pueblo	Pueblo Memorial	PUB	CS	$3.00	$395,322	21y1m	11/1/1993	12/1/2014
CO	Steamboat Springs	Steamboat Springs/Bob Adams	SBS		$3.00	$159,576	4y2m	4/1/1993	6/1/1997
CO	Telluride	Telluride Regional	TEX	CS	$3.00	$778,287	9y2m	2/1/1993	4/1/2002
CO	Telluride	Telluride Regional	TEX	CS	$4.50	$6,268,750	16y9m	4/1/2002	1/1/2019
CT	New Haven	Tweed-New Haven	HVN	N	$3.00	$983,636	4y4m	12/1/1993	4/1/1998
CT	New Haven	Tweed-New Haven	HVN	N	$4.50	$567,286	3y9m	10/1/2001	7/1/2005
CT	New Haven	Tweed-New Haven	HVN	N	$4.50	$2,626,681	14y2m	5/1/2006	7/1/2020
CT	Windsor Locks	Bradley International	BDL	M	$3.00	$8,607,831	2y2m	10/1/1993	12/1/1995
CT	Windsor Locks	Bradley International	BDL	M	$3.00	$3,263,971	6m	7/1/1996	1/1/1997
CT	Windsor Locks	Bradley International	BDL	M	$3.00	$27,749,445	2y11m	9/1/1997	8/1/2000
CT	Windsor Locks	Bradley International	BDL	M	$4.50	$257,534,407	18y10m	5/1/2001	3/1/2020
CT	Windsor Locks	Bradley International	BDL	M	$3.00	$4,152,000	4m	3/1/2020	7/1/2020
CT	Windsor Locks	Bradley International	BDL	M	$4.50	$19,753,032	1y5m	7/1/2020	12/1/2021
DE	Wilmington	New Castle County	ILG	N	$4.50	$1,810,089	2y10m	7/1/2014	5/1/2017
FL	Daytona Beach	Daytona Beach International	DAB	N	$3.00	$29,469,817	8y1m	7/1/1993	8/1/2001
FL	Daytona Beach	Daytona Beach International	DAB	N	$3.00	*	3y8m	2/1/2002	11/1/2005
FL	Daytona Beach	Daytona Beach International	DAB	N	$4.50	**	14y4m	11/1/2005	3/1/2020
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	FLL	L	$3.00	$221,507,827	10y10m	1/1/1995	10/1/2005
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	FLL	L	$4.50	$1,699,155,818	26y4m	10/1/2005	2/1/2032
FL	Fort Myers	Southwest Florida International	RSW	M	$3.00	$109,252,734	11y	11/1/1992	11/1/2003
FL	Fort Myers	Southwest Florida International	RSW	M	$4.50	**	2y10m	11/1/2003	9/1/2006
FL	Fort Myers	Southwest Florida International	RSW	M	$4.50	$212,369,381	13y4m	9/1/2006	1/1/2020
FL	Gainesville	Gainesville Regional	GNV	N	$3.00	$484,900	1y7m	7/1/2000	2/1/2002
FL	Gainesville	Gainesville Regional	GNV	N	$4.50	$5,668,584	10y1m	1/1/2003	2/1/2013
FL	Gainesville	Gainesville Regional	GNV	N	$4.50	$1,250,942	2y7m	1/1/2014	8/1/2016
FL	Jacksonville	Jacksonville International	JAX	M	$3.00	$39,343,583	9y1m	4/1/1994	5/1/2003
FL	Jacksonville	Jacksonville International	JAX	M	$4.50	$310,577,713	21y6m	5/1/2003	11/1/2024
FL	Key West	Key West International	EYW	S	$3.00	$1,922,283	3y5m	3/1/1993	8/1/1996
FL	Key West	Key West International	EYW	S	$3.00	$3,634,125	5y7m	12/1/1997	6/1/2003
FL	Key West	Key West International	EYW	S	$4.50	$745,867	2y1m	6/1/2003	7/1/2005
FL	Key West	Key West International	EYW	S	$4.50	$13,523,000	11y3m	10/1/2005	1/1/2017
FL	Marathon	Marathon	MTH	GA	$3.00	$390,001	5y3m	3/1/1993	6/1/1998
FL	Melbourne	Melbourne International	MLB	N	$3.00	$11,080,917	12y7m	5/1/1997	12/1/2009
FL	Melbourne	Melbourne International	MLB	N	$4.50	**	9y3m	12/1/2009	3/1/2019
FL	Miami	Miami International	MIA	L	$3.00	$176,730,162	7y2m	11/1/1994	1/1/2002
FL	Miami	Miami International	MIA	L	$4.50	**	1y2m	1/1/2002	3/1/2003
FL	Miami	Miami International	MIA	L	$4.50	$2,420,400,341	34y7m	3/1/2003	10/1/2037

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FL	Naples	Naples Municipal	APF	GA	$3.00	$899,685	6y	2/1/1995	2/1/2001
FL	Naples	Naples Municipal	APF	GA	$3.00	$91,651	2y3m	2/1/2002	5/1/2004
FL	Orlando	Orlando International	MCO	L	$3.00	$530,760,470	14y2m	2/1/1993	4/1/2007
FL	Orlando	Orlando International	MCO	L	$4.50	$1,133,733,269	12y2m	4/1/2007	6/1/2019
FL	Orlando	Orlando International	MCO	L	$3.00	$305,570,400	6y6m	6/1/2019	12/1/2025
FL	Orlando	Orlando International	MCO	L	$4.50	$189,994,500	2y6m	12/1/2025	6/1/2028
FL	Orlando	Orlando International	MCO	L	$4.50	$232,500,000	3y1m	6/1/2031	7/1/2034
FL	Orlando	Orlando International	MCO	L	$3.00	$396,491,622	4y1m	7/1/2034	8/1/2038
FL	Orlando	Orlando Sanford International	SFB	S	$1.00	$1,192,352	2y9m	3/1/2001	12/1/2003
FL	Orlando	Orlando Sanford International	SFB	S	$2.00	$13,312,090	7y9m	12/1/2003	9/1/2011
FL	Orlando	Orlando Sanford International	SFB	S	$4.00	**	1y3m	9/1/2011	12/1/2012
FL	Orlando	Orlando Sanford International	SFB	S	$4.00	$29,837,167	9y11m	12/1/2012	11/1/2022
FL	Panama City	Panama City - Bay County International	PFN	S	$3.00	$6,732,080	10y3m	2/1/1994	5/1/2004
FL	Panama City	Panama City - Bay County International	PFN	S	$4.50	**	4y8m	5/1/2004	1/1/2009
FL	Panama City	Panama City - Bay County International	PFN	S	$4.50	$39,251,783	1y4m	1/1/2009	5/1/2010
FL	Panama City	Northwest Florida Beaches International	ECP	S	$4.50	**	28y11m	5/1/2010	4/1/2039
FL	Pensacola	Penscola Gulf Coast Regional	PNS	S	$3.00	$24,954,478	9y10m	2/1/1993	12/1/2002
FL	Pensacola	Penscola Gulf Coast Regional	PNS	S	$4.50	**	4y9m	12/1/2002	9/1/2007
FL	Pensacola	Penscola Gulf Coast Regional	PNS	S	$4.50	$119,534,914	23y1m	9/1/2007	10/1/2031
FL	Sarasota	Sarasota/Bradenton International	SRQ	S	$3.00	$75,384,399	9y8m	9/1/1992	5/1/2002
FL	Sarasota	Sarasota/Bradenton International	SRQ	S	$4.50	**	19y9m	5/1/2002	2/1/2022
FL	St Petersburg	St Petersburg-Clearwater International	PIE	S	$3.00	$3,811,738	1y6m	5/1/2005	11/1/2006
FL	St Petersburg	St Petersburg-Clearwater International	PIE	S	$4.50	**	2y3m	11/1/2006	2/1/2009
FL	St Petersburg	St Petersburg-Clearwater International	PIE	S	$4.50	$17,685,075	8y4m	2/1/2009	6/1/2017
FL	Tallahassee	Tallahassee Regional	TLH	N	$3.00	$11,219,936	9y8m	2/1/1993	10/1/2002
FL	Tallahassee	Tallahassee Regional	TLH	N	$4.50	$36,852,800	13y3m	10/1/2002	1/1/2016
FL	Tampa	Tampa International	TPA	L	$3.00	$170,777,120	8y8m	10/1/1993	6/1/2002
FL	Tampa	Tampa International	TPA	L	$4.50	$658,095,350	17y5m	6/1/2002	11/1/2019
FL	Valparaiso	Eglin AFB	VPS	N	$3.00	$34,407,710	1y5m	1/1/2001	6/1/2002
FL	Valparaiso	Eglin AFB	VPS	N	$4.50	**	16y2m	6/1/2002	8/1/2018
FL	Valparaiso	Eglin AFB	VPS	N	$4.50	$13,330,797	6y9m	8/1/2018	5/1/2025
FL	West Palm Beach	Palm Beach International	PBI	M	$3.00	$122,322,594	14y3m	4/1/1994	7/1/2008
FL	West Palm Beach	Palm Beach International	PBI	M	$4.50	$22,283,317	1y9m	7/1/2008	4/1/2010
FL	West Palm Beach	Palm Beach International	PBI	M	$4.50	$72,412,929	6y6m	4/1/2010	10/1/2016
GA	Albany	Southwest Georgia Regional	ABY	N	$3.00	$348,383	2y9m	9/1/1995	6/1/1998
GA	Albany	Southwest Georgia Regional	ABY	N	$3.00	$539,645	3y8m	6/1/1999	2/1/2003
GA	Albany	Southwest Georgia Regional	ABY	N	$4.50	**	6m	2/1/2003	8/1/2003
GA	Albany	Southwest Georgia Regional	ABY	N	$4.50	$457,111	4y6m	8/1/2003	2/1/2008
GA	Albany	Southwest Georgia Regional	ABY	N	$4.50	$995,083	6y9m	7/1/2008	4/1/2015
GA	Athens	Athens/Ben Epps	AHN	GA	$3.00	$165,615	4y5m	8/1/1997	1/1/2002
GA	Atlanta	Hartsfield-Jackson Atlanta Internatiional	ATL	L	$3.00	$1,463,359,982	3y11m	5/1/1997	4/1/2001
GA	Atlanta	Hartsfield-Jackson Atlanta Internatiional	ATL	L	$4.50	**	7y6m	4/1/2001	10/1/2008
GA	Atlanta	Hartsfield-Jackson Atlanta Internatiional	ATL	L	$4.50	$2,456,415,221	15y	10/1/2008	10/1/2023
GA	Augusta	Augusta Regional @ Bush Field	AGS	N	$3.00	$27,636,360	1y10m	9/1/1999	7/1/2001

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GA	Augusta	Augusta Regional @ Bush Field	AGS	N	$4.50	**	23y1m	7/1/2001	8/1/2024
GA	Augusta	Augusta Regional @ Bush Field	AGS	N	$4.50	$4,098,034	3y3m	8/1/2024	11/1/2027
GA	Brunswick	Brunswick Golden Isles	BQK	N	$3.00	$813,170	2y6m	5/1/2001	11/1/2003
GA	Brunswick	Brunswick Golden Isles	BQK	N	$4.50	**	5y6m	11/1/2003	5/1/2009
GA	Brunswick	Brunswick Golden Isles	BQK	N	$4.50	$860,268	7y11m	5/1/2009	4/1/2017
GA	Columbus	Columbus	CSG	N	$3.00	$530,103	1y9m	12/1/1993	9/1/1995
GA	Columbus	Columbus	CSG	N	$3.00	$876,138	2y10m	8/1/2000	6/1/2003
GA	Columbus	Columbus	CSG	N	$4.50	**	3y5m	6/1/2003	11/1/2006
GA	Columbus	Columbus	CSG	N	$4.50	$1,032,681	2y2m	2/1/2010	4/1/2012
GA	Columbus	Columbus	CSG	N	$4.50	$601,216	2y7m	8/1/2012	3/1/2015
GA	Macon	Middle Georgia Regional	MCN	GA	$4.50	$1,052,392	9y2m	3/1/2002	5/1/2011
GA	Savannah	Savannah/ Hilton Head International	SAV	S	$3.00	$48,179,908	8y9m	7/1/1992	4/1/2001
GA	Savannah	Savannah/ Hilton Head International	SAV	S	$4.50	**	8y10m	4/1/2001	2/1/2010
GA	Savannah	Savannah/ Hilton Head International	SAV	S	$3.00	$977,956	3m	2/1/2010	5/1/2010
GA	Savannah	Savannah/ Hilton Head International	SAV	S	$4.50	$22,155,927	7y5m	5/1/2010	10/1/2017
GA	Valdosta	Valdosta Regional	VLD	N	$3.00	$369,077	6y7m	3/1/1993	10/1/1999
GA	Valdosta	Valdosta Regional	VLD	N	$3.00	$230,300	1y2m	4/1/2000	6/1/2001
GA	Valdosta	Valdosta Regional	VLD	N	$4.50	**	3m	6/1/2001	9/1/2001
GA	Valdosta	Valdosta Regional	VLD	N	$4.50	$438,675	3y	9/1/2001	9/1/2004
GA	Valdosta	Valdosta Regional	VLD	N	$3.00	$67,858	3m	2/1/2006	5/1/2006
GA	Valdosta	Valdosta Regional	VLD	N	$3.00	$12,140	2m	11/1/2006	1/1/2007
GA	Valdosta	Valdosta Regional	VLD	N	$3.00	$94,727	11m	8/1/2009	7/1/2010
GA	Valdosta	Valdosta Regional	VLD	N	$4.50	$517,379	2y7m	6/1/2011	1/1/2014
GA	Valdosta	Valdosta Regional	VLD	N	$4.50	$247,442	2y	4/1/2014	4/1/2016
GU	Agana	Guam International	GUM	S	$3.00	$258,370,758	9y9m	2/1/1993	11/1/2002
GU	Agana	Guam International	GUM	S	$4.50	**	22y4m	11/1/2002	3/1/2025
HI	Hilo	Hilo International	ITO	S	$3.00	$548,196	1y7m	2/1/2007	11/1/2008
HI	Hilo	Hilo International	ITO	S	$4.50	**	1y2m	11/1/2008	1/1/2010
HI	Hilo	Hilo International	ITO	S	$4.50	$17,975,817	12y5m	2/1/2014	7/1/2026
HI	Honolulu	Honolulu International	HNL	L	$3.00	$106,852,554	4y1m	10/1/2004	11/1/2008
HI	Honolulu	Honolulu International	HNL	L	$4.50	**	1y2m	11/1/2008	1/1/2010
HI	Honolulu	Honolulu International	HNL	L	$4.50	$428,207,098	16y6m	1/1/2010	7/1/2026
HI	Kahului	Kahului	OGG	M	$3.00	$24,112,619	4y1m	10/1/2004	11/1/2008
HI	Kahului	Kahului	OGG	M	$4.50	**	1y2m	11/1/2008	1/1/2010
HI	Kahului	Kahului	OGG	M	$4.50	$114,986,595	16y6m	1/1/2010	7/1/2026
HI	Kailua/Kona	Kona International @ Keohole	KOA	S	$3.00	$8,524,277	4y1m	10/1/2004	11/1/2008
HI	Kailua/Kona	Kona International @ Keohole	KOA	S	$4.50	**	1y2m	11/1/2008	1/1/2010
HI	Kailua/Kona	Kona International @ Keohole	KOA	S	$4.50	$35,670,339	16y6m	1/1/2010	7/1/2026
HI	Lihue	Lihue	LIH	S	$3.00	$4,854,355	4y1m	10/1/2004	11/1/2008
HI	Lihue	Lihue	LIH	S	$4.50	**	1y2m	11/1/2008	1/1/2010
HI	Lihue	Lihue	LIH	S	$4.50	$26,682,130	16y6m	1/1/2010	7/1/2026
ID	Boise	Boise Air Terminal/ Gowen Field	BOI	S	$3.00	$20,191,058	7y	8/1/1994	8/1/2001
ID	Boise	Boise Air Terminal/ Gowen Field	BOI	S	$4.50	$89,739,798	15y9m	8/1/2001	5/1/2017
ID	Hailey	Friedman Memorial	SUN	N	$3.00	$188,000	1y1m	9/1/1993	10/1/1994

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ID	Hailey	Friedman Memorial	SUN	N	$3.00	$1,721,835	10y3m	3/1/1995	6/1/2005
ID	Hailey	Friedman Memorial	SUN	N	$4.50	$5,053,753	23y1m	6/1/2005	7/1/2028
ID	Idaho Falls	Idaho Falls Regional	IDA	N	$3.00	$1,473,899	5y	1/1/1993	1/1/1998
ID	Idaho Falls	Idaho Falls Regional	IDA	N	$3.00	$836,239	2y8m	2/1/1998	10/1/2000
ID	Idaho Falls	Idaho Falls Regional	IDA	N	$3.00	$8,950,000	6m	10/1/2000	4/1/2001
ID	Idaho Falls	Idaho Falls Regional	IDA	N	$4.50	**	19y3m	4/1/2001	7/1/2020
ID	Idaho Falls	Idaho Falls Regional	IDA	N	$4.50	$1,658,299	3y3m	7/1/2020	10/1/2023
ID	Lewiston	Lewiston-Nez Perce County	LWS	N	$3.00	$2,478,343	7y	5/1/1994	5/1/2001
ID	Lewiston	Lewiston-Nez Perce County	LWS	N	$4.50	**	5y5m	5/1/2001	10/1/2006
ID	Lewiston	Lewiston-Nez Perce County	LWS	N	$4.50	$2,751,122	12y5m	10/1/2006	3/1/2019
ID	Pocatello	Pocatello Regional	PIH	N	$3.00	$814,719	6y8m	9/1/1994	5/1/2001
ID	Pocatello	Pocatello Regional	PIH	N	$4.50	**	5m	5/1/2001	10/1/2001
ID	Pocatello	Pocatello Regional	PIH	N	$4.50	$1,769,170	15y3m	10/1/2001	1/1/2017
ID	Twin Falls	Joslin Field - Magic Valley Regional	TWF	N	$3.00	$1,628,107	8y7m	11/1/1992	6/1/2001
ID	Twin Falls	Joslin Field - Magic Valley Regional	TWF	N	$4.50	**	6y	6/1/2001	6/1/2007
ID	Twin Falls	Joslin Field - Magic Valley Regional	TWF	N	$4.50	$1,103,939	8y11m	7/1/2007	6/1/2016
IL	Belleville	Scott AFB/Midamerica	BLV	N	$3.00	$7,000,000	41y4m	11/1/2005	3/1/2047
IL	Bloomington	Central Illinois Regional Airport at Bloomington-Normal	BMI	N	$3.00	$28,084,564	6y5m	11/1/1994	4/1/2001
IL	Bloomington	Central Illinois Regional Airport at Bloomington-Normal	BMI	N	$4.50	**	16y6m	4/1/2001	10/1/2017
IL	Bloomington	Central Illinois Regional Airport at Bloomington-Normal	BMI	N	$4.50	$1,161,019	7m	10/1/2017	6/1/2018
IL	Champaign/Urbana	University of Illinois-Willard	CMI	N	$3.00	$2,464,310	8y2m	12/1/1995	2/1/2004
IL	Champaign/Urbana	University of Illinois-Willard	CMI	N	$4.50	$3,107,855	1378m	10/1/2005	6/1/2019
IL	Chicago	Chicago Midway International	MDW	L	$3.00	$690,891,936	13y4m	9/1/1993	1/1/2007
IL	Chicago	Chicago Midway International	MDW	L	$4.50	**	5y11m	1/1/2007	11/1/2012
IL	Chicago	Chicago Midway International	MDW	L	$4.50	$1,720,370,920	41y	11/1/2012	11/1/2053
IL	Chicago	Chicago O'Hare International	ORD	L	$3.00	$1,158,485,219	7y7m	9/1/1993	4/1/2001
IL	Chicago	Chicago O'Hare Intenational	ORD	L	$4.50	**	4y10m	4/1/2001	2/1/2006
IL	Chicago	Chicago O'Hare International	ORD	L	$4.50	$5,380,398,766	32y10m	2/1/2006	12/1/2038
IL	Decatur	Decatur	DEC	CS	$4.50	$732,628	12y9m	6/1/2006	3/1/2019
IL	Marion	Williamson County Regional	MWA	N	$4.50	$509,499	10y6m	9/1/2005	3/1/2016
IL	Moline	Quad City International	MLI	S	$3.00	$29,523,476	7y11m	12/1/1994	1/1/2002
IL	Moline	Quad City International	MLI	S	$4.50	**	14y6m	1/1/2002	7/1/2016
IL	Moline	Quad City International	MLI	S	$4.50	$26,132,335	21y	7/1/2016	7/1/2037
IL	Peoria	General Downing - Peoria International	PIA	N	$3.00	$8,145,036	6y7m	12/1/1994	7/1/2001
IL	Peoria	General Downing - Peoria International	PIA	N	$4.50	**	5y7m	7/1/2001	2/1/2007
IL	Peoria	General Downing - Peoria International	PIA	N	$4.50	$1,476,770	1y6m	2/1/2007	8/1/2008
IL	Peoria	General Downing - Peoria International	PIA	N	$4.50	$19,258,250	14y10m	11/1/2008	9/1/2023
IL	Quincy	Quincy Regional-Baldwin Field	UIN	N	$3.00	$115,517	2y9m	10/1/1994	7/1/1997
IL	Quincy	Quincy Regional-Baldwin Field	UIN	N	$3.00	$298,153	7y7m	11/1/1997	6/1/2005
IL	Quincy	Quincy Regional-Baldwin Field	UIN	N	$3.00	*	2y2m	11/1/2005	1/1/2008
IL	Quincy	Quincy Regional-Baldwin Field	UIN	N	$4.50	$635,573	11y2m	1/1/2008	3/1/2019
IL	Rockford	Chicago/ Rockford International	RFD	N	$3.00	$385,681	4y	10/1/1992	10/1/1996

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IL	Rockford	Chicago/ Rockford International	RFD	N	$3.00	$7,066,659	10y1m	5/1/1997	6/1/2007
IL	Rockford	Chicago/ Rockford International	RFD	N	$4.50	**	13y11m	6/1/2007	5/1/2021
IL	Springfield	Abraham Lincoln Capital	SPI	N	$3.00	$4,922,593	9y11m	6/1/1992	5/1/2002
IL	Springfield	Abraham Lincoln Capital	SPI	N	$4.50	**	5y5m	5/1/2002	10/1/2005
IL	Springfield	Abraham Lincoln Capital	SPI	N	$4.50	$3,608,170	15y9m	10/1/2005	7/1/2021
IN	Evansville	Evansville Regional	EVV	N	$4.50	$1,270,789	1y3m	8/1/2007	11/1/2008
IN	Evansville	Evansville Regional	EVV	N	$4.50	$6,414,914	9y11m	12/1/2008	11/1/2018
IN	Fort Wayne	Fort Wayne International	FWA	N	$3.00	$26,563,457	12y5m	7/1/1993	12/1/2005
IN	Fort Wayne	Fort Wayne International	FWA	N	$4.50	**	10y10m	12/1/2005	10/1/2016
IN	Fort Wayne	Fort Wayne International	FWA	N	$4.50	$2,045,000	1y5m	10/1/2016	3/1/2018
IN	Indianapolis	Indianapolis International	IND	M	$3.00	$80,825,898	7y7m	9/1/1993	4/1/2001
IN	Indianapolis	Indianapolis International	IND	M	$4.50	**	6m	4/1/2001	10/1/2001
IN	Indianapolis	Indianapolis International	IND	M	$4.50	$444,022,707	20y10m	10/1/2001	9/1/2022
IN	Indianapolis	Indianapolis International	IND	M	$3.00	$59,000	1m	9/1/2022	10/1/2022
IN	South Bend	South Bend	SBN	N	$3.00	$34,172,802	16y8m	11/1/1994	7/1/2011
IN	South Bend	South Bend	SBN	N	$4.50	**	9y6m	7/1/2011	1/1/2021
IN	South Bend	South Bend	SBN	N	$4.50	$6,000,000	8y6m	1/1/2021	7/1/2029
IA	Burlington	Southeast Iowa Regional	BRL	CS	$3.00	$521,304	4y2m	7/1/1997	9/1/2001
IA	Burlington	Southeast Iowa Regional	BRL	CS	$4.50	**	12y10m	9/1/2001	7/1/2014
IA	Burlington	Southeast Iowa Regional	BRL	CS	$4.50	$470,485	14y4m	7/1/2014	11/1/2028
IA	Cedar Rapids	The Eastern Iowa	CID	S	$3.00	$11,716,385	7y5m	1/1/1995	6/1/2002
IA	Cedar Rapids	The Eastern Iowa	CID	S	$4.50	**	1y9m	6/1/2002	3/1/2004
IA	Cedar Rapids	The Eastern Iowa	CID	S	$4.50	$23,341,050	12y7m	5/1/2004	12/1/2016
IA	Des Moines	Des Moines International	DSM	S	$3.00	$17,953,852	7y5m	3/1/1994	8/1/2001
IA	Des Moines	Des Moines International	DSM	S	$4.50	**	9m	8/1/2001	5/1/2002
IA	Des Moines	Des Moines International	DSM	S	$4.50	$59,313,453	18y7m	5/1/2002	12/1/2020
IA	Dubuque	Dubuque Regional	DBQ	N	$3.00	$1,106,761	8y4m	1/1/1993	5/1/2001
IA	Dubuque	Dubuque Regional	DBQ	N	$4.50	$6,461,405	31y9m	5/1/2001	2/1/2033
IA	Fort Dodge	Fort Dodge Regional	FOD	CS	$3.00	$169,331	6y6m	3/1/1995	9/1/2001
IA	Fort Dodge	Fort Dodge Regional	FOD	CS	$4.50	$315,570	9y3m	1/1/2002	4/1/2011
IA	Mason City	Mason City Municipal	MCW	CS	$3.00	$302,090	5y9m	2/1/1996	10/1/2001
IA	Mason City	Mason City Municipal	MCW	CS	$4.50	**	1y6y	10/1/2001	4/1/2003
IA	Mason City	Mason City Municipal	MCW	CS	$4.50	$1,000,284	14y4m	8/1/2003	12/1/2017
IA	Sioux City	Sioux Gateway/Col. Bud Day Field	SUX	N	$3.00	$204,465	1y	6/1/1993	6/1/1994
IA	Sioux City	Sioux Gateway/Col. Bud Day Field	SUX	N	$3.00	$2,505,560	7y1m	2/1/1995	3/1/2002
IA	Sioux City	Sioux Gateway/Col. Bud Day Field	SUX	N	$4.50	**	1y10m	3/1/2002	1/1/2004
IA	Sioux City	Sioux Gateway/Col. Bud Day Field	SUX	N	$4.50	$1,803,177	16y8m	11/1/2004	7/1/2021
IA	Spencer	Spencer Municipal	SPW	GA	$3.00	$77,638	10y6m	9/1/1995	3/1/2006
IA	Waterloo	Waterloo Regional	ALO	N	$3.00	$628,088	4y	6/1/1994	6/1/1998
IA	Waterloo	Waterloo Regional	ALO	N	$3.00	$784,036	1y10m	9/1/1999	7/1/2001
IA	Waterloo	Waterloo Regional	ALO	N	$4.50	**	1y10m	7/1/2001	5/1/2003
IA	Waterloo	Waterloo Regional	ALO	N	$4.50	$1,631,044	16y3m	5/1/2003	8/1/2019
KS	Garden City	Garden City Regional	GCK	N	$4.50	$770,628	9y	10/1/2013	10/1/2022
KS	Manhattan	Manhattan Regional	MHK	N	$3.00	$401,978	3y5m	10/1/1998	3/1/2002

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KS	Manhattan	Manhattan Regional	MHK	N	$4.50	**	6y4m	3/1/2002	7/1/2008
KS	Manhattan	Manhattan Regional	MHK	N	$4.50	$4,097,925	16y10m	7/1/2008	5/1/2025
KS	Topeka	Forbes Field	FOE	CS	$4.50	$823,720	15y7m	8/1/2007	3/1/2023
KS	Wichita	Wichita Mid-Continent	ICT	S	$3.00	$25,595,809	10y6m	12/1/1994	5/1/2005
KS	Wichita	Wichita Mid-Continent	ICT	S	$4.50	**	2y1m	5/1/2005	6/1/2007
KS	Wichita	Wichita Mid-Continent	ICT	S	$4.50	$7,548,050	2y2m	7/1/2007	9/1/2009
KS	Wichita	Wichita Mid-Continent	ICT	S	$4.50	$166,384,422	35y5m	11/1/2010	4/1/2046
KY	Covington	Cincinnati/Northern Kentucky International	CVG	M	$3.00	$155,087,555	6y2m	6/1/1994	8/1/2000
KY	Covington	Cincinnati/Northern Kentucky International	CVG	M	$3.00	$67,819,829	2y1m	7/1/2001	8/1/2003
KY	Covington	Cincinnati/Northern Kentucky International	CVG	M	$4.50	$210,651,000	5y9m	8/1/2003	5/1/2009
KY	Covington	Cincinnati/Northern Kentucky International	CVG	M	$3.00	$74,555,000	3y8m	5/1/2009	1/1/2013
KY	Covington	Cincinnati/Northern Kentucky International	CVG	M	$4.50	$85,004,657	7y2m	1/1/2013	3/1/2020
KY	Lexington	Blue Grass	LEX	S	$3.00	$11,900,969	7y7m	11/1/1993	6/1/2001
KY	Lexington	Blue Grass	LEX	S	$4.50	**	2y	6/1/2001	6/1/2003
KY	Lexington	Blue Grass	LEX	S	$3.00	$500,557	4m	8/1/2003	12/1/2003
KY	Lexington	Blue Grass	LEX	S	$4.50	$87,804,742	34y2m	12/1/2003	2/1/2038
KY	Louisville	Louisville International - Standiford Field	SDF	S	$3.00	$75,594,112	8y10m	5/1/1997	3/1/2006
KY	Louisville	Louisville International - Standiford Field	SDF	S	$4.50	**	7m	3/1/2006	10/1/2006
KY	Louisville	Louisville International - Standiford Field	SDF	S	$3.00	**	1y11m	10/1/2006	9/1/2008
KY	Louisville	Louisville International - Standiford Field	SDF	S	$4.50	**	1m	9/1/2008	10/1/2008
KY	Louisville	Louisville International - Standiford Field	SDF	S	$3.00	**	2y2m	10/1/2008	12/1/2010
KY	Louisville	Louisville International - Standiford Field	SDF	S	$4.50	**	9m	12/1/2010	9/1/2011
KY	Louisville	Louisville International - Standiford Field	SDF	S	$4.50	$29,928,413	4y8m	9/1/2011	5/1/2016
KY	Paducah	Barkley Regional	PAH	N	$3.00	$1,696,178	20y2m	3/1/1994	5/1/2014
KY	Paducah	Barkley Regional	PAH	N	$4.50	**	1y9m	5/1/2014	2/1/2016
KY	Paducah	Barkley Regional	PAH	N	$4.50	$532,931	8y7m	2/1/2016	9/1/2024
LA	Alexandria	Alexandria International	AEX	N	$3.00	$10,284,927	2y8m	5/1/1999	1/1/2002
LA	Alexandria	Alexandria International	AEX	N	$4.50	**	20y11m	1/1/2002	12/1/2022
LA	Baton Rouge	Baton Rouge Metropolitan, Ryan Field	BTR	S	$3.00	$37,469,799	12y10m	12/1/1992	10/1/2005
LA	Baton Rouge	Baton Rouge Metropolitan, Ryan Field	BTR	S	$4.50	**	9y10m	10/1/2005	8/1/2015
LA	Baton Rouge	Baton Rouge Metropolitan, Ryan Field	BTR	S	$4.50	$43,889,437	15y11m	8/1/2015	7/1/2031
LA	Lafayette	Lafayette Regional	LFT	N	$3.00	$1,083,024	3y	9/1/1995	9/1/1998
LA	Lafayette	Lafayette Regional	LFT	N	$3.00	$2,273,692	1y	4/1/2001	4/1/2002
LA	Lafayette	Lafayette Regional	LFT	N	$4.50	**	2y8m	4/1/2002	1/1/2005
LA	Lafayette	Lafayette Regional	LFT	N	$4.50	$3,433,629	2y11m	5/1/2005	4/1/2008
LA	Lafayette	Lafayette Regional	LFT	N	$4.50	$5,736,733	6y4m	8/1/2008	12/1/2014
LA	Lake Charles	Lake Charles Regional	LCH	N	$3.00	$1,877,234	4y2m	3/1/2001	5/1/2005
LA	Lake Charles	Lake Charles Regional	LCH	N	$4.50	**	6y4m	5/1/2005	9/1/2011
LA	Lake Charles	Lake Charles Regional	LCH	N	$4.50	$1,085,490	4y4m	9/1/2011	1/1/2016
LA	Monroe	Monroe Regional	MLU	N	$4.50	$1,359,504	4y5m	4/1/2003	9/1/2007
LA	Monroe	Monroe Regional	MLU	N	$4.50	$16,400,000	25y7m	11/1/2008	6/1/2036
LA	New Orleans	Louis Armstrong New Orleans International	MSY	M	$3.00	$133,503,363	8y10m	6/1/1993	4/1/2002
LA	New Orleans	Louis Armstrong New Orleans International	MSY	M	$4.50	**	1y4m	4/1/2002	8/1/2003
LA	New Orleans	Louis Armstrong New Orleans International	MSY	M	$4.50	$431,317,387	23y4m	8/1/2003	12/1/2026

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LA	Shreveport	Shreveport Regional	SHV	N	$3.00	$29,841,353	8y9m	2/1/1994	11/1/2002
LA	Shreveport	Shreveport Regional	SHV	N	$4.50	**	11y10m	11/1/2002	9/1/2014
LA	Shreveport	Shreveport Regional	SHV	N	$4.50	$6,248,208	8y9m	2/1/2015	2/1/2020
ME	Bangor	Bangor International	BGR	N	$3.00	$8,961,006	15y3m	6/1/1995	9/1/2010
ME	Bangor	Bangor International	BGR	N	$4.50	$7,574,597	7y5m	12/1/2010	5/1/2018
ME	Portland	Portland International Jetport	PWM	S	$3.00	$33,601,082	15y	2/1/1994	2/1/2009
ME	Portland	Portland International Jetport	PWM	S	$4.50	**	1y9m	2/1/2009	11/1/2010
ME	Portland	Portland International Jetport	PWM	S	$4.50	$132,206,104	29y5m	11/1/2010	4/1/2040
ME	Presque Isle	Northern Maine Regional Airport at Presque Isle	PQI	N	$4.50	$245,853	4y9m	9/1/2004	6/1/2009
ME	Presque Isle	Northern Maine Regional Airport at Presque Isle	PQI	N	$4.50	$353,298	7y5m	8/1/2010	1/1/2018
ME	Rockland	Knox County Regional	RKD	N	$4.50	$167,250	4y6m	1/1/2012	7/1/2016
MD	Baltimore	Baltimore/Washington International Thurgood Marshall	BWI	L	$3.00	$189,381,695	9y8m	10/1/1992	6/1/2002
MD	Baltimore	Baltimore/Washington International Thurgood Marshall	BWI	L	$4.50	**	5m	6/1/2002	11/1/2002
MD	Baltimore	Baltimore/Washington International Thurgood Marshall	BWI	L	$4.50	$1,205,583,429	25y4m	11/1/2002	3/1/2028
MD	Hagerstown	Hagerstown Regional-Richard A Henson Field	HGR	N	$3.00	$308,817	2y7m	8/1/1999	3/1/2002
MD	Hagerstown	Hagerstown Regional-Richard A Henson Field	HGR	N	$4.50	**	1y10m	3/1/2002	1/1/2004
MD	Hagerstown	Hagerstown Regional-Richard A Henson Field	HGR	N	$4.50	$108,124	3y7m	1/1/2004	8/1/2007
MD	Hagerstown	Hagerstown Regional-Richard A Henson Field	HGR	N	$4.50	$12,303	0m	4/1/2013	4/1/2013
MD	Salisbury	Salisbury-Ocean City Wicomico Regional	SBY	N	$3.00	$1,446,184	6y1m	2/1/2002	3/1/2008
MD	Salisbury	Salisbury-Ocean City Wicomico Regional	SBY	N	$4.50	**	4y3m	3/1/2008	6/1/2012
MD	Salisbury	Salisbury-Ocean City Wicomico Regional	SBY	N	$4.50	$2,018,993	4y8m	6/1/2012	2/1/2017
MD	Wiley Ford	Greater Cumberland Reg	CBE	GA	$3.00	$144,345	5y	7/1/1994	7/1/1999
MD	Wiley Ford	Greater Cumberland Reg	CBE	GA	$3.00	*	6y8m	10/1/1999	6/1/2006
MA	Boston	General Edward Lawrence Logan International	BOS	L	$3.00	$702,015,217	11y11m	11/1/1993	10/1/2005
MA	Boston	General Edward Lawrence Logan International	BOS	L	$4.50	**	5y4m	10/1/2005	2/1/2011
MA	Boston	General Edward Lawrence Logan International	BOS	L	$4.50	$847,068,039	13y8m	2/1/2011	10/1/2024
MA	Hyannis	Barnstable Municipal-Boardman/Polando Field	HYA	N	$2.00	$2,573,600	13y7m	3/1/2011	10/1/2024
MA	Nantucket	Nantucket Memorial	ACK	N	$4.50	$6,942,081	9y10m	7/1/2014	5/1/2024
MA	Worcester	Worcester Regional	ORH	CS	$3.00	$614,336	5y	10/1/1992	10/1/1997
MA	Worcester	Worcester Regional	ORH	CS	$3.00	$1,021,417	13y3m	9/1/1999	12/1/2011
MI	Alpena	Alpena County Regional	APN	N	$3.00	$282,898	4y4m	8/1/2001	12/1/2005
MI	Alpena	Alpena County Regional	APN	N	$4.50	**	6y	12/1/2005	12/1/2011
MI	Alpena	Alpena County Regional	APN	N	$4.50	$193,959	7y1m	12/1/2011	1/1/2019
MI	Detroit	Coleman A Young Municipal	DET	GA	$3.00	$240,053	4y2m	1/1/2000	3/1/2004
MI	Detroit	Detroit Metropolitan Wayne County	DTW	L	$3.00	$2,198,215,360	8y9m	1/1/1993	10/1/2001
MI	Detroit	Detroit Metropolitan Wayne County	DTW	L	$4.50	**	24y7m	10/1/2001	5/1/2026
MI	Detroit	Detroit Metropolitan Wayne County	DTW	L	$4.50	$936,750,724	7y9m	5/1/2026	2/1/2034
MI	Escanaba	Delta County	ESC	N	$3.00	$164,496	5y2m	2/1/1993	11/1/1997
MI	Escanaba	Delta County	ESC	N	$3.00	$182,700	1y11m	8/1/1998	7/1/2000
MI	Escanaba	Delta County	ESC	N	$3.00	$78,073	2y5m	10/1/2001	3/1/2004
MI	Escanaba	Delta County	ESC	N	$4.50	$40,000	1y10m	3/1/2004	1/1/2006
MI	Escanaba	Delta County	ESC	N	$4.50	$456,829	9y89m	4/1/2006	1/1/2016
MI	Flint	Bishop International	FNT	S	$3.00	$31,865,870	8y1m	9/1/1993	10/1/2001

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MI	Flint	Bishop International	FNT	S	$4.50	**	16y3m	10/1/2001	1/1/2018
MI	Grand Rapids	Gerald R. Ford International	GRR	S	$3.00	$94,359,802	12y11m	12/1/1992	11/1/2005
MI	Grand Rapids	Gerald R. Ford International	GRR	S	$4.50	**	14y	11/1/2005	11/1/2019
MI	Grand Rapids	Gerald R. Ford International	GRR	S	$4.50	$11,748,112	3y7m	11/1/2019	6/1/2023
MI	Hancock	Houghton County Memorial	CMX	N	$3.00	$164,920	2y8m	7/1/1993	3/1/1996
MI	Hancock	Houghton County Memorial	CMX	N	$3.00	$149,326	3y	7/1/1996	7/1/1999
MI	Hancock	Houghton County Memorial	CMX	N	$3.00	$387,250	5y9m	10/1/1999	7/1/2005
MI	Hancock	Houghton County Memorial	CMX	N	$4.50	**	3m	7/1/2005	10/1/2005
MI	Hancock	Houghton County Memorial	CMX	N	$4.50	$1,062,318	10y10m	10/1/2005	8/1/2016
MI	Iron Mountain Kingsford	Ford	IMT	N	$3.00	$176,029	8y9m	9/1/1995	6/1/2004
MI	Ironwood	Gogebic-Iron County	IWD	CS	$3.00	$90,531	13y2m	8/1/1993	10/1/2006
MI	Ironwood	Gogebic-Iron County	IWD	CS	$4.50	$128,549	18y8m	6/1/2007	2/1/2026
MI	Kalamazoo	Kalamazoo/Battle Creek Internaitonal	AZO	N	$3.00	$1,089,716	3y2m	4/1/1997	6/1/2000
MI	Kalamazoo	Kalamazoo/Battle Creek Internaitonal	AZO	N	$3.00	$5,312,429	4y	1/1/2001	1/1/2005
MI	Kalamazoo	Kalamazoo/Battle Creek Internaitonal	AZO	N	$4.50	**	1y7m	1/1/2005	8/1/2006
MI	Kalamazoo	Kalamazoo/Battle Creek Internaitonal	AZO	N	$4.50	$1,279,785	1y6m	10/1/2006	4/1/2008
MI	Kalamazoo	Kalamazoo/Battle Creek Internaitonal	AZO	N	$4.50	$14,821,076	16y	9/1/2008	9/1/2024
MI	Lansing	Capital Region International	LAN	N	$3.00	$9,380,340	8y9m	10/1/1993	7/1/2002
MI	Lansing	Capital Region International	LAN	N	$4.50	**	1y4m	7/1/2002	11/1/2003
MI	Lansing	Capital Region International	LAN	N	$4.50	$21,115,759	24y5m	11/1/2003	4/1/2028
MI	Manistee	Manistee County-Blacker	MBL	GA	$4.50	$388,986	32y5m	6/1/2008	11/1/2040
MI	Marquette	Marquette County	MQT	N	$3.00	$62,225	4y	12/1/1992	12/1/1996
MI	Marquette	Sawyer International	SAW/MQT	N	$3.00	$888,286	4y3m	4/1/1998	7/1/2002
MI	Marquette	Sawyer International	SAW/MQT	N	$4.50	**	6m	7/1/2002	1/1/2003
MI	Marquette	Sawyer International	SAW/MQT	N	$4.50	$779,776	3y8m	1/1/2003	9/1/2006
MI	Marquette	Sawyer International	SAW/MQT	N	$4.50	$150,711	1y7m	10/1/2006	5/1/2008
MI	Marquette	Sawyer International	SAW/MQT	N	$4.50	$852,250	3y	8/1/2008	8/1/2011
MI	Marquette	Sawyer International	SAW/MQT	N	$4.50	$704,574	3y	3/1/2012	3/1/2015
MI	Muskegon	Muskegon County	MKG	N	$3.00	$5,013,088	10y1m	5/1/1994	5/1/2004
MI	Muskegon	Muskegon County	MKG	N	$4.50	**	16y6m	5/1/2004	11/1/2020
MI	Pellston	Pellston Regional Airport of Emmet County	PLN	N	$3.00	$159,752	4y6m	3/1/1993	9/1/1997
MI	Pellston	Pellston Regional Airport of Emmet County	PLN	N	$3.00	$916,433	13y7m	12/1/1997	7/1/2011
MI	Pellston	Pellston Regional Airport of Emmet County	PLN	N	$4.50	$1,460,618	13y	7/1/2011	7/1/2024
MI	Saginaw	MBS International	MBS	N	$3.00	$5,141,920	10y5m	2/1/1997	7/1/2007
MI	Saginaw	MBS International	MBS	N	$4.50	**	1m	7/1/2007	8/1/2007
MI	Saginaw	MBS International	MBS	N	$4.50	$9,333,477	17y1m	8/1/2007	9/1/2024
MI	Sault Ste. Marie	Chippewa County International	CIU	N	$4.50	$1,050,115	14y8m	11/1/2005	7/1/2020
MI	Traverse City	Cherry Capital	TVC	N	$3.00	$3,637,041	5y	1/1/1997	1/1/2002
MI	Traverse City	Cherry Capital	TVC	N	$4.50	**	1y9m	1/1/2002	10/1/2003

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MI	Traverse City	Cherry Capital	TVC	N	$4.50	$6,441,642	7y2m	10/1/2003	12/1/2010
MI	Traverse City	Cherry Capital	TVC	N	$4.50	$2,452,975	5y	2/1/2011	2/1/2016
MN	Bemidji	Bemidji Regional	BJI	N	$3.00	$362,099	5y3m	11/1/1996	2/1/2002
MN	Bemidji	Bemidji Regional	BJI	N	$4.50	$401,336	3y6m	2/1/2002	8/1/2005
MN	Bemidji	Bemidji Regional	BJI	N	$4.50	$790,324	9y8m	6/1/2006	2/1/2016
MN	Brainerd	Brainerd Lakes Regional	BRD	N	$3.00	$313,455	7y11m	8/1/1993	7/1/2001
MN	Brainerd	Brainerd Lakes Regional	BRD	N	$4.50	$1,833,556	32y1m	7/1/2001	8/1/2033
MN	Duluth	Duluth International	DLH	N	$3.00	$2,341,795	7y6m	10/1/1994	4/1/2002
MN	Duluth	Duluth International	DLH	N	$4.50	$1,278,964	2y7m	4/1/2002	11/1/2004
MN	Duluth	Duluth International	DLH	N	$4.50	$8,846,024	15y6m	4/1/2005	10/1/2020
MN	Grand Rapids	Grand Rapids/Itasca County	GPZ	GA	$3.00	$151,263	3y10m	12/1/1997	10/1/2001
MN	Grand Rapids	Grand Rapids/Itasca County	GPZ	GA	$4.50	**	5y3m	10/1/2001	1/1/2007
MN	Hibbing	Range Regional	HIB	N	$3.00	$338,299	7y1m	6/1/1996	7/1/2003
MN	Hibbing	Range Regional	HIB	N	$4.50	**	3y10m	7/1/2003	5/1/2007
MN	Hibbing	Range Regional	HIB	N	$4.50	$461,737	10y6m	5/1/2007	11/1/2017
MN	International Falls	Falls International	INL	N	$3.00	$597,058	7y6m	12/1/1994	6/1/2002
MN	International Falls	Falls International	INL	N	$4.50	**	3y	6/1/2002	6/1/2005
MN	International Falls	Falls International	INL	N	$4.50	$1,312,865	27y4m	11/1/2005	3/1/2033
MN	Minneapolis	Minneapolis-St Paul International/Wold-Chamberlain	MSP	L	$3.00	$430,142,570	8y10m	6/1/1992	4/1/2001
MN	Minneapolis	Minneapolis-St Paul International/Wold-Chamberlain	MSP	L	$4.50	**	1y10m	4/1/2001	2/1/2003
MN	Minneapolis	Minneapolis-St Paul International/Wold-Chamberlain	MSP	L	$4.50	$1,110,940,447	15y8m	2/1/2003	10/1/2018
MN	Rochester	Rochester International	RST	N	$3.00	$5,507,696	5y10m	5/1/1996	3/1/2002
MN	Rochester	Rochester International	RST	N	$4.50	**	6y5m	3/1/2002	8/1/2008
MN	Rochester	Rochester International	RST	N	$4.50	$5,567,215	8y5m	8/1/2008	1/1/2017
MN	St. Cloud	St. Cloud Regional	STC	N	$3.00	$1,147,578	2y5m	2/1/2000	7/1/2002
MN	St. Cloud	St. Cloud Regional	STC	N	$4.50	**	18y3m	7/1/2002	10/1/2020
MN	Thief River Falls	Thief River Falls Regional	TVF	GA	$4.50	$636,828	20y	6/1/2003	6/1/2023
MP	Rota Island	Benjamin Taisacan Mangiona International	GRO /ROP	N	$4.50	$1,777,742	11y8m	1/1/2005	8/1/2016
MP	Saipan	Francisco C. Ada/Saipan International	GSN/ SPN	S	$4.50	$29,573,280	11y8m	1/1/2005	8/1/2016
MP	Tinian Island	Tinian International	TNI/ TIQ	CS	$4.50	$1,705,526	11y8m	1/1/2005	8/1/2016
MS	Columbus	Golden Triangle Regional	GTR	N	$3.00	$1,526,314	8y8m	8/1/1992	4/1/2001
MS	Columbus	Golden Triangle Regional	GTR	N	$4.50	**	2y9m	4/1/2001	1/1/2004
MS	Columbus	Golden Triangle Regional	GTR	N	$4.50	$2,320,794	15y9m	1/1/2004	10/1/2019
MS	Greenville	Mid Delta Regional	GLH	CS	$3.00	$148,873	4y4m	10/1/1998	2/1/2003
MS	Greenville	Mid Delta Regional	GLH	CS	$3.00	*	4m	4/1/2003	8/1/2003
MS	Greenville	Mid Delta Regional	GLH	CS	$3.00	$21,327	1y8m	8/1/2003	4/1/2005
MS	Greenville	Mid Delta Regional	GLH	CS	$4.50	**	8m	4/1/2005	12/1/2005
MS	Greenville	Mid Delta Regional	GLH	CS	$4.50	$162,432	5y4m	12/1/2005	8/1/2011
MS	Greenville	Mid Delta Regional	GLH	CS	$4.50	$114,263	3y1m	9/1/2012	10/1/2015
MS	Gulfport	Gulfport-Biloxi International	GPT	N	$3.00	$8,247,199	9y1m	7/1/1992	8/1/2001
MS	Gulfport	Gulfport-Biloxi International	GPT	N	$3.00	*	6m	12/1/2001	6/1/2002
MS	Gulfport	Gulfport-Biloxi International	GPT	N	$3.00	$1,031,474	9m	6/1/2002	5/1/2003

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MS	Gulfport	Gulfport-Biloxi International	GPT	N	$4.50	$57,145,388	24y8m	5/1/2003	1/1/2028
MS	Hattiesburg	Hattiesburg-Laurel Regional	PIB	N	$3.00	$237,929	8y11m	7/1/1992	6/1/2001
MS	Hattiesburg	Hattiesburg-Laurel Regional	PIB	N	$4.50	$869,778	15y7m	6/1/2001	1/1/2017
MS	Jackson	Jackson-Medgar Wiley Evers International	JAN	S	$3.00	$22,059,819	10y5m	5/1/1993	10/1/2003
MS	Jackson	Jackson-Medgar Wiley Evers International	JAN	S	$4.50	**	2y3m	10/1/2003	1/1/2006
MS	Jackson	Jackson-Medgar Wiley Evers International	JAN	S	$4.50	$66,347,349	25y1m	1/1/2006	2/1/2031
MS	Meridian	Key Field	MEI	N	$3.00	$293,059	3y9m	11/1/1992	8/1/1996
MS	Meridian	Key Field	MEI	N	$3.00	$436,597	4y9m	3/1/1997	12/1/2001
MS	Meridian	Key Field	MEI	N	$4.50	**	2y5m	12/1/2001	5/1/2004
MS	Meridian	Key Field	MEI	N	$4.50	$1,025,361	15y	10/1/2005	10/1/2020
MS	Tupelo	Tupelo Regional	TUP	CS	$3.00	$457,216	8y5m	11/1/1994	4/1/2003
MS	Tupelo	Tupelo Regional	TUP	CS	$4.50	**	8m	4/1/2003	1/1/2004
MS	Tupelo	Tupelo Regional	TUP	CS	$4.50	$1,285,973	14y11m	1/1/2004	12/1/2018
MO	Columbia	Columbia Regional	COU	N	$4.50	$2,949,763	24y1m	11/1/2002	12/1/2026
MO	Joplin	Joplin Regional	JLN	N	$4.50	$889,664	12y2m	4/1/2003	6/1/2015
MO	Kansas City	Kansas City International	MCI	M	$3.00	$350,021,210	9y5m	3/1/1996	8/1/2005
MO	Kansas City	Kansas City International	MCI	M	$4.50	**	9y	8/1/2005	8/1/2014
MO	Kansas City	Kansas City International	MCI	M	$4.50	$31,070,963	3y9m	8/1/2014	5/1/2018
MO	Kansas City	Kansas City International	MCI	M	$3.00	$47,267,589	2y11m	5/1/2018	4/1/2021
MO	Springfield	Springfield-Branson National	SGF	N	$3.00	$3,110,598	3y9m	11/1/1993	5/1/1997
MO	Springfield	Springfield-Branson National	SGF	N	$3.00	$6,370,614	2y10m	7/1/1998	5/1/2001
MO	Springfield	Springfield-Branson National	SGF	N	$4.50	**	2y7m	5/1/2001	1/1/2004
MO	Springfield	Springfield-Branson National	SGF	N	$4.50	$2,168,000	1y3m	5/1/2004	8/1/2005
MO	Springfield	Springfield-Branson National	SGF	N	$4.50	$900,000	6m	9/1/2005	3/1/2006
MO	Springfield	Springfield-Branson National	SGF	N	$4.50	$83,651,097	29y	1/1/2007	1/1/2036
MO	St Louis	Lambert-St Louis International	STL	M	$3.00	$330,818,323	9y	12/1/1992	12/1/2001
MO	St Louis	Lambert-St Louis International	STL	M	$4.50	**	12y1m	12/1/2001	5/1/2002
MO	St Louis	Lambert-St Louis International	STL	M	$4.50	$760,523,801	24y5m	5/1/2002	10/1/2026
MT	Billings	Billings Logan International	BIL	S	$3.00	$19,812,489	20y5m	4/1/1994	9/1/2014
MT	Bozeman	Bozeman Yellowstone International	BZN	S	$3.00	$9,144,326	15y7m	8/1/1993	3/1/2009
MT	Bozeman	Bozeman Yellowstone International	BZN	S	$4.50	$31,200,000	19y4m	3/1/2009	7/1/2028
MT	Butte	Bert Mooney	BTM	N	$3.00	$1,289,307	11y11m	7/1/1994	6/1/2006
MT	Butte	Bert Mooney	BTM	N	$3.00	$112,047	1y1m	7/1/2006	8/1/2007
MT	Butte	Bert Mooney	BTM	N	$3.00	$58,163	2y4m	11/1/2007	3/1/2010
MT	Butte	Bert Mooney	BTM	N	$4.50	$620,434	7y11m	3/1/2010	2/1/2018
MT	Great Falls	Great Falls International	GTF	N	$3.00	$3,059,263	9y8m	11/1/1992	7/1/2002
MT	Great Falls	Great Falls International	GTF	N	$4.50	$12,867,065	18y11m	7/1/2002	6/1/2021
MT	Helena	Helena Regional	HLN	N	$3.00	$1,949,098	9y4m	4/1/1993	8/1/2002
MT	Helena	Helena Regional	HLN	N	$4.50	**	1y2m	8/1/2002	10/1/2003
MT	Helena	Helena Regional	HLN	N	$4.50	$4,276,888	13y9m	10/1/2003	7/1/2017
MT	Kalispell	Glacier Park International	GPI/ FCA	N	$3.00	$10,997,914	11y5m	12/1/1993	4/1/2005
MT	Kalispell	Glacier Park International	GPI/ FCA	N	$4.50	**	11y3m	4/1/2005	7/1/2016
MT	Kalispell	Glacier Park International	GPI/ FCA	N	$4.50	$833,138	1y4m	7/1/2016	11/1/2017
MT	Missoula	Missoula International	MSO	N	$3.00	$5,110,384	8y7m	9/1/1992	4/1/2001

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MT	Missoula	Missoula International	MSO	N	$4.50	**	1y2m	4/1/2001	6/1/2002
MT	Missoula	Missoula International	MSO	N	$4.50	$14,917,768	15y4m	6/1/2002	10/1/2017
MT	West Yellowstone	Yellowstone	WYS	CS	$4.50	$277,202	14y	6/1/2011	6/1/2025
NE	Grand Island	Central Nebraska Regional	GRI	N	$3.00	$50,370	2y2m	2/1/1999	4/1/2001
NE	Grand Island	Central Nebraska Regional	GRI	N	$4.50	$1,486,809	15y	5/1/2001	5/1/2016
NE	Kearney	Kearney Regional	EAR	N	$4.00	$0	1y10m	11/1/2005	9/1/2007
NE	Kearney	Kearney Regional	EAR	N	$4.50	$231,600	3y10m	9/1/2007	7/1/2011
NE	Kearney	Kearney Regional	EAR	N	$4.50	$191,378	4y6m	10/1/2011	4/1/2016
NE	Scottsbluff	Western Nebraska Regional/ William B. Heilig Field	BFF	N	$3.00	$0	3y	3/1/2000	3/1/2003
NE	Scottsbluff	Western Nebraska Regional/ William B. Heilig Field	BFF	N	$4.50	$1,299,534	20y	7/1/2004	7/1/2024
NV	Elko	Elko Regional	EKO	N	$3.00	$6,790,017	5y2m	9/1/1998	11/1/2003
NV	Elko	Elko Regional	EKO	N	$4.50	**	17y3m	11/1/2003	2/1/2021
NV	Las Vegas	McCarran International	LAS	L	$3.00	$849,713,056	12y5m	6/1/1992	11/1/2004
NV	Las Vegas	McCarran International	LAS	L	$4.50	**	1y10m	11/1/2004	9/1/2006
NV	Las Vegas	McCarran International	LAS	L	$3.00	**	4m	9/1/2006	1/1/2007
NV	Las Vegas	McCarran International	LAS	L	$4.00	**	1y9m	1/1/2007	10/1/2008
NV	Las Vegas	McCarran International	LAS	L	$4.50	$3,713,433,002	45y1m	10/1/2008	11/1/2053
NV	Reno	Reno/Tahoe International	RNO	S	$3.00	$55,670,235	7y1m	1/1/1994	2/1/2001
NV	Reno	Reno/Tahoe International	RNO	S	$4.50	$7,258,689	10m	8/1/2001	6/1/2002
NV	Reno	Reno/Tahoe International	RNO	S	$3.00	$6,940,843	8m	6/1/2002	2/1/2003
NV	Reno	Reno/Tahoe International	RNO	S	$4.50	$11,922,040	1y8m	2/1/2003	10/1/2004
NV	Reno	Reno/Tahoe International	RNO	S	$3.00	**	2m	10/1/2004	12/1/2004
NV	Reno	Reno/Tahoe International	RNO	S	$3.00	$52,073,714	5m	12/1/2004	4/1/2005
NV	Reno	Reno/Tahoe International	RNO	S	$4.50	**	2y4m	4/1/2005	7/1/2007
NV	Reno	Reno/Tahoe International	RNO	S	$3.00	$3,066,408	5m	7/1/2007	12/1/2007
NV	Reno	Reno/Tahoe International	RNO	S	$4.50	$40,406,476	10y7m	12/1/2007	7/1/2018
NH	Lebanon	Lebanon Municipal	LEB	N	$3.00	$530,630	7y	8/1/1995	8/1/2002
NH	Lebanon	Lebanon Municipal	LEB	N	$4.50	$63,774	2y6m	11/1/2003	5/1/2006
NH	Lebanon	Lebanon Municipal	LEB	N	$4.50	$203,144	6y7m	10/1/2007	5/1/2014
NH	Lebanon	Lebanon Municipal	LEB	N	$4.50	$167,203	3y8m	10/1/2014	6/1/2018
NH	Manchester	Manchester	MHT	S	$3.00	$123,305,983	15y	1/1/1993	1/1/2008
NH	Manchester	Manchester	MHT	S	$4.50	**	7y7m	1/1/2008	8/1/2015
NH	Manchester	Manchester	MHT	S	$4.50	$75,185,261	7y4m	8/1/2015	12/1/2022
NJ	Atlantic City	Atlantic City International	ACY	S	$3.00	$15,737,308	6y2m	10/1/1999	12/1/2005
NJ	Atlantic City	Atlantic City International	ACY	S	$4.50	**	3y5m	12/1/2005	4/1/2009
NJ	Atlantic City	Atlantic City International	ACY	S	$4.50	$14,569,296	5y4m	4/1/2009	8/1/2014
NJ	Atlantic City	Atlantic City International	ACY	S	$4.50	$27,459,848	10y6m	9/1/2014	3/1/2025
NJ	Newark	Newark Liberty International	EWR	L	$3.00	$939,876,509	13y6m	10/1/1992	4/1/2006
NJ	Newark	Newark Liberty International	EWR	L	$4.50	**	5y3m	4/1/2006	7/1/2011
NJ	Newark	Newark Liberty International	EWR	L	$4.50	$357,084,428	7y	7/1/2011	7/1/2018
NJ	Trenton	Trenton Mercer	TTN	N	$3.00	$0	3y4m	1/1/2001	5/1/2004
NJ	Trenton	Trenton Mercer	TTN	N	$4.50	$3,975,081	11y8m	5/1/2004	1/1/2016
NM	Albuquerque	Albuquerque International Sunport	ABQ	M	$3.00	$169,822,308	15y	7/1/1996	7/1/2011
NM	Albuquerque	Albuquerque International Sunport	ABQ	M	$4.50	**	6y3m	7/1/2011	10/1/2017

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NM	Farmington	Four Corners Regional	FMN	N	$3.00	$661,102	13y11m	6/1/2003	5/1/2017
NM	Roswell	Roswell International Air Center	ROW	N	$3.00	$334,477	4y10m	4/1/1999	2/1/2004
NM	Roswell	Roswell International Air Center	ROW	N	$4.50	**	4m	2/1/2004	6/1/2004
NM	Roswell	Roswell International Air Center	ROW	N	$3.00	**	1y	6/1/2004	6/1/2005
NM	Roswell	Roswell International Air Center	ROW	N	$4.50	**	2y8m	6/1/2005	2/1/2008
NM	Roswell	Roswell International Air Center	ROW	N	$4.50	$2,085,789	14y1m	3/1/2008	4/1/2022
NY	Albany	Albany International	ALB	S	$3.00	$116,740,338	15y6m	3/1/1994	9/1/2009
NY	Albany	Albany International	ALB	S	$4.50	**	10y5m	9/1/2009	2/1/2020
NY	Binghamton	Greater Binghamton/Edwin A. Link Field	BGM	N	$3.00	$4,452,419	8y10m	11/1/1993	9/1/2002
NY	Binghamton	Greater Binghamton/Edwin A. Link Field	BGM	N	$4.50	**	3y10m	9/1/2002	7/1/2006
NY	Binghamton	Greater Binghamton/Edwin A. Link Field	BGM	N	$4.50	$425,339	3y2m	7/1/2006	2/1/2008
NY	Binghamton	Greater Binghamton/Edwin A. Link Field	BGM	N	$4.50	$5,174,411	10y	5/1/2008	5/1/2018
NY	Buffalo	Buffalo Niagara International	BUF	M	$3.00	$145,570,565	14y11m	8/1/1992	8/1/2007
NY	Buffalo	Buffalo Niagara International	BUF	M	$4.50	**	5y3m	8/1/2007	11/1/2012
NY	Buffalo	Buffalo Niagara International	BUF	M	$4.50	$18,574,476	2y5m	11/1/2012	4/1/2015
NY	Elmira	Elmira/Corning Regional	ELM	N	$3.00	$733,042	3y1m	12/1/2004	1/1/2008
NY	Elmira	Elmira/Corning Regional	ELM	N	$4.50	$5,931,284	11y3m	5/1/2008	8/1/2019
NY	Islip	Long Island MacArthur	ISP	S	$3.00	$27,645,312	10y9m	12/1/1994	9/1/2005
NY	Islip	Long Island MacArthur	ISP	S	$4.50	$36,789,972	9y10m	9/1/2005	7/1/2015
NY	Ithaca	Ithaca Tompkins Regional	ITH	N	$3.00	$6,872,612	16y2m	1/1/1993	3/1/2009
NY	Ithaca	Ithaca Tompkins Regional	ITH	N	$4.50	**	7y2m	3/1/2009	5/1/2016
NY	Ithaca	Ithaca Tompkins Regional	ITH	N	$4.50	$677,825	1y9m	5/1/2016	2/1/2018
NY	Jamestown	Chautauqua County/Jamestown	JHW	CS	$3.00	$593,058	9y2m	6/1/1993	8/1/2002
NY	Jamestown	Chautauqua County/Jamestown	JHW	CS	$4.50	$200,112	11y2m	9/1/2004	11/1/2015
NY	Massena	Massena International - Richards Field	MSS	CS	$3.00	$163,429	19y7m	4/1/1996	11/1/2015
NY	New York	John F. Kennedy International	JFK	L	$3.00	$998,002,783	13y6m	10/1/1992	4/1/2006
NY	New York	John F. Kennedy International	JFK	L	$4.50	**	5y3m	4/1/2006	7/1/2011
NY	New York	John F. Kennedy International	JFK	L	$4.50	$661,152,839	7y6m	7/1/2011	1/1/2019
NY	New York	LaGuardia	LGA	L	$3.00	$705,913,652	13y6m	10/1/1992	4/1/2006
NY	New York	LaGuardia	LGA	L	$4.50	**	5y3m	4/1/2006	7/1/2011
NY	New York	LaGuardia	LGA	L	$4.50	$328,031,127	7y6m	7/1/2011	1/1/2019
NY	Newburgh	Stewart International	SWF	N	$3.00	$8,827,899	6y4m	11/1/1995	3/1/2002
NY	Newburgh	Stewart International	SWF	N	$4.50	**	3y8m	3/1/2002	11/1/2005
NY	Newburgh	Stewart International	SWF	N	$4.50	$254,187	4m	5/1/2007	9/1/2007
NY	Newburgh	Stewart International	SWF	N	$4.50	$9,018,731	9y3m	7/1/2010	10/1/2019
NY	Ogdensburg	Ogdensburg International	OGS	CS	$3.00	$125,050	23y8m	4/1/1996	12/1/2019
NY	Plattsburgh	Clinton County	PLB	N	$3.00	$184,658	7y8m	7/1/1993	3/1/2001
NY	Plattsburgh	Clinton County	PLB	N	$3.00	$46,317	3y10m	6/1/2001	4/1/2003
NY	Plattsburgh	Plattsburgh International	PBG	N	$4.50	$56,896,377	34y1m	1/1/2009	2/1/2043
NY	Rochester	Greater Rochester International	ROC	S	$3.00	$20,664,219	6y8m	12/1/1997	9/1/2004
NY	Rochester	Greater Rochester International	ROC	S	$4.50	$107,822,638	23y	9/1/2004	9/1/2027
NY	Saranac Lake	Adirondack Regional	SLK	CS	$3.00	$120,749	13y1m	8/1/1994	9/1/2007
NY	Saranac Lake	Adirondack Regional	SLK	CS	$4.50	$470,825	22y4m	2/1/2011	6/1/2033
NY	Syracuse	Syracuse Hancock International	SYR	S	$3.00	$15,445,446	6y3m	10/1/1995	1/1/2002

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NY	Syracuse	Syracuse Hancock International	SYR	S	$4.50	$10,495,193	2y10m	10/1/2002	8/1/2005
NY	Syracuse	Syracuse Hancock International	SYR	S	$4.50	$4,248,943	1y3m	11/1/2005	2/1/2007
NY	Syracuse	Syracuse Hancock International	SYR	S	$4.50	$96,732,010	19y4m	4/1/2007	8/1/2026
NY	Utica	Oneida County	UCA		$3.00	$1,298,631	12y10m	8/1/1997	6/1/2010
NY	White Plains	Westchester County	HPN	S	$3.00	$15,546,537	8y10m	2/1/1993	12/1/2001
NY	White Plains	Westchester County	HPN	S	$4.50	**	2y5m	12/1/2001	5/1/2004
NY	White Plains	Westchester County	HPN	S	$4.50	$26,100,000	10y	5/1/2004	5/1/2014
NC	Asheville	Asheville Regional	AVL	N	$3.00	$5,622,844	7y10m	12/1/1994	10/1/2002
NC	Asheville	Asheville Regional	AVL	N	$4.50	$4,916,517	4y1m	10/1/2002	11/1/2006
NC	Asheville	Asheville Regional	AVL	N	$4.50	$478,051	5m	4/1/2007	9/1/2007
NC	Asheville	Asheville Regional	AVL	N	$4.50	$18,534,839	16y6m	10/1/2007	4/1/2024
NC	Charlotte	Charlotte/Douglas International	CLT	L	$3.00	$1,036,775,656	18y9m	11/1/2004	8/1/2023
NC	Fayetteville	Fayetteville Regional/Grannis Field	FAY	N	$3.00	$1,676,077	5y3m	11/1/2000	2/1/2006
NC	Fayetteville	Fayetteville Regional/Grannis Field	FAY	N	$4.00	$1,992,908	3y3m	7/1/2009	10/1/2012
NC	Fayetteville	Fayetteville Regional/Grannis Field	FAY	N	$4.00	$1,575,744	3m	3/1/2013	6/1/2013
NC	Greensboro	Piedmont Triad International	GSO	S	$4.50	$43,872,158	10y8m	9/1/2011	5/1/2022
NC	Greenville	Pitt-Greenville	PGV	N	$3.00	$494,486	3y6m	10/1/1997	4/1/2001
NC	Greenville	Pitt-Greenville	PGV	N	$4.50	**	3m	4/1/2001	7/1/2001
NC	Greenville	Pitt-Greenville	PGV	N	$4.50	$3,184,473	14y6m	7/1/2001	1/1/2016
NC	Jacksonville	Albert J. Ellis	OAJ	N	$3.00	$208,878	2y9m	1/1/1996	10/1/1998
NC	Jacksonville	Albert J. Ellis	OAJ	N	$3.00	*	11m	9/1/1999	8/1/2000
NC	Jacksonville	Albert J. Ellis	OAJ	N	$3.00	$980,261	3y10m	3/1/2005	1/1/2009
NC	Jacksonville	Albert J. Ellis	OAJ	N	$3.00	$115,842	2y9m	2/1/2009	11/1/2011
NC	Jacksonville	Albert J. Ellis	OAJ	N	$3.00	$11,919,255	3m	11/1/2011	2/1/2012
NC	Jacksonville	Albert J. Ellis	OAJ	N	$4.50	**	17y2m	2/1/2012	4/1/2029
NC	New Bern	Coastal Carolina Regional	EWN	N	$3.00	$10,681,398	6y9m	2/1/1997	11/1/2003
NC	New Bern	Coastal Carolina Regional	EWN	N	$4.50	**	21y	11/1/2003	11/1/2024
NC	New Bern	Coastal Carolina Regional	EWN	N	$4.50	$518,877	11m	11/1/2024	10/1/2025
NC	Raleigh	Raleigh-Durham International	RDU	M	$3.00	$7,439,029	1y6m	4/1/2003	10/1/2004
NC	Raleigh	Raleigh-Durham International	RDU	M	$4.50	$765,251,376	28y11m	10/1/2004	9/1/2032
NC	Wilmington	Wilmington International	ILM	S	$3.00	$1,526,487	2y7m	2/1/1994	9/1/1996
NC	Wilmington	Wilmington International	ILM	S	$3.00	$7,984,994	4y11m	6/1/1998	5/1/2003
NC	Wilmington	Wilmington International	ILM	S	$4.50	**	3y11m	5/1/2003	4/1/2007
NC	Wilmington	Wilmington International	ILM	S	$4.50	$23,669,238	17y4m	4/1/2007	8/1/2024
ND	Bismarck	Bismarck Municipal	BIS	N	$3.00	$349,092	1y	7/1/1996	7/1/1997
ND	Bismarck	Bismarck Municipal	BIS	N	$3.00	$1,342,095	3y10m	6/1/1998	4/1/2002
ND	Bismarck	Bismarck Municipal	BIS	N	$4.50	$13,190,620	16y2m	4/1/2002	6/1/2018
ND	Dickinson	Dickinson - Theodore Roosevelt Regional	DIK	N	$4.50	$714,384	6y2m	4/1/2014	6/1/2020
ND	Fargo	Hector International	FAR	S	$3.00	$4,633,814	5y7m	1/1/1997	8/1/2002
ND	Fargo	Hector International	FAR	S	$4.50	**	1y11m	8/1/2002	7/1/2004
ND	Fargo	Hector International	FAR	S	$4.50	$18,778,543	14y	7/1/2004	7/1/2018
ND	Grand Forks	Grand Forks International	GFK	N	$3.00	$680,106	3y6m	2/1/1993	8/1/1996
ND	Grand Forks	Grand Forks International	GFK	N	$3.00	$1,649,102	3y11m	5/1/1997	4/1/2001
ND	Grand Forks	Grand Forks International	GFK	N	$4.50	**	2y2m	4/1/2001	6/1/2003

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ND	Grand Forks	Grand Forks International	GFK	N	$4.50	$1,506,569	4y5m	5/1/2004	10/1/2008
ND	Grand Forks	Grand Forks International	GFK	N	$4.50	$5,628,792	13y1m	1/1/2009	2/1/2022
ND	Minot	Minot International	MOT	N	$3.00	$825,445	4y4m	3/1/1994	7/1/1998
ND	Minot	Minot International	MOT	N	$3.00	$990,656	2y11m	3/1/1999	2/1/2002
ND	Minot	Minot International	MOT	N	$4.50	**	1y2m	2/1/2002	4/1/2003
ND	Minot	Minot International	MOT	N	$4.50	$15,821,748	20y4m	4/1/2003	8/1/2023
ND	Williston	Sloulin Field International	ISN	N	$4.50	$2,825,713	12y10m	4/1/2013	2/1/2026
OH	Akron	Akron-Canton Regional	CAK	S	$3.00	$7,139,248	10y	9/1/1992	9/1/2002
OH	Akron	Akron-Canton Regional	CAK	S	$4.50	$44,624,553	16y4m	9/1/2002	1/1/2019
OH	Cleveland	Cleveland-Hopkins International	CLE	M	$3.00	$194,277,586	9y4m	11/1/1992	3/1/2002
OH	Cleveland	Cleveland-Hopkins International	CLE	M	$4.50	**	2y5m	3/1/2002	8/1/2004
OH	Cleveland	Cleveland-Hopkins International	CLE	M	$4.50	$396,639,879	19y1m	8/1/2004	9/1/2023
OH	Columbus	Port Columbus International	CMH	M	$3.00	$128,445,302	9y6m	10/1/1992	4/1/2002
OH	Columbus	Port Columbus International	CMH	M	$4.50	**	2y6m	4/1/2002	10/1/2004
OH	Columbus	Port Columbus International	CMH	M	$4.50	$334,181,216	19y4m	10/1/2004	2/1/2024
OH	Dayton	James M Cox Dayton International	DAY	S	$3.00	$28,098,728	6y11m	10/1/1994	9/1/2001
OH	Dayton	James M Cox Dayton International	DAY	S	$4.50	**	1y10m	9/1/2001	7/1/2003
OH	Dayton	James M Cox Dayton International	DAY	S	$4.50	$102,734,120	15y9m	7/1/2003	4/1/2019
OH	Toledo	Toledo Express	TOL	N	$3.00	$2,246,374	3y	9/1/1993	9/1/1996
OH	Toledo	Toledo Express	TOL	N	$3.00	$6,442,493	4y	7/1/1997	7/1/2001
OH	Toledo	Toledo Express	TOL	N	$4.50	**	2y6m	7/1/2001	1/1/2004
OH	Toledo	Toledo Express	TOL	N	$4.50	$7,607,456	13y11m	1/1/2004	12/1/2017
OH	Youngstown	Youngstown-Warren Regional	YNG	N	$3.00	$214,384	2y2m	5/1/1994	7/1/1996
OH	Youngstown	Youngstown-Warren Regional	YNG	N	$3.00	$477,044	4y6m	8/1/1997	2/1/2002
OH	Youngstown	Youngstown-Warren Regional	YNG	N	$4.50	$2,493,885	22y10m	4/1/2007	2/1/2030
OK	Lawton	Lawton-Fort Sill Regional	LAW	N	$2.00	$452,189	1y5m	8/1/1992	1/1/1994
OK	Lawton	Lawton-Fort Sill Regional	LAW	N	$3.00	**	2y3m	1/1/1994	4/1/1996
OK	Lawton	Lawton-Fort Sill Regional	LAW	N	$3.00	$380,745	2y7m	1/1/1998	8/1/2000
OK	Lawton	Lawton-Fort Sill Regional	LAW	N	$4.50	$303,687	1y9m	6/1/2002	3/1/2004
OK	Lawton	Lawton-Fort Sill Regional	LAW	N	$4.50	$249,492	1y1m	9/1/2004	10/1/2005
OK	Lawton	Lawton-Fort Sill Regional	LAW	N	$4.50	$2,424,273	8y	11/1/2007	11/1/2015
OK	Oklahoma City	Will Rogers World	OKC	S	$3.00	$131,057,571	12y9m	7/1/1997	4/1/2010
OK	Oklahoma City	Will Rogers World	OKC	S	$4.50	**	10y1m	4/1/2010	5/1/2020
OK	Oklahoma City	Will Rogers World	OKC	S	$4.50	$5,226,000	7m	5/1/2020	12/1/2020
OK	Tulsa	Tulsa International	TUL	S	$3.00	$15,986,724	3y7m	8/1/1992	3/1/1996
OK	Tulsa	Tulsa International	TUL	S	$3.00	$107,383,756	12y11m	1/1/1997	8/1/2010
OK	Tulsa	Tulsa International	TUL	S	$4.50	**	11y8m	8/1/2010	4/1/2022
OK	Tulsa	Tulsa International	TUL	S	$4.50	$65,980,712	11y	4/1/2022	4/1/2033
OR	Eugene	Mahlon Sweet Field	EUG	S	$3.00	$6,537,176	7y7m	11/1/1993	6/1/2001
OR	Eugene	Mahlon Sweet Field	EUG	S	$4.50	$22,716,750	14y	6/1/2001	6/1/2015
OR	Klamath Falls	Klamath Falls	LMT	N	$3.00	$426,251	1y1m	3/1/2000	4/1/2001
OR	Klamath Falls	Klamath Falls	LMT	N	$4.50	**	3y1m	4/1/2001	5/1/2004
OR	Klamath Falls	Klamath Falls	LMT	N	$4.50	$718,606	7y7m	5/1/2004	12/1/2011
OR	Klamath Falls	Klamath Falls	LMT	N	$4.50	$987,785	11y6m	4/1/2012	10/1/2023

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OR	Medford	Rogue Valley International - Medford	MFR	N	$3.00	$4,881,207	7y9m	7/1/1993	4/1/2001
OR	Medford	Rogue Valley International - Medford	MFR	N	$4.50	**	2y	4/1/2001	4/1/2003
OR	Medford	Rogue Valley International - Medford	MFR	N	$4.50	$29,951,653	23y4m	4/1/2003	8/1/2026
OR	North Bend	Southwest Oregon Regional	OTH	N	$3.00	$520,605	7y6m	2/1/1994	8/1/2001
OR	North Bend	Southwest Oregon Regional	OTH	N	$4.50	**	1y9m	8/1/2001	5/1/2003
OR	North Bend	Southwest Oregon Regional	OTH	N	$4.50	$2,557,363	17y9m	5/1/2003	2/1/2021
OR	Pendleton	Eastern Oregon Regional at Pendleton	PDT	CS	$3.00	$486,540	13y10m	12/1/1995	10/1/2009
OR	Pendleton	Eastern Oregon Regional at Pendleton	PDT	CS	$4.50	**	7y2m	10/1/2009	12/1/2016
OR	Portland	Portland International	PDX	L	$3.00	$613,687,685	9y3m	7/1/1992	10/1/2001
OR	Portland	Portland International	PDX	L	$4.50	**	14y7m	10/1/2001	5/1/2016
OR	Portland	Portland International	PDX	L	$4.50	$501,226,941	18y6m	5/1/2016	11/1/2034
OR	Redmond	Roberts Field	RDM	N	$3.00	$3,517,536	8y1m	10/1/1993	11/1/2001
OR	Redmond	Roberts Field	RDM	N	$4.50	**	2y1m	11/1/2001	12/1/2003
OR	Redmond	Roberts Field	RDM	N	$4.50	$2,083,546	3y	12/1/2003	12/1/2006
OR	Redmond	Roberts Field	RDM	N	$4.50	$27,930,168	33y4m	3/1/2007	7/1/2040
PA	Allentown	Lehigh Valley International	ABE	N	$3.00	$11,092,349	8y3m	11/1/1992	2/1/2001
PA	Allentown	Lehigh Valley International	ABE	N	$3.00	$2,807,572	5m	6/1/2001	11/1/2001
PA	Allentown	Lehigh Valley International	ABE	N	$4.50	**	1y2m	11/1/2001	1/1/2003
PA	Allentown	Lehigh Valley International	ABE	N	$4.50	$31,075,601	14y11m	9/1/2003	8/1/2018
PA	Altoona	Altoona-Blair County	AOO	CS	$3.00	$110,500	2y9m	5/1/1993	2/1/1996
PA	Altoona	Altoona-Blair County	AOO	CS	$3.00	$116,620	2y9m	1/1/1997	10/1/1999
PA	Altoona	Altoona-Blair County	AOO	CS	$3.00	$276,005	8y5m	7/1/2000	12/1/2008
PA	Altoona	Altoona-Blair County	AOO	CS	$4.50	**	3y	12/1/2008	12/1/2011
PA	Altoona	Altoona-Blair County	AOO	CS	$4.50	$139,918	7y	12/1/2011	12/1/2018
PA	Bradford	Bradford Regional	BFD	GA	$3.00	$206,793	7y9m	8/1/1995	5/1/2003
PA	Bradford	Bradford Regional	BFD	GA	$4.50	$437,822	14y6m	5/1/2003	11/1/2017
PA	Du Bois	Dubois Regional	DUJ	CS	$3.00	$386,636	5y10m	6/1/1995	4/1/2001
PA	Du Bois	Dubois Regional	DUJ	CS	$4.50	**	2y7m	4/1/2001	11/1/2003
PA	Du Bois	Dubois Regional	DUJ	CS	$4.50	$325,413	14y6m	4/1/2004	10/1/2018
PA	Erie	Erie International/Tom Ridge Field	ERI	N	$3.00	$2,022,109	4y8m	10/1/1992	6/1/1997
PA	Erie	Erie International/Tom Ridge Field	ERI	N	$3.00	$1,216,914	3y5m	12/1/1997	5/1/2001
PA	Erie	Erie International/Tom Ridge Field	ERI	N	$4.50	$618,885	1y5m	8/1/2003	1/1/2005
PA	Erie	Erie International/Tom Ridge Field	ERI	N	$4.50	$12,070,540	19y7m	7/1/2005	2/1/2025
PA	Harrisburg	Harrisburg International	MDT	S	$3.00	$17,744,614	5y11m	2/1/1997	1/1/2003
PA	Harrisburg	Harrisburg International	MDT	S	$4.50	$118,372,500	31y6m	1/1/2003	7/1/2034
PA	Johnstown	John Murtha Johnstown-Cambria County	JST	CS	$3.00	$148,269	3y1m	11/1/1993	12/1/1996
PA	Johnstown	John Murtha Johnstown-Cambria County	JST	CS	$3.00	$510,227	5y4m	12/1/1997	5/1/2001
PA	Johnstown	John Murtha Johnstown-Cambria County	JST	CS	$4.50	**	5y8m	5/1/2001	1/1/2007
PA	Johnstown	John Murtha Johnstown-Cambria County	JST	CS	$4.50	$285,335	8y7m	7/1/2007	2/1/2016
PA	Lancaster	Lancaster	LNS	GA	$3.00	$495,032	14y	2/1/1995	2/1/2009
PA	Lancaster	Lancaster	LNS	GA	$4.50	$35,917	4y	7/1/2013	7/1/2017
PA	Latrobe	Arnold Palmer Regional	LBE	N	$3.00	$1,397,687	17y4m	3/1/1996	7/1/2013
PA	Latrobe	Arnold Palmer Regional	LBE	N	$4.50	$1,212,231	4y	7/1/2013	7/1/2017
PA	Philadelphia	Philadelphia International	PHL	L	$3.00	$1,141,562,798	8y7m	9/1/1992	4/1/2001

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PA	Philadelphia	Philadelphia International	PHL	L	$4.50	**	11y10m	4/1/2001	2/1/2013
PA	Philadelphia	Philadelphia International	PHL	L	$3.00	**	1m	2/1/2013	3/1/2013
PA	Philadelphia	Philadelphia International	PHL	L	$4.50	**	3y3m	3/1/2013	6/1/2016
PA	Philadelphia	Philadelphia International	PHL	L	$3.00	$24,400,000	5m	6/1/2016	11/1/2016
PA	Philadelphia	Philadelphia International	PHL	L	$4.50	$249,450,000	2y3m	11/1/2016	2/1/2019
PA	Pittsburgh	Pittsburgh International	PIT	M	$3.00	$100,098,648	3y2m	10/1/2001	12/1/2004
PA	Pittsburgh	Pittsburgh International	PIT	M	$4.50	**	1y9m	12/1/2004	9/1/2006
PA	Pittsburgh	Pittsburgh International	PIT	M	$4.50	$426,674,028	18y3m	9/1/2006	12/1/2024
PA	Reading	Reading Regional/Carl A Spaatz Field	RDG	GA	$3.00	$1,006,653	13y7m	12/1/1994	7/1/2008
PA	State College	University Park	UNV/ SCE	N	$3.00	$3,742,876	11y	11/1/1992	11/1/2003
PA	State College	University Park	UNV/ SCE	N	$4.50	**	2y8m	11/1/2003	7/1/2006
PA	State College	University Park	UNV/ SCE	N	$4.50	$5,370,994	8y9m	7/1/2006	4/1/2015
PA	Wilkes-Barre	Wilkes-Barre/Scranton International	AVP	N	$3.00	$4,453,122	3y6m	12/1/1993	6/1/1997
PA	Wilkes-Barre	Wilkes-Barre/Scranton International	AVP	N	$3.00	*	3y5m	12/1/1997	5/1/2001
PA	Wilkes-Barre	Wilkes-Barre/Scranton International	AVP	N	$4.50	$19,507,262	32y2m	5/1/2001	7/1/2033
PA	Williamsport	Williamsport Regional	IPT	N	$3.00	$132,488	1y6m	5/1/1997	11/1/1998
PA	Williamsport	Williamsport Regional	IPT	N	$4.50	$1,725,000	14y10m	11/1/2013	9/1/2028
PR	Aguadilla	Rafael Hernandez	BQN	N	$3.00	$0	3y2m	3/1/1993	5/1/1996
PR	Aguadilla	Rafael Hernandez	BQN	N	$4.50	$9,828,476	16y	12/1/2005	12/1/2021
PR	Ponce	Mercedita	PSE	N	$3.00	$866,000	5y5m	3/1/1993	9/1/1998
PR	San Juan	Luis Munoz Marin International	SJU	M	$3.00	$180,182,826	12y9m	3/1/1993	12/1/2005
PR	San Juan	Luis Munoz Marin International	SJU	M	$4.50	**	2y6m	12/1/2005	6/1/2008
PR	San Juan	Luis Munoz Marin International	SJU	M	$4.50	$641,472,585	19y3m	6/1/2008	9/1/2027
RI	Providence	Theodore Francis Green State	PVD	M	$3.00	$100,136,720	12y7m	2/1/1994	9/1/2006
RI	Providence	Theodore Francis Green State	PVD	M	$4.50	**	1y6m	9/1/2006	3/1/2008
RI	Providence	Theodore Francis Green State	PVD	M	$4.50	$161,799,036	20y4m	3/1/2008	7/1/2028
SC	Charleston	Charleston AFB/International	CHS	S	$4.50	$197,985,832	30y7m	3/1/2010	10/1/2040
SC	Columbia	Columbia Metropolitan	CAE	S	$3.00	$70,528,884	8y1m	11/1/1993	12/1/2001
SC	Columbia	Columbia Metropolitan	CAE	S	$4.50	**	26y10m	12/1/2001	10/1/2028
SC	Florence	Florence Regional	FLO	N	$3.00	$669,334	3y11m	12/1/1995	11/1/1999
SC	Florence	Florence Regional	FLO	N	$3.00	*	2m	12/1/1999	2/1/2000
SC	Florence	Florence Regional	FLO	N	$4.50	$827,258	3y2m	12/1/2014	2/1/2018
SC	Hilton Head Island	Hilton Head	HXD/ HHH	N	$3.00	$1,542,300	6y4m	2/1/1994	6/1/2000
SC	Hilton Head Island	Hilton Head	HXD/ HHH	N	$3.00	$1,375,156	6y10m	12/1/2000	10/1/2007
SC	Hilton Head Island	Hilton Head	HXD/ HHH	N	$4.50	$2,619,447	10y2m	5/1/2012	7/1/2022
SC	Myrtle Beach	Myrtle Beach International	MYR	S	$3.00	$27,941,134	5y10m	10/1/1996	8/1/2001
SC	Myrtle Beach	Myrtle Beach International	MYR	S	$4.50	**	6y	8/1/2001	8/1/2007
SC	Myrtle Beach	Myrtle Beach International	MYR	S	$4.50	$104,020,700	21y7m	6/1/2010	1/1/2032
SD	Aberdeen	Aberdeen Regional	ABR	N	$3.00	$677,809	2y	1/1/2000	1/1/2002
SD	Aberdeen	Aberdeen Regional	ABR	N	$4.50	**	5y5m	1/1/2002	6/1/2007
SD	Aberdeen	Aberdeen Regional	ABR	N	$4.50	$1,076,140	11y10m	6/1/2007	4/1/2019
SD	Pierre	Pierre Regional	PIR	N	$4.50	$366,239	6y5m	2/1/2003	7/1/2009
SD	Pierre	Pierre Regional	PIR	N	$4.50	$422,107	7y	9/1/2009	9/1/2016

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SD	Rapid City	Rapid City Regional	RAP	N	$3.00	$700,358	2y5m	8/1/1997	1/1/2000
SD	Rapid City	Rapid City Regional	RAP	N	$3.00	$4,109,960	6y	6/1/2000	6/1/2006
SD	Rapid City	Rapid City Regional	RAP	N	$4.50	**	9m	6/1/2006	5/1/2007
SD	Rapid City	Rapid City Regional	RAP	N	$4.50	$30,121,900	26y10m	5/1/2007	3/1/2034
TN	Bristol	Tri-Cities Regional TN/VA	TRI	N	$3.00	$10,521,507	10y5m	2/1/1997	7/1/2007
TN	Bristol	Tri-Cities Regional TN/VA	TRI	N	$4.50	**	5y7m	7/1/2007	2/1/2013
TN	Bristol	Tri-Cities Regional TN/VA	TRI	N	$4.50	$3,916,612	4y3m	2/1/2013	5/1/2017
TN	Chattanooga	Lovell Field	CHA	N	$3.00	$12,249,301	6y9m	7/1/1994	4/1/2001
TN	Chattanooga	Lovell Field	CHA	N	$4.50	**	3y7m	4/1/2001	11/1/2004
TN	Chattanooga	Lovell Field	CHA	N	$3.00	**	3m	11/1/2004	2/1/2005
TN	Chattanooga	Lovell Field	CHA	N	$4.50	**	5y6m	2/1/2005	8/1/2010
TN	Chattanooga	Lovell Field	CHA	N	$4.50	$10,471,254	5y2m	8/1/2010	10/1/2015
TN	Jackson	McKellar-Sipes Regional	MKL	CS	$4.50	$332,248	22y8m	10/1/2002	6/1/2025
TN	Knoxville	McGhee Tyson	TYS	S	$3.00	$99,080,294	9y9m	1/1/1994	10/1/2003
TN	Knoxville	McGhee Tyson	TYS	S	$4.50	**	18y9m	10/1/2003	7/1/2022
TN	Knoxville	McGhee Tyson	TYS	S	$4.50	$4,691,627	1y2m	7/1/2022	9/1/2023
TN	Memphis	Memphis International	MEM	M	$3.00	$53,700,000	4y5m	8/1/1992	1/1/1997
TN	Nashville	Nashville International	BNA	M	$3.00	$220,000,330	22y8m	1/1/1993	12/1/2009
TN	Nashville	Nashville International	BNA	M	$4.50	**	9m	12/1/2009	9/1/2010
TN	Nashville	Nashville International	BNA	M	$3.00	$72,476,440	4y8m	9/1/2010	5/1/2015
TN	Nashville	Nashville International	BNA	M	$4.50	$24,163,987	1y6m	5/1/2015	11/1/2016
TX	Abilene	Abilene Regional	ABI	N	$3.00	$2,008,611	4y8m	1/1/1998	9/1/2002
TX	Abilene	Abilene Regional	ABI	N	$4.50	**	5y10m	9/1/2002	7/1/2008
TX	Abilene	Abilene Regional	ABI	N	$4.50	$5,944,505	15y8m	7/1/2008	3/1/2024
TX	Amarillo	Rick Husband Amarillo International	AMA	S	$4.50	$19,200,000	9y7m	12/1/2008	7/1/2018
TX	Austin	Robert Mueller Municipal	AUS	M	$2.00	$6,189,459	3m	11/1/1993	2/1/1994
TX	Austin	Robert Mueller Municipal	AUS	M	$3.00	**	1y	2/1/1994	2/1/1995
TX	Austin	Austin-Bergstrom International	AUS	M	$3.00	$343,074,546	8y9m	7/1/1995	4/1/2004
TX	Austin	Austin-Bergstrom International	AUS	M	$4.50	**	15y9m	4/1/2004	1/1/2020
TX	Austin	Austin-Bergstrom International	AUS	M	$4.50	$4,125,000	4m	1/1/2020	5/1/2020
TX	Beaumont/Port Arthur	Jack Brooks Regional	BPT	N	$3.00	$2,784,768	7y6m	9/1/1994	3/1/2002
TX	Beaumont/Port Arthur	Jack Brooks Regional	BPT	N	$4.50	**	3y1m	3/1/2002	4/1/2005
TX	Beaumont/Port Arthur	Jack Brooks Regional	BPT	N	$4.50	$1,758,573	16y6m	4/1/2005	10/1/2021
TX	Brownsville	Brownsville/South Padre Island International	BRO	N	$3.00	$1,099,404	5y7m	10/1/1997	5/1/2003
TX	Brownsville	Brownsville/South Padre Island International	BRO	N	$4.50	$5,925,705	17y11m	5/1/2003	4/1/2021
TX	College Station	Easterwood Field	CLL	N	$3.00	$2,063,797	4y9m	7/1/1996	4/1/2001
TX	College Station	Easterwood Field	CLL	N	$4.50	**	2y9m	4/1/2001	1/1/2004
TX	College Station	Easterwood Field	CLL	N	$4.50	$4,712,844	14y4m	1/1/2004	5/1/2018
TX	Corpus Christi	Corpus Christi International	CRP	N	$3.00	$49,700,114	9y1m	3/1/1994	3/1/2003
TX	Corpus Christi	Corpus Christi International	CRP	N	$4.50	**	23y10m	3/1/2003	1/1/2027
TX	Dallas	Dallas Love Field	DAL	M	$3.00	$349,086,108	2y	2/1/2008	2/1/2010
TX	Dallas	Dallas Love Field	DAL	M	$4.50	**	14y3m	2/1/2010	5/1/2024
TX	Dallas	Dallas Love Field	DAL	M	$3.00	$10,987,816	7m	5/1/2024	12/1/2024
TX	Dallas-Ft Worth	Dallas/Ft Worth International	DFW	L	$3.00	$182,438,761	2y1m	5/1/1994	6/1/1996

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TX	Dallas-Ft Worth	Dallas/Ft Worth International	DFW	L	$3.00	$2,306,174,080	5y5m	2/1/1997	7/1/2002
TX	Dallas-Ft Worth	Dallas/Ft Worth International	DFW	L	$4.50	**	14y8m	7/1/2002	3/1/2017
TX	Dallas-Ft Worth	Dallas/Ft Worth International	DFW	L	$3.00	$51,900,495	2m	3/1/2017	5/1/2017
TX	Dallas-Ft Worth	Dallas/Ft Worth International	DFW	L	$4.50	$2,988,412,952	17y4m	5/1/2017	9/1/2034
TX	Del Rio	Del Rio International	DRT	N	$4.50	$403,739	5y10m	2/1/2010	12/1/2015
TX	El Paso	El Paso International	ELP	S	$3.00	$75,350,052	13y7m	1/1/1997	8/1/2010
TX	El Paso	El Paso International	ELP	S	$4.50	**	2y9m	8/1/2010	5/1/2013
TX	El Paso	El Paso International	ELP	S	$4.50	$19,085,123	2y10m	6/1/2013	4/1/2016
TX	Harlingen	Valley International	HRL	N	$3.00	$9,716,744	9y1m	11/1/1998	12/1/2007
TX	Harlingen	Valley International	HRL	N	$4.50	$3,401,949	1y7m	12/1/2007	7/1/2009
TX	Harlingen	Valley International	HRL	N	$4.50	$13,044,000	6y5m	8/1/2009	1/1/2016
TX	Houston	William P. Hobby	HOU	M	$3.00	$163,517,150	12y	11/1/2006	11/1/2017
TX	Houston	George Bush Intercontinental/ Houston	IAH	L	$3.00	$1,372,445,143	18y11m	12/1/2008	11/1/2027
TX	Killeen	Killeen Municipal	ILE	N	$3.00	$242,051	1y10m	1/1/1993	11/1/1994
TX	Killeen	Killeen Municipal	ILE	N	$3.00	$3,579,834	6y1m	4/1/1995	5/1/2001
TX	Killeen	Killeen Municipal	ILE	N	$4.50	**	2y3m	5/1/2001	8/1/2003
TX	Killeen	Robert Gray AAF	ILE/ GRK	N	$4.50	*	2y1m	12/1/2003	1/1/2006
TX	Killeen	Robert Gray AAF	GRK	N	$4.50	$7,901,575	12y5m	6/1/2006	11/1/2018
TX	Laredo	Laredo International	LRD	N	$3.00	$6,303,839	15y8m	10/1/1993	6/1/2009
TX	Laredo	Laredo International	LRD	N	$4.50	**	9y2m	6/1/2009	8/1/2016
TX	Laredo	Laredo International	LRD	N	$4.50	$7,852,765	9y5m	8/1/2016	1/1/2026
TX	Longview	East Texas Regional	GGG	N	$3.00	$472,571	5y7m	9/1/1996	4/1/2002
TX	Longview	East Texas Regional	GGG	N	$3.00	$699,232	10y	9/1/2002	9/1/2012
TX	Longview	East Texas Regional	GGG	N	$4.50	**	4m	9/1/2012	1/1/2013
TX	Longview	East Texas Regional	GGG	N	$4.50	$1,178,540	10y8m	1/1/2013	9/1/2023
TX	Lubbock	Lubbock Preston Smith International	LBB	S	$3.00	$16,178,722	11y4m	10/1/1993	2/1/2005
TX	Lubbock	Lubbock Preston Smith International	LBB	S	$2.00	$4,168,971	2y	2/1/2005	2/1/2007
TX	Lubbock	Lubbock Preston Smith International	LBB	S	$3.00	$12,794,346	1y4m	2/1/2007	6/1/2008
TX	Lubbock	Lubbock Preston Smith International	LBB	S	$4.50	**	4y5m	6/1/2008	11/1/2012
TX	Lubbock	Lubbock Preston Smith International	LBB	S	$4.50	$14,023,957	7y4m	11/1/2012	3/1/2020
TX	McAllen	McAllen Miller International	MFE	N	$3.00	$9,570,146	13y2m	4/1/1998	6/1/2011
TX	McAllen	McAllen Miller International	MFE	N	$4.50	**	2y	6/1/2011	6/1/2013
TX	McAllen	McAllen Miller International	MFE	N	$4.50	$19,145,000	8y10m	6/1/2013	4/1/2022
TX	Midland	Midland International	MAF	S	$3.00	$35,873,495	11y9m	1/1/1993	9/1/2004
TX	Midland	Midland International	MAF	S	$4.50	**	9y4m	9/1/2004	1/1/2014
TX	Midland	Midland International	MAF	S	$3.00	$1,395,921	10m	1/1/2014	11/1/2014
TX	Midland	Midland International	MAF	S	$4.50	$7,719,111	3y6m	11/1/2014	5/1/2018
TX	San Angelo	San Angelo Regional/Mathis Field	SJT	N	$3.00	$1,266,877	8y11m	5/1/1993	4/1/2002
TX	San Angelo	San Angelo Regional/Mathis Field	SJT	N	$4.50	**	2y4m	4/1/2002	8/1/2004
TX	San Angelo	San Angelo Regional/Mathis Field	SJT	N	$4.50	$3,687,430	14y	8/1/2004	8/1/2018
TX	San Antonio	San Antonio International	SAT	M	$3.00	$364,227,049	5y11m	11/1/2001	10/1/2007
TX	San Antonio	San Antonio International	SAT	M	$4.50	**	11y7m	10/1/2007	5/1/2019
TX	San Antonio	San Antonio International	SAT	M	$4.50	$142,929,158	6y2m	5/1/2019	7/1/2025
TX	Tyler	Tyler Pounds Regional	TYR	N	$3.00	$2,901,212	9y6m	3/1/1994	9/1/2003

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TX	Tyler	Tyler Pounds Regional	TYR	N	$4.50	**	4y11m	9/1/2003	8/1/2008
TX	Tyler	Tyler Pounds Regional	TYR	N	$4.50	$3,220,587	9y1m	8/1/2008	9/1/2017
TX	Victoria	Victoria Regional	VCT	CS	$3.00	$195,960	3y	12/1/1994	8/1/1998
TX	Victoria	Victoria Regional	VCT	CS	$3.00	$188,872	3y	1/1/1999	1/1/2002
TX	Victoria	Victoria Regional	VCT	CS	$4.50	$444,905	14y2m	1/1/2002	3/1/2016
TX	Waco	Waco Regional	ACT	N	$3.00	$2,438,451	5y11m	11/1/1995	10/1/2001
TX	Waco	Waco Regional	ACT	N	$4.50	**	6y3m	10/1/2001	1/1/2008
TX	Waco	Waco Regional	ACT	N	$4.50	$2,210,688	8y	1/1/2008	1/1/2016
TX	Wichita Falls	Sheppard AFB/Wichita Falls Municipal	SPS	N	$4.50	$9,607,509	49y10m	10/1/2008	8/1/2058
UT	Cedar City	Cedar City Regional	CDC	N	$4.50	$121,704	4y8m	2/1/2007	10/1/2011
UT	Cedar City	Cedar City Regional	CDC	N	$4.50	$500,000	12y1m	2/1/2012	3/1/2024
UT	Salt Lake City	Salt Lake City International	SLC	L	$3.00	$166,173,468	6y4m	12/1/1994	4/1/2001
UT	Salt Lake City	Salt Lake City International	SLC	L	$4.50	**	3m	4/1/2001	7/1/2001
UT	Salt Lake City	Salt Lake City International	SLC	L	$4.50	$839,365,261	20y6m	7/1/2001	1/1/2022
UT	St George	St George Municipal	DXZ/ SGU	N	$3.00	$23,568	4y4m	5/1/1998	9/1/2002
UT	St George	St George Municipal	DXZ/ SGU	N	$4.50	$3,765,402	14y	6/1/2003	6/1/2017
UT	Wendover	Wendover	ENV	GA	$3.00	$142,300	3y2m	8/1/1996	10/1/1999
VT	Burlington	Burlington International	BTV	S	$3.00	$25,408,285	6y5m	4/1/1997	9/1/2003
VT	Burlington	Burlington International	BTV	S	$4.50	**	6y1m	9/1/2003	10/1/2009
VT	Burlington	Burlington International	BTV	S	$4.50	$22,708,469	6y2m	12/1/2009	2/1/2016
VI	Charlotte Amalie	Cyril E. King	STT	S	$3.00	$3,808,574	2y5m	3/1/1993	8/1/1995
VI	Charlotte Amalie	Cyril E. King	STT	S	$3.00	$7,792,000	7y	12/1/1995	12/1/2002
VI	Charlotte Amalie	Cyril E. King	STT	S	$3.00	$13,500,000	7y9m	8/1/2004	4/1/2012
VI	Charlotte Amalie	Cyril E. King	STT	S	$4.50	$13,353,396	9y6m	4/1/2012	10/1/2021
VI	Christiansted	Henry E. Rohlsen	STX	N	$3.00	$2,158,095	3y1m	3/1/1993	4/1/1996
VI	Christiansted	Henry E. Rohlsen	STX	N	$3.00	$4,914,898	6y7m	12/1/1996	7/1/2003
VI	Christiansted	Henry E. Rohlsen	STX	N	$3.00	$1,869,822	9y4m	10/1/2011	2/1/2021
VA	Arlington	Ronald Reagan Washington National	DCA	L	$3.00	$249,603,543	7y6m	11/1/1993	5/1/2001
VA	Arlington	Ronald Reagan Washington National	DCA	L	$4.50	**	4y1m	5/1/2001	6/1/2005
VA	Arlington	Ronald Reagan Washington National	DCA	L	$4.50	$775,963,763	17y8m	6/1/2005	2/1/2023
VA	Chantilly	Washington Dulles International	IAD	L	$3.00	$269,427,498	7y6m	1/1/1994	5/1/2001
VA	Chantilly	Washington Dulles International	IAD	L	$4.50	**	4y	5/1/2001	5/1/2005
VA	Chantilly	Washington Dulles International	IAD	L	$4.50	$2,173,226,652	33y7m	5/1/2005	12/1/2038
VA	Charlottesville	Charlottesville-Albemarle	CHO	N	$2.00	$305,992	1y1m	9/1/1992	10/1/1993
VA	Charlottesville	Charlottesville-Albemarle	CHO	N	$3.00	$3,499,774	9y9m	4/1/1995	1/1/2005
VA	Charlottesville	Charlottesville-Albemarle	CHO	N	$4.50	**	1m	1/1/2005	2/1/2005
VA	Charlottesville	Charlottesville-Albemarle	CHO	N	$4.50	$2,658,998	4y11m	2/1/2005	1/1/2010
VA	Charlottesville	Charlottesville-Albemarle	CHO	N	$4.50	$6,739,394	5y11m	8/1/2010	7/1/2016
VA	Lynchburg	Lynchburg Regional/Preston Glenn Field	LYH	N	$3.00	$184,209	1y	7/1/1995	7/1/1996
VA	Lynchburg	Lynchburg Regional/Preston Glenn Field	LYH	N	$3.00	$827,616	1y9m	9/1/2000	6/1/2002
VA	Lynchburg	Lynchburg Regional/Preston Glenn Field	LYH	N	$4.50	$5,724,121	19y7m	6/1/2002	1/1/2022
VA	Newport News	Newport News/Williamsburg International	PHF	N	$3.00	$552,500	9m	10/1/2006	7/1/2007
VA	Newport News	Newport News/Williamsburg International	PHF	N	$4.50	$38,131,794	27y5m	7/1/2010	12/1/2037
VA	Norfolk	Norfolk International	ORF	S	$3.00	$64,951,249	12y7m	5/1/1997	1/1/2010

State	Associated City	Airport Name	LOC ID	Hub size	Level	Total Approved	Duration	Start Date	Est. Expir. Date
VA	Norfolk	Norfolk International	ORF	S	$4.50	$47,090,687	6y1m	9/1/2010	10/1/2016
VA	Richmond	Richmond International	RIC	S	$3.00	$136,345,671	10y7m	5/1/1994	1/1/2005
VA	Richmond	Richmond International	RIC	S	$4.50	**	14y10m	1/1/2005	10/1/2019
VA	Richmond	Richmond International	RIC	S	$4.50	$34,059,375	5y5m	10/1/2019	3/1/2025
VA	Roanoke	Roanoke Regional/Woodrum Field	ROA	N	$3.00	$6,463,183	3y3m	9/1/1998	12/1/2001
VA	Roanoke	Roanoke Regional/Woodrum Field	ROA	N	$4.50	**	3y2m	12/1/2001	2/1/2005
VA	Roanoke	Roanoke Regional/Woodrum Field	ROA	N	$3.00	$8,158,043	9m	2/1/2005	11/1/2005
VA	Roanoke	Roanoke Regional/Woodrum Field	ROA	N	$4.50	**	6y	11/1/2005	11/1/2011
VA	Roanoke	Roanoke Regional/Woodrum Field	ROA	N	$4.50	$6,471,251	4y4m	11/1/2011	3/1/2016
VA	Staunton	Shenandoah Valley Regional	SHD	N	$3.00	$87,482	5y	12/1/2001	12/1/2006
VA	Staunton	Shenandoah Valley Regional	SHD	N	$4.50	$555,364	10y3m	6/1/2007	9/1/2017
WA	Bellingham	Bellingham International	BLI	S	$3.00	$1,594,527	5y1m	7/1/1993	8/1/1998
WA	Bellingham	Bellingham International	BLI	S	$3.00	*	10m	3/1/1999	1/1/2000
WA	Bellingham	Bellingham International	BLI	S	$3.00	$1,400,000	2y6m	1/1/2000	7/1/2002
WA	Bellingham	Bellingham International	BLI	S	$4.50	**	2y11m	7/1/2002	6/1/2005
WA	Bellingham	Bellingham International	BLI	S	$4.50	$4,944,021	5y1m	6/1/2005	7/1/2010
WA	Bellingham	Bellingham International	BLI	S	$4.50	$30,250,000	17y3m	10/1/2010	10/1/2027
WA	Friday Harbor	Friday Harbor	FRD/ FHR	GA	$3.00	$517,077	15y5m	2/1/2001	7/1/2016
WA	Moses Lake	Grant County International	MW H		$3.00	$470,000	6y8m	3/1/1999	11/1/2005
WA	Moses Lake	Grant County International	MW H		$4.50	**	10y2m	11/1/2005	1/1/2016
WA	Pasco	Tri-Cities	PSC	N	$3.00	$3,657,898	7y11m	11/1/1993	10/1/2001
WA	Pasco	Tri-Cities	PSC	N	$4.50	**	1y6m	10/1/2001	4/1/2003
WA	Pasco	Tri-Cities	PSC	N	$4.50	$52,053,726	31y9m	4/1/2003	1/1/2035
WA	Port Angeles	William R. Fairchild International	CLM	GA	$3.00	$117,556	1y9m	8/1/1993	5/1/1995
WA	Port Angeles	William R. Fairchild International	CLM	GA	$3.00	$721,391	15y1m	9/1/1996	10/1/2011
WA	Port Angeles	William R. Fairchild International	CLM	GA	$3.00	$161,209	9y9m	7/1/2012	4/1/2022
WA	Pullman	Pullman/Moscow Regional	PUW	N	$3.00	$169,288	2y8m	6/1/1994	2/1/1996
WA	Pullman	Pullman/Moscow Regional	PUW	N	$3.00	$706,727	1y11m	2/1/2000	1/1/2002
WA	Pullman	Pullman/Moscow Regional	PUW	N	$4.50	**	3y9m	1/1/2002	10/1/2005
WA	Pullman	Pullman/Moscow Regional	PUW	N	$4.50	$1,566,644	7y11m	10/1/2005	9/1/2013
WA	Pullman	Pullman/Moscow Regional	PUW	N	$4.50	$0	4y	11/1/2013	11/1/2017
WA	Seattle	Seattle-Tacoma International	SEA	L	$3.00	$369,583,600	8y11m	11/1/1992	10/1/2001
WA	Seattle	Seattle-Tacoma International	SEA	L	$4.50	**	1y7m	10/1/2001	3/1/2003
WA	Seattle	Seattle-Tacoma International	SEA	L	$4.50	$1,797,794,860	25y8m	3/1/2003	11/1/2028
WA	Spokane	Spokane International	GEG	S	$3.00	$52,372,419	9y10m	6/1/1993	4/1/2003
WA	Spokane	Spokane International	GEG	S	$4.50	**	2y1m	4/1/2003	5/1/2005
WA	Spokane	Spokane International	GEG	S	$4.50	$68,320,189	10y2m	5/1/2005	7/1/2015
WA	Walla Walla	Walla Walla Regional	ALW	N	$3.00	$3,745,775	7y11m	11/1/1993	10/1/2001
WA	Walla Walla	Walla Walla Regional	ALW	N	$4.50	**	18y	10/1/2001	10/1/2019
WA	Wenatchee	Pangborn Memorial	EAT	N	$3.00	$622,488	2y2m	8/1/1993	10/1/1995
WA	Wenatchee	Pangborn Memorial	EAT	N	$3.00	$660,570	4y1m	6/1/1998	7/1/2002
WA	Wenatchee	Pangborn Memorial	EAT	N	$4.50	**	7m	7/1/2002	2/1/2003
WA	Wenatchee	Pangborn Memorial	EAT	N	$4.50	$1,194,578	6y11m	5/1/2003	4/1/2010
WA	Wenatchee	Pangborn Memorial	EAT	N	$4.50	$938,454	6y3m	5/1/2010	8/1/2016

State	Associated City	Airport Name	LOC ID	Hub size	Level	Total Approved	Duration	Start Date	Est. Expir. Date
WA	Yakima	Yakima Air Terminal/McAllister Field	YKM	N	$3.00	$1,565,797	6y	2/1/1993	2/1/1999
WA	Yakima	Yakima Air Terminal/McAllister Field	YKM	N	$3.00	*	1y1m	5/1/1999	6/1/2000
WA	Yakima	Yakima Air Terminal/McAllister Field	YKM	N	$3.00	$1,650,240	10y10m	6/1/2000	4/1/2011
WA	Yakima	Yakima Air Terminal/McAllister Field	YKM	N	$4.50	$1,220,979	4y9m	4/1/2011	1/1/2016
WV	Charleston	Yeager	CRW	N	$3.00	$6,921,430	8y3m	8/1/1993	11/1/2001
WV	Charleston	Yeager	CRW	N	$4.50	**	1y5m	11/1/2001	4/1/2003
WV	Charleston	Yeager	CRW	N	$4.50	$18,720,086	15y2m	4/1/2003	6/1/2018
WV	Clarksburg	North Central West Virginia	CKB	N	$3.00	$79,103	2y1m	3/1/1994	10/1/1995
WV	Clarksburg	North Central West Virginia	CKB	N	$4.50	$101,489	1y10m	4/1/2001	8/1/2002
WV	Clarksburg	North Central West Virginia	CKB	N	$4.50	$2,920,641	50y	5/1/2004	5/1/2054
WV	Huntington	Tri-State/Milton J. Ferguson Field	HTS	N	$3.00	$1,853,497	13y	12/1/1995	12/1/2008
WV	Huntington	Tri-State/Milton J. Ferguson Field	HTS	N	$3.00	$1,195,890	3y1m	5/1/2009	6/1/2012
WV	Huntington	Tri-State/Milton J. Ferguson Field	HTS	N	$4.50	$2,369,532	5y4m	7/1/2012	11/1/2017
WV	Lewisburg	Greenbrier Valley	LWB	CS	$4.50	$1,105,408	13y9m	4/1/2011	1/1/2025
WV	Morgantown	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$2.00	$54,012	1y1m	12/1/1992	1/1/1994
WV	Morgantown	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$2.00	$211,390	7y1m	12/1/1994	1/1/2002
WV	Morgantown	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$4.50	**	2y5m	1/1/2002	6/1/2004
WV	Morgantown	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$4.50	$227,618	3y9m	6/1/2004	3/1/2008
WV	Morgantown	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$4.50	$663,774	16y7m	6/1/2009	1/1/2026
WV	Parkersburg	Mid-Ohio Valley Regional	PKB	CS	$3.00	$305,491	3y3m	5/1/1999	8/1/2002
WV	Parkersburg	Mid-Ohio Valley Regional	PKB	CS	$4.50	$286,543	13y5m	8/1/2003	1/1/2016
WI	Appleton	Outagamie County Regional	ATW	N	$3.00	$10,466,940	11y11m	7/1/1994	6/1/2006
WI	Appleton	Outagamie County Regional	ATW	N	$4.50	**	1y10m	6/1/2006	4/1/2008
WI	Appleton	Outagamie County Regional	ATW	N	$3.00	$318,410	5m	4/1/2008	9/1/2008
WI	Appleton	Outagamie County Regional	ATW	N	$4.50	$9,632,210	8y8m	9/1/2008	5/1/2017
WI	Eau Claire	Chippewa Valley Regional	EAU	N	$3.00	$708,253	5y10m	2/1/1996	12/1/2001
WI	Eau Claire	Chippewa Valley Regional	EAU	N	$4.50	**	4y1m	12/1/2001	1/1/2006
WI	Eau Claire	Chippewa Valley Regional	EAU	N	$4.50	$662,411	8y9m	8/1/2006	5/1/2015
WI	Green Bay	Austin Straubel International	GRB	N	$3.00	$7,530,958	9y	3/1/1993	3/1/2002
WI	Green Bay	Austin Straubel International	GRB	N	$4.50	$38,768,829	18y7m	3/1/2002	10/1/2020
WI	La Crosse	La Crosse Municipal	LSE	N	$3.00	$1,964,469	6y9m	7/1/1994	4/1/2001
WI	La Crosse	La Crosse Municipal	LSE	N	$4.50	**	6m	4/1/2001	10/1/2001
WI	La Crosse	La Crosse Municipal	LSE	N	$4.50	$11,069,946	26y7m	10/1/2001	5/1/2028
WI	Madison	Dane County Regional - Truax Field	MSN	S	$3.00	$12,308,713	8y2m	9/1/1993	11/1/2001
WI	Madison	Dane County Regional - Truax Field	MSN	S	$4.50	$79,902,856	21y11m	11/1/2001	10/1/2023
WI	Milwaukee	General Mitchell International	MKE	M	$3.00	$185,730,598	17y6m	5/1/1995	11/1/2012
WI	Milwaukee	General Mitchell International	MKE	M	$4.50	**	5m	11/1/2012	4/1/2013
WI	Milwaukee	General Mitchell International	MKE	M	$4.50	$34,755,919	2y9m	4/1/2013	1/1/2016
WI	Milwaukee	General Mitchell International	MKE	M	$3.00	$174,001,850	11y4m	1/1/2016	5/1/2027
WI	Mosinee	Central Wisconsin	CWA	N	$3.00	$7,725,600	13y10m	11/1/1993	9/1/2007
WI	Mosinee	Central Wisconsin	CWA	N	$4.50	**	3y2m	9/1/2007	12/1/2010
WI	Mosinee	Central Wisconsin	CWA	N	$4.50	$3,529,500	5y9m	12/1/2010	9/1/2016
WI	Rhinelander	Rhinelander-Oneida County	RHI	N	$3.00	$204,771	2y2m	1/1/1994	4/1/1996

State	Associated City	Airport Name	LOC ID	Hub size	Level	Total Approved	Duration	Start Date	Est. Expir. Date
WI	Rhinelander	Rhinelander-Oneida County	RHI	N	$3.00	$457,484	5y3m	6/1/1996	9/1/2001
WI	Rhinelander	Rhinelander-Oneida County	RHI	N	$4.50	**	2y4m	9/1/2001	1/1/2004
WI	Rhinelander	Rhinelander-Oneida County	RHI	N	$4.50	$1,480,260	11y3m	1/1/2004	4/1/2015
WY	Casper	Casper/ Natrona County International	CPR	N	$3.00	$1,629,582	7y7m	9/1/1993	4/1/2001
WY	Casper	Casper/ Natrona County International	CPR	N	$4.50	**	2y2m	4/1/2001	6/1/2003
WY	Casper	Casper/ Natrona County International	CPR	N	$4.50	$2,382,924	8y9m	6/1/2003	3/1/2012
WY	Casper	Casper/ Natrona County International	CPR	N	$3.00	$1,751,415	7y2m	3/1/2012	5/1/2019
WY	Cheyenne	Cheyenne Regional/Jerry Olson Field	CYS	N	$3.00	$957,013	7y5m	11/1/1993	4/1/2001
WY	Cheyenne	Cheyenne Regional/Jerry Olson Field	CYS	N	$4.50	**	5y8m	4/1/2001	1/1/2007
WY	Cheyenne	Cheyenne Regional/Jerry Olson Field	CYS	N	$4.50	$407,728	5y8m	1/1/2007	9/1/2012
WY	Cheyenne	Cheyenne Regional/Jerry Olson Field	CYS	N	$4.50	$439,896	10y	9/1/2014	9/1/2024
WY	Cody	Yellowstone Regional	COD	N	$3.00	$413,037	3y11m	8/1/1997	7/1/2001
WY	Cody	Yellowstone Regional	COD	N	$4.50	**	2y	7/1/2001	7/1/2003
WY	Cody	Yellowstone Regional	COD	N	$4.50	$76,373	1y9m	7/1/2003	4/1/2005
WY	Cody	Yellowstone Regional	COD	N	$4.50	$858,632	10y3m	9/1/2005	12/1/2015
WY	Gillette	Gillette-Campbell County	GCC	N	$3.00	$369,132	8y3m	9/1/1993	12/1/2001
WY	Gillette	Gillette-Campbell County	GCC	N	$4.50	$162,537	2y6m	12/1/2001	6/1/2004
WY	Gillette	Gillette-Campbell County	GCC	N	$4.50	*	6m	1/1/2005	7/1/2005
WY	Gillette	Gillette-Campbell County	GCC	N	$4.50	$1,283,823	11y8m	7/1/2005	3/1/2017
WY	Jackson	Jackson Hole	JAC	N	$3.00	$3,799,325	7y8m	8/1/1993	4/1/2001
WY	Jackson	Jackson Hole	JAC	N	$4.50	**	1y4m	4/1/2001	8/1/2002
WY	Jackson	Jackson Hole	JAC	N	$4.50	$35,838,684	39y1m	8/1/2002	9/1/2041
WY	Laramie	Laramie Regional	LAR	N	$3.00	$126,457	4y2m	8/1/1996	10/1/2000
WY	Laramie	Laramie Regional	LAR	N	$3.00	*	9m	12/1/2000	8/1/2001
WY	Laramie	Laramie Regional	LAR	N	$4.50	$252,009	6y4m	12/1/2006	4/1/2013
WY	Laramie	Laramie Regional	LAR	N	$4.50	$185,425	4y	6/1/2013	6/1/2017
WY	Riverton	Riverton Regional	RIW	N	$3.00	$1,055,040	5y11m	5/1/1995	4/1/2001
WY	Riverton	Riverton Regional	RIW	N	$4.50	**	22y6m	4/1/2001	10/1/2023
WY	Rock Springs	Rock Springs-Sweetwater County	RKS	N	$3.00	$382,300	11y	4/1/1995	4/1/2006
WY	Rock Springs	Rock Springs-Sweetwater County	RKS	N	$4.50	$938,840	11y8m	4/1/2006	12/1/2017
WY	Sheridan	Sheridan County	SHR	N	$3.00	$218,988	5y10m	3/1/1996	12/1/2001
WY	Sheridan	Sheridan County	SHR	N	$4.50	$433,610	6y9m	12/1/2001	9/1/2008
WY	Sheridan	Sheridan County	SHR	N	$4.50	$736,114	6y8m	10/1/2008	6/1/2015
WY	Worland	Worland Municipal	WRL	CS	$4.50	$72,022	5y2m	1/1/2003	3/1/2008
WY	Worland	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 imediately above the double asterisk is the total approved collections at this location at both the $3 and $4.50 levels.								

Letter of Intent (LOI) Commitments by Fiscal Year

State	City	Airport Name			Discretionary 2015	Entitlement 2015
AK	Anchorage	Ted Stevens Anchorage International			4,000,000	-
CA	Los Angeles	Los Angeles International			10,000,000	-
CA	Sacramento	Sacramento International			6,000,000	1,769,912
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International			20,000,000	4,000,000
IL	Chicago	Chicago O'Hare International			50,000,000	-
IN	Gary	Gary/Chicago International			2,844,597	1,000,000
NC	Greensboro	Piedmont Triad International			-	3,504,135
NY	New York	John F Kennedy International			7,000,000	-
OH	Cleveland	Cleveland-Hopkins International			-	3,455,000
OH	Columbus	Port Columbus International			10,000,000	2,104,000
PA	Philadelphia	Philadelphia International			16,000,000	6,900,000
TX	Dallas	Dallas Love Field			7,000,000	900,000
UT	St. George	St George Municipal			9,000,000	1,000,000
VA	Washington	Washington Dulles International			14,000,000	-
WA	Seattle	Seattle-Tacoma International			-	6,231,753
			Total		155,844,597	30,864,800

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2016	Entitlement 2016	Discretionary 2017	Entitlement 2017
AK	Anchorage	Ted Stevens Anchorage International	1,000,000	-	-	-
CA	Los Angeles	Los Angeles International	11,000,000	-	11,000,000	-
CA	Sacramento	Sacramento International	-	-	-	-
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	20,000,000	-	20,000,000	-
IL	Chicago	Chicago O'Hare International	45,000,000	-	45,000,000	-
IN	Gary	Gary/Chicago International	-	-	-	-
NC	Greensboro	Piedmont Triad International	-	-	-	-
NY	New York	John F Kennedy International	7,000,000	-	-	-
OH	Cleveland	Cleveland-Hopkins International	-	3,535,000	-	658,991
OH	Columbus	Port Columbus International	10,000,000	2,144,000	1,928,463	1,703,869
PA	Philadelphia	Philadelphia International	27,000,000	7,000,000	22,000,000	-
TX	Dallas	Dallas Love Field	7,000,000	900,000	7,000,000	900,000
UT	St. George	St George Municipal	-	-	-	-
VA	Washington	Washington Dulles International	9,000,000	-	-	-
WA	Seattle	Seattle-Tacoma International	-	-	-	-
		Total	137,000,000	13,579,000	106,928,463	3,262,860

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2018	Entitlement 2018	Discretionary 2019	Entitlement 2019
AK	Anchorage	Ted Stevens Anchorage International	-	-	-	-
CA	Los Angeles	Los Angeles International	11,000,000	-	11,000,000	-
CA	Sacramento	Sacramento International	-	-	-	-
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	20,000,000	-	20,000,000	-
IL	Chicago	Chicago O'Hare International	55,000,000	-	65,000,000	-
IN	Gary	Gary/Chicago International	-	-	-	-
NC	Greensboro	Piedmont Triad International	-	-	-	-
NY	New York	John F Kennedy International	-	-	-	-
OH	Cleveland	Cleveland-Hopkins International	-	-	-	-
OH	Columbus	Port Columbus International	-	-	-	-
PA	Philadelphia	Philadelphia International	26,000,000	-	30,000,000	-
TX	Dallas	Dallas Love Field	-	-	-	-
UT	St. George	St George Municipal	-	-	-	-
VA	Washington	Washington Dulles International	-	-	-	-
WA	Seattle	Seattle-Tacoma International	-	-	-	-
		Total	112,000,000	-	126,000,000	-

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2020	Entitlement 2020	Discretionary 2021	Entitlement 2021
AK	Anchorage	Ted Stevens Anchorage International	-	-	-	-
CA	Los Angeles	Los Angeles International	-	-	-	-
CA	Sacramento	Sacramento International	-	-	-	-
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	20,000,000	-	20,000,000	-
IL	Chicago	Chicago O'Hare International	65,000,000	-	25,000,000	-
IN	Gary	Gary/Chicago International	-	-	-	-
NC	Greensboro	Piedmont Triad International	-	-	-	-
NY	New York	John F Kennedy International	-	-	-	-
OH	Cleveland	Cleveland-Hopkins International	-	-	-	-
OH	Columbus	Port Columbus International	-	-	-	-
PA	Philadelphia	Philadelphia International	32,000,000	-	40,000,000	-
TX	Dallas	Dallas Love Field	-	-	-	-
UT	St. George	St George Municipal	-	-	-	-
VA	Washington	Washington Dulles International	-	-	-	-
WA	Seattle	Seattle-Tacoma International	-	-	-	-
		Total	117,000,000	-	85,000,000	-

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2022	Entitlement 2022	Discretionary 2023	Entitlement 2023
AK	Anchorage	Ted Stevens Anchorage International	-	-	-	-
CA	Los Angeles	Los Angeles International	-	-	-	-
CA	Sacramento	Sacramento International	-	-	-	-
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	10,000,000	-	-	-
IL	Chicago	Chicago O'Hare International	25,000,000	-	20,000,000	-
IN	Gary	Gary/Chicago International	-	-	-	-
NC	Greensboro	Piedmont Triad International	-	-	-	-
NY	New York	John F Kennedy International	-	-	-	-
OH	Cleveland	Cleveland-Hopkins International	-	-	-	-
OH	Columbus	Port Columbus International	-	-	-	-
PA	Philadelphia	Philadelphia International	40,000,000	-	40,000,000	-
TX	Dallas	Dallas Love Field	-	-	-	-
UT	St. George	St George Municipal	-	-	-	-
VA	Washington	Washington Dulles International	-	-	-	-
WA	Seattle	Seattle-Tacoma International	-	-	-	-
		Total	75,000,000	-	60,000,000	-

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary Beyond	Entitlement Beyond	Discretionary Total	Entitlement Total
AK	Anchorage	Ted Stevens Anchorage International	-	-	5,000,000	-
CA	Los Angeles	Los Angeles International	-	-	54,000,000	-
CA	Sacramento	Sacramento International	-	-	6,000,000	1,769,912
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	-	-	150,000,000	4,000,000
IL	Chicago	Chicago O'Hare International	60,000,000	-	455,000,000	-
IN	Gary	Gary/Chicago International	-	-	2,844,597	1,000,000
NC	Greensboro	Piedmont Triad International	-	-	-	3,504,135
NY	New York	John F Kennedy International	-	-	14,000,000	-
OH	Cleveland	Cleveland-Hopkins International	-	-	-	7,648,991
OH	Columbus	Port Columbus International	-	-	21,928,463	5,951,869
PA	Philadelphia	Philadelphia International	128,000,000	-	401,000,000	13,900,000
TX	Dallas	Dallas Love Field	-	-	21,000,000	2,700,000
UT	St. George	St George Municipal	-	-	9,000,000	1,000,000
VA	Washington	Washington Dulles International	-	-	23,000,000	-
WA	Seattle	Seattle-Tacoma International	-	-	-	6,231,753
		Total	188,000,000	-	1,162,773,060	47,706,660

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3E. OTHER INFORMATION

FACILITIES AND EQUIPMENT, RECOVERY ACT

Program and Financing
(in millions of dollars)

Identification code: 69-1304-0		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Change in obligated balances:			
	Unpaid Obligations:			
3000	Unpaid Obligations, brought forward, Oct 1:	1	1	1
3050	Unpaid Obligations, end of year	1	1	1
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	1	1	1
3200	Obligated balance, end of year	1	1	1

The American Recovery and Reinvestment Act of 2009 provided $200 million to Federal Aviation Administration's (FAA) Facilities & Equipment 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 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.

AVIATION USER FEES

Special and Trust Fund Receipts
(in millions of dollars)

Identification code: 69-5422-0-2-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
0100	Balance, start of year..	35	20	19
	Receipts:			
0200	Aviation User Fee, Overflight Fees......................................	85	97	100
0220	Property Disposal or Lease Proceeds, Aviation User Fee.......	1	....	......
0299	Total receipts and collections...	86	97	100
0400	Total: Balances and collections	121	117	119
	Appropriations:			
0500	Essential Air Service and Rural Airport Improvement Fund..	9	8	......
0501	Aviation User Fees...	-130	-106	-102
0599	Total appropriations..	-121	-98	-102
0610	Aviation User Fees...	20	......	......
0799	Balance, end of year...	20	19	17

Program and Financing
(in millions of dollars)

Identification code: 69-5422-0-2-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Budgetary Resources:			
0001	Other Collections	1	......	......
0100	Direct program activities, subtotal	1	......	......
0900	Total new obligations (object class 25.2)	1	......	......
	Unobligated balance:			
1000	Unobligated balance brought forward, Oct 1............................	21	2	2
1029	Other balances withdrawn	-20	......	....
1050	Unobligated balance (total)	1	2	2
	Budget authority:			
1201	Appropriations (special or trust fund)......................................	130	106	102
1220	Appropriations Transferred to other accounts [69-5423]	-128	-106	-102
1260	Appropriations, mandatory (total)..	2	......	......
1900	Budget authority (total)..	2	.....	......
1930	Total budgetary resources available	3	2	2
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year..........................	2	2	2
1950	Other balances withdrawn and returned to unappropriated receipts..	20	.....	......
	Budget authority and outlays net:			
3010	Obligations incurred unexpired accounts.	1	.....	......
3020	Outlays (gross)	-1	.....	......
4090	Budget authority, gross..	2	......	......
	Outlays, gross:			
4100	Outlays from new mandatory authority.....................................	1	.....	......
4180	Budget authority, net (total)..	2	.....	......
4190	Outlays, net (total)..	1	.....	......

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 Federal Aviation Administration to aircraft that neither take off nor land in the United States, commonly known as overflight fees. The Budget estimates that $100 million in overflight fees will be collected in 2016.

AVIATION INSURANCE REVOLVING FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4120-0-3-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Obligations by program activity:			
0801	Program administration	5	6	1
0802	Insurance Claims	9	......	......
0900	Total new obligations	14	6	1
	Budget resources:			
	Unobligated balance:			
1000	Unobligated balance brought forward, Oct. 1	2,012	2,146	2,170
	Budget authority:			
	Spending authority form offsetting collections, mandatory:			
1800	Collected	148	30	52
1850	Spending auth from offsetting collections, mand (total)	148	30	52
1930	Total budgetary resources available	2,160	2,176	2,222
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	2,146	2,170	2,221
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct. 1 (gross)	2	2	2
3010	Obligations incurred, unexpired accounts	14	6	1
3020	Outlays (gross)	-14	-6	-1
3050	Unpaid obligations, end of year	2	2	2
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	2	2	2
3200	Obligated balance, end of year	2	2	2
	Budget authority and outlays net:			
	Mandatory:			
4090	Budget authority, gross	148	30	52
	Outlay, gross:			
4100	Outlays from new mandatory authority	14	6	1
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4121	Interest on Federal securities	-16	-28	-52
4123	Non-Federal sources	-132	-2	......
4130	Offsets against gross budget authority and outlays (total)	-148	-30	-52
4170	Outlays, net (mandatory)	-134	-24	-51
4190	Outlays, net (total)	-134	-24	-51
	Memorandum (non-add) entries:			
5000	Total investments, SOY: Federal securities: Par value	1,937	2,137	2,150
5001	Total investments, EOY: Federal securities: Par value	2,137	2,150	2,200

The fund provides direct support for the aviation insurance program (chapter 443 of title 49, U.S. Code). In December 2014, Congress sunset part of the aviation insurance program. Specifically, Congress returned U.S. air carriers to the commercial aviation market for all of their war risk insurance coverage by ending the FAA's authority to provide war risk insurance for a premium. Pursuant to 49 USC 44305, the FAA may provide insurance without premium at the request of the Secretary of Defense or the head of a department, agency, or instrumentality designated by the President when the Secretary of Defense or the designated head agrees to indemnify the Secretary of Transportation against all losses covered by the insurance. The "non-premium" aviation insurance program is authorized through December 31, 2018.

Object Classification
(in millions of dollars)

Identification code: 69-4120-0-3-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Reimbursable obligations:			
111	Personnel Compensation: Full time permanent......................	1	1	1
420	Projected Insurance Claims and indemnities	9	......	......
440	Refunds	4	5	......
999	Total new obligations	14	6	1

Employment Summary

Identification code: 69-4120-0-3-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
2001	Reimbursable Civilian full-time equivalent employment....	5	2	2

ADMINISTRATIVE SERVICES FRANCHISE FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4562-0-4-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Obligations by program activity:			
0801	Accounting Services	65	56	54
0804	Information Services	124	130	132
0806	Multi Media	4	4	4
0807	CMEL/Training	6	9	11
0808	International Training	4	6	6
0810	Logistics	179	208	211
0811	Aircraft Maintenance	62	60	61
0812	Acquisition	8	8	8
0900	Total new obligations	452	481	487
	Budgetary Resources:			
1000	Unobligated balance brought forward, Oct 1	121	186	184
1021	Recoveries of prior year unpaid obligations	25	....	....
1050	Unobligated balance (total)	146	186	184
	Budget authority:			
	Spending authority from offsetting collections, discretionary:			
1700	Collected	506	477	478
1701	Change in uncollected payments, federal sources	-14	2	....
1750	Spending auth from offsetting collections, disc (total)	492	479	478
1930	Total budgetary resources available	638	665	662
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	186	184	175
	Change in obligated balances:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct 1	158	175	174
3010	Obligations incurred, unexpired accounts	452	481	487
3020	Outlays (gross)	-410	-482	-533
3040	Recoveries of prior year unpaid obligations unexpired	-25	....	....
3050	Unpaid obligations, end of year	175	174	128
	Uncollected payments:			
3060	Uncollected pymts, Fed sources, brought forward, Oct 1	-12	2	....
3070	Change in Uncollected pymts, fed sources, unexpired	14	-2	....
3090	Uncollected pymts, fed sources, end of year	2	....	....
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	146	177	174
3200	Obligated balance, end of year	177	174	128
	Budget authority and Outlays, net:			
	Discretionary:			
4000	Budget authority, gross	492	479	478
	Outlays gross:			
4010	Outlays from new discretionary authority	315	326	325
4011	Outlays from discretionary balances	95	156	208
4020	Outlays, gross (total)	410	482	533
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-495	-477	-478
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pmts, Fed sources unexpired	14	-2	....
4080	Outlays, net (discretionary)	-96	5	55
4190	Outlays, net (total)	-96	5	55

In 1997, the Federal Aviation Administration (FAA) established a franchise fund to finance operations where the costs for goods and services provided are charged to the users on a fee-for-service basis. The fund improves organizational efficiency and provides better support to FAA's internal and external customers. The activities included in this franchise fund are: training, accounting, travel, duplicating services, multi-media services, information technology, materiel management (logistics), and aircraft maintenance

Object Classification
(in millions of dollars)

Identification code: 69-4562-0-4-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Reimbursable obligations:			
11.1	Personnel compensation: Full-time permanent	130	131	134
12.1	Civilian personnel benefits	42	46	46
21.0	Travel and transportation of persons	5	4	5
22.0	Transportation of things	6	5	5
23.3	Communications, utilities, and miscellaneous charges	12	10	10
25.2	Other services	191	180	182
26.0	Supplies and materials	51	86	87
31.0	Equipment	14	18	17
42.0	Insurance claims and indemnities	1	1	1
99.9	Total new obligations	452	481	487

Employment Summary

Identification code: 69-4562-0-4-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
2001	Reimbursable civilian full-time equivalent employment	1,678	2,072	2,084

AIRPORT AND AIRWAY TRUST FUND

Program and Financing
(in millions of dollars)

Identification code: 69-8103-0-7-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Memorandum (non-add) entries:			
50.00	Total investments, start of year: Federal securities: Par value	11,808	12,759	11,003
50.01	Total investments, end of year: Federal securities: Par value	12,759	11,003	10,775

Section 9502 of Title 26, U.S. Code, provides for amounts equivalent to the funds received in the U.S. 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, Federal Aviation Administration 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: 69-8103-0-7-402		FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Unexpended balance, start of year:			
01.00	Balance, start of year	13,203	14,187	12,226
	Adjustments:			
11.01	Grants-in-aid for Airports (Airport and Airway Trust Fund) [021-12-8106-0]	-2		
11.11	Grants-in-aid for Airports (Airport and Airway Trust Fund) [021-12-8106-0]	2		
01.99	Total balance, start of year	13,203	14,187	12,226
	Cash Income during the year:			
	Current law:			
	Receipts			
12.00	Excise Taxes, Airport and Airway Trust Fund	13,513	13,138	14,699
	Offsetting receipts (intragovernmental):			
12.40	Interest, Airport and Airway Trust Fund	233	266	244
	Offsetting collections:			
12.81	Grants-in-aid for Airports (Airport and Airway Trust Fund)	1	1	1
12.82	Facilities and Equipment (Airport and Airway and Airport Trust Fund)	40	16	16
12.83	Facilities and Equipment (Airport and Airway and Airport Trust Fund)	49	36	36
12.84	Research, Engineering and Development (Airport and Airway Trust Fund)	2	3	3
12.99	Income under present law	13,838	13,460	14,999
32.99	Total cash income	13,838	13,460	14,999
	Cash outgo during year:			
	Current law:			
45.01	Payments to Air Carriers	-141	-138	-167
45.02	Trust Fund Share of FAA Activities (Airport and Airway Trust Fund)	-6,495	-8,595	-8,547
45.03	Grants-in-aid for Airports (Airport and Airway Trust Fund) …	-3,259	-3,801	-3,580

45.04	Facilities and Equipment (Airport and Airway Trust Fund)	-2,807	-2,713	-2,879
45.05	Research, Engineering and Development (Airport and Airway Trust Fund)	-150	-174	-182
45.99	Outgo under current law (-)	-12,852	-15,421	-15,355
65.99	Total Cash outgo (-)	-12,852	-15,421	-15,355
	Manual Adjustments:			
76.91	Rounding adjustment	-2		
76.99	Total adjustments	-2		
	Unexpended balance, end of year:			
87.00	Uninvested balance (net), end of year........	1,428	1,223	1,095
87.01	Airport and Airway Trust Fund........	12,759	11,003	10,775
87.99	Total balance, end of year........	14,187	12,226	11,870

TRUST FUND SHARE OF FAA ACTIVITIES
(AIRPORT AND AIRWAY TRUST FUND)

Program and Financing
(in millions of dollars)

	Identification code: 69-8104-0-7-402	FY 2014 Actual	FY 2015 Estimate	FY 2016 Estimate
	Obligations by program activity:			
0001	Payment to Operations	6,495	8,595	8,547
0900	Total new obligations (object class 94.0)	6,495	8,595	8,547
	Budgetary resources:			
	Appropriations, discretionary:			
1101	Appropriations (special or trust fund).	6,495	8,595	8,547
1160	Appropriations, discretionary (total)	6,495	8,595	8,547
1930	Total budgetary resources available	6,495	8,595	8,547
	Change in obligated balance:			
	Unpaid obligations:			
3010	Obligations incurred, unexpired accounts	6,495	8,595	8,547
3020	Outlays (gross):	-6,495	-8,595	-8,547
	Budget authority and outlays, net:			
	Discretionary:			
4000	Budget authority, gross	6,495	8,595	8,547
	Outlays, gross:			
4010	Outlays from new discretionary authority	6,495	8,595	8,547
4180	Budget authority, net (total)	6,495	8,595	8,547
4190	Outlays, net (total)	6,495	8,595	8,547

For 2016, the Budget proposes $9,915 million for Federal Aviation Administration Operations, of which $8,547 million would be provided from the Airport and Airway Trust Fund.

FAA ADMINISTRATIVE PROVISIONS

Sec. 112. The Administrator of the Federal Aviation Administration will reimburse amounts made available to satisfy 49 U.S.C. 41742(a)(1) from fees credited under 49 U.S.C. 45303 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 over-flight fees collected and is needed in order to continue the practice in FY 2016.

Sec. 113. 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. 114. None of the funds in this Act shall be available for paying premium pay under subsection 5546(a) of title 5, United States Code, to any Federal Aviation Administration employee unless such employee actually performed work during the time corresponding to such premium pay.

- The provision stems from past legal action taken by air traffic controllers to receive premium pay for a full shift, even if only part of the shift was eligible for premium pay. The FAA recommends retaining this provision as a GP that would apply to all FAA accounts. FAA also recommends keeping this provision for FY 2016 in order to minimize potential payroll liability.

Sec. 115. None of the funds in this Act may be obligated or expended for an employee of the Federal Aviation Administration to purchase a store gift card or gift certificate through use of a Government-issued credit card.

- This provision prohibits FAA employees from using a government-issued credit card to purchase a store gift card or gift certificate. FAA recommends retaining this provision as a GP that would apply to all FAA accounts.

Sec. 117. None of the funds in this Act may be obligated or expended for retention bonuses for an employee of the Federal Aviation Administration without the prior written approval of the Assistant Secretary for Administration of the Department of Transportation.

- The FY 2016 budget proposes to retain the provision that all FAA retention bonuses continue to be approved by the Assistant Secretary for Administration.

GENERAL PROVISIONS—THIS ACT

Sec. 404. (a) Except as otherwise provided in this Act, none of the funds provided in this Act, provided by previous appropriations Acts to the agencies or entities funded in this Act that remain available for obligation or expenditure in fiscal year 2016, or provided from any accounts in the Treasury derived by the collection of fees and available to the agencies funded by this Act, shall be available for obligation or expenditure through a reprogramming of funds that:

(1) creates a new program;
(2) eliminates a program, project, or activity;
(3) increases funds or personnel for any program, project, or activity for which funds have been denied or restricted by the Congress;
(4) proposes to use funds directed for a specific activity by either the House or Senate Committees on Appropriations for a different purpose;
(5) augments existing programs, projects, or activities in excess of $5,000,000 or 10 percent, whichever is less;
(6) reduces existing programs, projects, or activities by $5,000,000 or 10 percent, whichever is less; or
(7) creates, reorganizes, or restructures a branch, division, office, bureau, board, commission, agency, administration, or department different from the budget justifications submitted to the Committees on Appropriations or the table accompanying the explanatory statement accompanying this Act, whichever is more detailed, unless notice is transmitted to the House and Senate Committees on Appropriations: Provided, That not later than 60 days after the date of enactment of this Act, each agency funded by this Act shall submit a report to the Committees on Appropriations of the Senate and of the House of Representatives to establish the baseline for application of reprogramming and transfer authorities for the current fiscal year: Provided further, That the report shall include:

(A) a table for each appropriation with a separate column to display the prior year enacted level, the President's budget request, adjustments made by Congress, adjustments due to enacted rescissions, if appropriate, and the fiscal year enacted level;
(B) a delineation in the table for each appropriation and its respective prior year enacted level by object class and program, project, and activity as detailed in the budget appendix for the respective appropriation; and
(C) an identification of items of special congressional interest.

(b) Notwithstanding any other transfer restriction under this Act, not to exceed 10 percent of any appropriation made available for the current fiscal year for the Federal Aviation Administration by this Act or provided by previous appropriations Acts may be transferred between such appropriations for the Federal Aviation Administration, but no such appropriation except as otherwise specifically provided, shall be increased by more than 10 percent by any such transfer: Provided, That funds transferred under this section shall be treated as a reprogramming of funds under subsection (a) and shall not be available for obligation unless the Committees on Appropriations of the Senate and the House of Representatives are notified 15 days in advance of such transfer: Provided further, that any transfer from an amount made available for obligation as discretionary grants-in-aid for airports pursuant to section 47117(f) of title 49, United States Code shall be deemed as obligated for grants-in-aid for airports under part B of subtitle VII of title 49, United States Code for the purposes of complying with the limitation on incurring obligations in this appropriations Act or any other appropriations Act under the heading "Grants-in-Aid for Airports."

- ❖ In keeping with the set of core principles that will guide us through the upcoming reauthorization, the FY 2016 budget requests additional budget flexibility. While the FAA has long benefited from the ability to seek congressional approval to reprogram limited amounts within budget accounts contained in Section 404(a), there has traditionally been no flexibility at the account level. This new authority in Section 404(b) will allow the FAA to transfer up to 10 percent of any appropriation across accounts, provided that no account is increased by more than 10 percent. Such a transfer would be subject to approval by both congressional Committees on Appropriations.

FEDERAL AVIATION ADMINISTRATION

OPERATIONS

ESTIMATES		APPROPRIATIONS	
2005	[1]7,849,000,000	2005	[2, 3]7,706,537,000
2006	[4, 5]8,201,000,000	2006	[6, 7]8,104,140,000
2007	[8]8,366,000,000	2007	[9]8,374,374,217
2008	[10]8,725,783,000	2008	[11]8,740,000,000
2009	[12]8,998,461,700	2009	[13]9,046,167,000
2010	[14]9,335,798,000	2010	[15, 16]9,351,400,000
2011	[17]9,793,000,000	2011	[18]9,516,172,000
2012	[19]9,823,000,000	2012	[20]9,653,395,000
2013	[21]9,517,948,000	2013	[22]9,653,395,000
		2013 Sequester (P.L.112-240)	[23]-485,623,489
		2013 Rescission (P.L. 113-6)	[24]-19,307,790
2014	[25]9,707,000,000	2014	[28]$9,651,422,000
2015	[26]9,750,000,000	2015	[29]$9,740,700,000
2016	[27]9,915,000,000		

[1] Includes $6,002,000,000 from Airport and Airway Trust Fund with $2M for Bureau of Transportation Statistics.
[2] Reflects 0.80 percent across-the-board rescission per P.L. 108-447 and Working Capital Fund cut of $6.3M.
[3] Includes $$4,878,728,416 from Airport and Airway Trust Fund.
[4] Includes $6,500,000,000 from the Airport and Airway Trust Fund.
[5] Includes $150,000,000 for Flight Service Station A-76 Competition.
[6] Reflects 1.0 percent across-the-board rescission per P.L. 109-148.
[7] Includes $5,541,000,000 from Airport and Airway Trust Fund.
[8] Includes $5,445,000,000 from Airport and Airway Trust Fund.
[9] Includes $5,627,900,000 from Airport and Airway Trust Fund
[10] 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.
[11] Includes $6,397,061,000 from Airport and Airway Trust Fund.
[12] 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.
[13] Includes $5,238,005,000 from Airport and Airway Trust Fund. Also includes $3.7 million transfer from the U.S. Department of State.
[14] Includes $6,207,798,000 from Airport and Airway Trust Fund.
[15] Includes $4,000,000,000 from Airport and Airway Trust Fund.
[16] Includes $1,300,000 transfer from the U.S. Department of State
[17] Includes $6,064,000,000 from Airport and Airway Trust Fund
[18] Reflects as rescission of $19,066,000 per P.L. 112-55. Includes $4,549,882,000 from Airport and Airway Trust Fund. Also includes $2.3 million transfer from the U.S. Department of State
[19] Includes $4,958,000,000 from Airport and Airway Trust Fund
[20] Includes $5,060,694,000 from Airport and Airway Trust Fund
[21] Includes $6,721,000,000 from Airport and Airway Trust Fund
[22] Reflects funding at the FY 2012 funding level pursuant to P.L. 113-6, Consolidated and Further Continuing Appropriations Act, 2013.
[23] FY 2013 funds sequestered pursuant to the Budget Control Act of 2011 as Amended by The American Taxpayer Relief Act of 2012 (P.L. 112-240).
[24] Reflects a 0.20 percent across-the-board rescission per P.L. 113-6.
[25] Includes $6,484,000,000 from the Airport and Airway Trust Fund
[26] Includes $9,040,850,000 from the Airport and Airway Trust Fund.
[27] Includes $8,547,000,000 from the Airport and Airway Trust Fund.
[28] Includes $6,495,208,000 from the Airport and Airway Trust Fund.
[29] Includes $8,595,000,000 from the Airport and Airway Trust Fund.

FEDERAL AVIATION ADMINISTRATION

FACILITIES AND EQUIPMENT (AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2005	2,500,000,000	2005	[1]2,519,680,000
		2005 Supplemental (P.L.108-324)	[2]5,100,000
2006	2,448,000,000	2006	[3]2,514,600,000
		2006	[4]40,600,000
2007	2,503,000,000	2007	2,517,520,000
2008	[5]2,461,566,000	2008	2,513,611,000
2009	[6]2,723,510,000	2009	2,742,095,000
		2009 Supplemental (P.L.111-5)	[7]200,000,000
2010	2,925,202,000	2010	[8]2,928,315,000
2011	2,970,000,000	2011	[9]2,730,731,000
2012	[10]3,120,000,000	2012	2,730,731,074
2013	2,850,000,000	2013	[11]2,730,731,074
		2013 Supplemental (P.L. 113-2)	[12]30,000,000
		2013 Sequester (P.L.11-240)	[13]-141,642,505
		2013 Rescission (P.L. 113-6)	[14]5,461,462
2014	2,777,798,000	2014	2,600,000,000
2015	2,603,700,000	2015	2,600,000,000
2016	2,855,000,000		

[1] Reflects 0.80 percent across-the-board rescission per P.L. 108-447.
[2] Emergency Hurricane Supplemental Appropriations Act Supplemental per P.L.108-324, from the Trust Fund.
[3] Reflects 1.0 percent across-the-board rescission, per P. L. 109-148.
[4] Hurricane Supplemental fund per P.L. 109-148
[5] 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.
[6] 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.
[7] American Recovery and Reinvestment Act Supplemental per P.L. 111-5, from the General Fund.
[8] Reflects $7,888,294 rescission of prior year authority per P.L. 111-226.
[9] Reflects a rescission of $5,472,000 per P.L. 112-55.
[10] Includes $250,000,000 of mandatory General Fund from the Administration's Infrastructure proposal.
[11] Reflects funding at the FY 2012 funding level pursuant to P.L. 113-6, Consolidated and Further Continuing Appropriations Act, 2013.
[12] Hurricane Sandy Emergency Supplemental, P.L. 113-2
[13] FY 2013 funds sequestered pursuant to the Budget Control Act of 2011 as Amended by The American Taxpayer Relief Act of 2012 (P.L. 112-240). Includes $2,770,000 in offsetting collections.
[14] Reflects a 0.20 percent across-the-board rescission per P.L. 113-6.

FEDERAL AVIATION ADMINISTRATION

RESEARCH, ENGINEERING, AND DEVELOPMENT

ESTIMATES		APPROPRIATIONS	
2005	117,000,000	2005	[1]129,879,584
2006	130,000,000	2006	[2]136,620,000
2007	130,000,000	2007	130,234,000
2008	[3]140,000,000	2008	146,828,000
2009	[4]171,028,000	2009	171,000,000
2010	180,000,000	2010	190,500,000
2011	190,000,000	2011	[5]169,660,000
2012	190,000,000	2012	167,556,000
2013	180,000,000	2013	[6]167,556,000
		2013 Sequester (P.L.112-240)	[7]-8,429,072
		2013 Rescission (P.L. 113-6)	[8] $335,112
2014	166,000,000	2014	158,792,000
		2014 Rescission	[9]-26,183,998
2015	156,750,000	2015	156,750,000
2016	166,000,000		

[1] Reflects a 0.80 percent across-the-board rescission per P.L. 108-447.
[2] Reflects a 1.0 percent across-the-board rescission of 1.0 percent per P.L. 109-148.
[3] Includes $122,867,000 from the Airport and Airway Trust Fund and $17,133,000 from the General Fund.
[4] Includes $156,003,000 from the Airport and Airway Trust Fund and $15,025,000 from the General Funs.
[5] Reflects a $340,000 rescission per P.L. 112-55.
[6] Reflects funding at the FY 2012 funding level pursuant to P.L. 113-6, Consolidated and Further Continuing Appropriations Act, 2013.
[7] FY 2013 funds sequestered pursuant to the Budget Control Act of 2011 as Amended by The American Taxpayer Relief Act of 2012 (P.L. 112-240).
[8] Reflects a 0.20 percent across-the-board rescission per P.L. 113-6.
[9] Reflects a $26,183,998 rescission, per P.L. 113-76.

FEDERAL AVIATION ADMINISTRATION

GRANTS-IN-AID FOR AIRPORTS
(LIQUIDATION OF CONTRACT AUTHORIZATION)
(AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
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)	[1]1,100,000,000
2010	3,000,000,000	2010	3,000,000,000
2011	3,550,000,000	2011	3,550,000,000
2012	3,600,000,000	2012	3,435,000,000
2013	3,400,000,000	2013	3,435,000,000
2014	3,200,000,000	2014	3,200,000,000
2015	3,200,000,000	2015	3,200,000,000
2016	3,500,000,000		

[1] American Recovery and Reinvestment Act Supplemental, per P.L. 111-5, from the General Fund.

FEDERAL AVIATION ADMINISTRATION

GRANTS-IN-AID FOR AIRPORTS
LIMITATION ON OBLIGATIONS
(AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2005	(3,500,000,000)	2005	[1](3,497,000,000)
2006	(3,000,000,000)	2006	(3,514,500,000)
2007	(2,750,000,000)	2007	(3,514,500,000)
2008	(2,750,000,000)	2008	(3,514,500,000)
2009	(2,750,000,000)	2009	(3,514,500,000)
2010	(3,515,000,000)	2010	(3,515,000,000)
2011	(3,515,000,000)	2011	(3,515,000,000)
2012	(2,424,000,000)	2012	(3,350,000,000)
2013	(2,424,000,000)	2013	[2](3,343,300,000)
2014	(2,900,000,000)	2014	(3,350,000,000)
2015	(2,900,000,000)	2015	(3,350,000,000)
2016	(2,900,000,000)		

[1] 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.
[2] Reflects funding at the FY 2012 funding level pursuant to P.L. 113-6, Consolidated and Further Continuing Appropriations Act, 2013, minus the 0.20% across-the-board rescission.

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SECTION 4. RESEARCH, DEVELOPMENT, & TECHNOLOGY

EXHIBIT IV-1
RESEARCH, DEVELOPMENT & TECHNOLOGY
DEPARTMENT OF TRANSPORTATION
BUDGET AUTHORITY
($ in Thousands)

	FEDERAL AVIATION ADMINISTRATION	FY 2014 Enacted	FY 2015 Eancted	FY 2016 Request	Applied	Development
A.	**Research, Engineering and Development**	**158,792**	**156,750**	**166,000**	**166,000**	
A11	**Improve Aviation Safety**	**87,244**	**91,019**	**96,623**	**96,623**	
a.	Fire Research and Safety	8,000	6,000	6,643	6,643	
b.	Propulsion and Fuel Systems	1,800	2,000	3,034	3,034	
c.	Advanced Materials/Structural Safety	2,600	2,909	3,625	3,625	
d.	Aircraft Icing/Digital System Safety	7,500	5,500	6,920	6,920	
e.	Continued Airworthiness	8,000	9,619	8,987	8,987	
f.	Aircraft Catastrophic Failure Prevention Research	1,500	1,500	1,433	1,433	
g.	Flightdeck/Maintenance/System Integration Human Factors	5,000	6,000	9,947	9,947	
h.	System Safety Management	11,000	7,970	6,063	6,063	
I.	Air Traffic Control/Technical Operations Human Factors	5,000	5,400	5,995	5,995	
j.	Aeromedical Research	7,000	8,300	10,255	10,255	
k.	Weather Program	14,200	14,847	18,253	18,253	
l.	Unmanned Aircraft Systems Research	8,644	14,974	9,635	9,635	
m.	NextGen - Alternative Fuels for General Aviation	6,000	6,000	5,833	5,833	
A12	**Improve Efficiency**	**24,329**	**22,286**	**24,671**	**24,671**	
b.	NextGen - Wake Turbulence	9,000	8,541	8,680	8,680	
c.	NextGen - Air Ground Integration Human Factors	11,329	9,697	8,875	8,875	
e.	NextGen - Weather Technology in the Cockpit	4,000	4,048	4,116	4,116	
d.	Commercial Space			3,000	3,000	
A13	**Reduce Environmental Impact**	**41,579**	**37,935**	**38,884**	**38,884**	
a.	Environment and Energy	14,600	14,921	15,061	15,061	
b.	NextGen - Environmental Research - Aircraft Technologies, Fuels, and Metrics	26,979	23,014	23,823	23,823	
A14	**Mission Support**	**5,640**	**5,510**	**5,822**	**5,822**	
a.	System Planning and Resource Management	2,200	2,100	2,377	2,377	
b.	William J. Hughes Technical Center Laboratory Facility	3,440	3,410	3,445	3,445	
B.	**Facilities & Equipment**	**106,638**	**114,229**	**198,050**		**198,050**
a.	Advanced Technology Development and Prototype	18,722	18,500	21,300		21,300
b.	Plant	17,000	25,249	32,250		32,250
c.	Center for Advanced Aviation System Development (CAASD)	12,840	60,000	60,000		60,000
d.	NextGen Applied Research & Development *	58,076	10,480	84,500		84,500
C.	**Grants-In-Aid for Airports, Airport Technology (T)**	**44,500**	**44,750**	**46,000**		**46,000**
a.	Airport Technology Research	29,500	29,750	31,000		31,000
b.	Airport Cooperative Research	15,000	15,000	15,000		15,000
D.	**Operations**	**10,464**	**9,518**	**10,186**		**10,186**
E.	**Commercial Space Transportation Safety**	**0**	**0**	**0**		**0**
	Subtotal, Research and Development Total	**258,894**	**255,248**	**341,986**	**166,000**	**175,986**
	Subtotal, Technology Investment (T) Total	**44,500**	**44,750**	**46,000**	**0**	**46,000**
	Subtotal , Facilities (F) Total	**17,000**	**25,249**	**32,250**	**0**	**32,250**
	TOTAL FAA	**320,394**	**325,247**	**420,236**	**166,000**	**254,236**

* FY 2016 increase is due to reclassifying existing work to better align with OMB Circular A-11 Research Definitions.

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SECTION 5: NEXTGEN

Next Generation Air Transportation System (NextGen)

For FY 2016, the FAA is requesting a total of $956.3 million for the Next Generation Air Transportation System.

Executive Summary

The FAA continues to make critical progress implementing Next Generation Air Transportation System (NextGen) capabilities, which encompass the deployment of new systems, technologies, and procedures that will help reduce delays, expand air traffic system capacity, and mitigate aviation's impact on the environment while ensuring the highest levels of safety.

Since NextGen's inception in 2007, FAA has focused primarily on conducting applied and basic research about adapting current information technology (IT) to a wide spectrum of aviation programs to enhance the efficiency and effectiveness of the NAS. NextGen is now moving programs out of development and into baselined and operational programs, and FAA and other stakeholders are beginning to experience the benefits of NextGen investments. NextGen achievements have already provided the following capabilities to the aviation community:

- Satellite-based surveillance and navigation. Automatic Dependent Surveillance-Broadcast (ADS-B) is in the final stages of implementation with delivery of the total complement of about 700 radio stations. Air traffic controllers are using ADS-B to separate traffic in South Florida, Louisville, Philadelphia, Juneau, and the Gulf of Mexico. Implementation of ADS-B to control air traffic in the Gulf of Mexico is a significant safety and efficiency improvement by providing radar-like services to a region which was without surveillance. Airlines, which are required to equip with ADS-B out capabilities by 2020, are already investing in the ADS-B to realize these benefits.

- Performance Based Navigation (PBN). The introduction of area navigation operations and the more advanced GPS-based performance-based navigation procedures are reducing flight distances, flight times, noise pollution, fuel consumption, and harmful engine emissions. As part of our Metroplex initiative, we implemented scores of new satellite-based air traffic procedures in several major cities, including Houston, North Texas, Northern California, and Washington D.C. These procedures are helping to increase on-time arrival, and reduce fuel consumption and emissions, results that are benefiting the airlines, the passenger, and the environment. For instance, in the North Texas area, we implemented 80 new RNAV and RNP air traffic instrument procedures. We project that airspace users will save 4.1 million gallons of fuel each year, resulting in a savings of 41,000 metric tons of carbon dioxide emissions and $10.3 million.

- Surface Movement Data Sharing. The FAA is beginning to share surface movement data between FAA, airport authorities and airlines to reduce aircraft wait times on the tarmac and to facilitate greater throughput at airports that have closely spaced and converging or intersecting runways.

Introduction

For FY 2016, $956.3 million is requested for the NextGen programs, projects, and activities. With the requested funding FAA will continue the on-going development and implementation of operational improvements to safely and efficiently operate the NAS, while fulfilling our responsibilities as stewards of the environment.

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 remain the gold standard for aviation safety. To make this happen, FAA actively builds partnerships and shares knowledge to create a safe, seamless and efficient global aviation system. Our premise is simple: national boundary lines should not be impediments to safety. The global aviation system moves more than 8.6 million people and tons of cargo to their destinations every day. Through the Office of Policy, International Affairs and Environment (APL), FAA collaborates with domestic and international partners to improve aviation safety, efficiency and the environment. People across the globe benefit from the work FAA does.

The public at large benefits from reduced aviation noise and emission impacts. The aviation industry also benefits because lower environmental impacts reduce restrictions on aviation 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.

By 2022, the air transportation system will be fundamentally different transportation 10 years ago. The way aircraft are tracked aircraft transforming from ground-based radar to satellite-based position-fixing. For commercial aviation, satellite-based surveillance is a technological leap that is greatly increasing accuracy and improving situational awareness at air traffic control facilities and on properly equipped aircraft.

Aircraft navigation capabilities are transitioning from cumbersome, step-by-step clearances to PBN-based procedures, allowing for more precise, direct trajectories in all phases of flight – takeoff, ascent, cruise, descent, and landing. Additionally, PBN procedures are reducing flight distances, flight times, fuel consumption, and harmful engine emissions – all of which further the FAA's commitment to reducing the environmental footprint of greenhouse-gas emissions and noise created by the aviation industry, while ensuring the continuation of a safe and secure NAS.

The FAA is also increasing its focus on the way information is transferred between the cockpit and air traffic control facilities. Currently, all communications are voice, but switching to a more data-focused transfer of information will both modernize the information transfers and increase efficiency by minimizing garbled or misunderstood messages. As with other improvements, this will be phased in to minimize disruption and ensure that messages are delivered without the errors in hearing and transcribing the information that cause repeats or worse – operational errors. Applied initially to messages between airport towers and aircraft on the surface, data communications will improve safety and reduce the time it takes from gate to air, and will eventually become the principal method of routine communications through all phases of flight.

Organizing information for pilots, controllers, airports, airlines and other NAS stakeholders will undergo perhaps the greatest change of all, moving from disjointed data presentations in ad-hoc formats to improved, fully-merged data presented in the same format to all players.

FY 2016 Funding Profile and Budget

This budget supports a continued progress on our NextGen efforts. The entire FY 2016 NextGen funding profile totals $956.3 million distributed among Facilities & Equipment ($844.6 million), Research, Engineering & Development ($60.9 million), and Operations ($50.8 million) accounts. The funding will be used to achieve the NextGen goals that have the largest benefits and the biggest need by focusing the deployment on enhancements at "optimal" sites and delivering ready capabilities now. This request is an increase of $99.4 million, or approximately 12 percent, above the FY 2015 enacted level.

The FAA is focusing the limited resources on implementation activities in FY 2016 to respond to a NextGen Advisory Committee (NAC) recommendation to deliver as many readily available benefits as possible in the near-term. The FAA's investment in pre-implementation activities in FY 2016 is also consistent with the NAC's recommendations for prioritizing NextGen.

The NextGen budget has also been updated to include unmanned aircraft system integration into the NAS, which is funded in the F&E, Operations and R,E&D account. The NextGen portion of the Operations account also now reflects the costs associated with implementing PBN, and NextGen staffing costs now include travel by FAA's NextGen organization (ANG).

Table 1 below shows the old budget BLIs as well as the new BLIs. Detailed funding and program requirements can be found in the budget narrative, Section 3. Table 2, located on the last page of this section, gives the section and page number of the specific locations. Line item detail for each account is shown in the table below.

Table 1: NextGen Program Summary

	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request
Facilities and Equipment	**828,166,093**	**$791,500,000**	**$844,575,000**
NextGen - Separation Management Portfolio		13,000,000	26,500,000
NextGen - Improved Surface/TFDM Portfolio		38,808,000	17,000,000
NextGen - On Demand NAS Portfolio		6,000,000	11,000,000
NextGen - Environment Portfolio		5,500,000	1,000,000
NextGen - Improved Multiple Runway Operations Portfolio		5,500,000	8,000,000
NextGen - NAS Infrastructure Portfolio		14,480,000	11,000,000
NextGen – Support Portfolio		13,000,000	10,000,000
NextGen - System Safety Management Portfolio		18,700,000	17,000,000
Performance Based Navigation and Metroplex Portfolio		26,500,000	13,000,000
NextGen - Communications in Support of NextGen	115,450,000	150,340,000	234,900,000
NextGen - Demonstration and Infrastructure Development	20,000,000		
NextGen - System Development	58,075,883		
NextGen - Trajectory Based Operations	15,988,063		
NextGen - Reduce Weather Impact	2,729,354		
NextGen - High Density Arrivals/Departures	5,484,247		
NextGen - Collaborative ATM	20,250,589		
NextGen - Flexible Terminals and Airports	12,923,385		
NextGen - System Network Facilities	5,094,032		
NextGen - Future Facilities	10,000,000		
Performance Based Navigation - Optimization of Airspace and Procedures for Metroplex (OAPM)	32,200,000		
En Route Automation Modernization (ERAM) - System Enhancements	35,000,000	45,200,000	79,400,000
System - Wide Information Management (SWIM)	66,550,000	60,261,000	37,400,000
ADS - B NAS Wide Implementation	282,100,400	254,700,000	45,200,000
Collaborative Air Traffic Management (CATMT) Portfolio	28,200,000	13,491,000	9,800,000
Colorado ADS - B WAM Cost Share	3,400,000		
Tactical Time Based Flow Management (TBFM)	10,500,000	21,000,000	42,600,000
Next Generation Weather Processor (NWP)	11,475,000	23,320,000	7,000,000
NAS Voice System (NVS)	16,000,000	20,550,000	53,550,000
Flight and Interfacility ATC Interface Modernization			9,000,000
Terminal Flight Data Manger (TFDM)	19,250,000		
Aviation Safety Information Analysis and Sharing (ASIAS)	15,000,000		
Aeronautical Information Management Program (AIM Segment 2)	9,050,000	12,650,000	5,000,000
Cross Agency NextGen Management		2,000,000	3,000,000
Activity 5 F&E PCBT - NextGen Staffing	33,445,140	46,500,000	63,825,000
Activity 6 Sustain ADS-B Services			139,400,000
Research Engineering and Development (RE&D)	**$58,308,000**	**$51,300,000**	**$60,962,000**
NextGen - Alternative Fuels for General Aviation	6,000,000	6,000,000	5,833,000
NextGen - Advanced Systems and Software Validation	1,000,000		
NextGen - Wake Turbulence	9,000,000	8,541,000	8,680,000
NextGen - Air Ground Integration	11,329,000	9,697,000	8,875,000
NextGen - Weather in the Cockpit	4,000,000	4,048,000	4,116,000
NextGen - Environmental Research, Aircraft Technologies, Fuels and Metrics	26,979,000	23,014,000	23,823,000
Unmanned Aircraft Systems Research			9,635,000
Operations	**$14,863,130**	**$14,100,000**	**$50,785,000**
NextGen Staffing	14,863,130	14,100,000	29,460,000
NextGen Unmanned Aircraft System			7,800,000
Performance Based Navigation (PBN) Activities			13,525,000
Total NextGen Programs	**$901,337,223**	**$856,900,000**	**$956,322,000**

* Note: NextGen PC&B has been increased by a rebaselining of staffing and the inclusion of 26 AVS and 4 ATO UAS positions that have been moved under the NextGen Portfolio for the first time in FY 2016.

Achieving the Benefits of NextGen

The FAA estimates that NextGen will reduce total flight delays about 11 percent by 2020, compared with the level that delays would reach without NextGen, while providing $18 billion in cumulative benefits to the traveling public, aircraft operators, and the FAA. Aircraft owners will save about 800 million gallons of fuel during this period, reducing carbon dioxide emissions by 7 million tons. The FAA is achieving these benefits by the improvements delivered through foundational program deployments and implementation portfolios.

NextGen programs made great strides in 2013 and 2014 in achieving these benefits. This is particularly true in the areas of ADS-B ground-based infrastructure deployment and the completion of the baselined ground station network, PBN procedure-related activities, renewable fuels, and responding to the Radio Technical Commission for Aeronautics (RTCA) recommendations.

In FY 2014, FAA published 158 PBN RNAV arrival procedures and 134 PBN RNAV departure procedures. These increased publication levels are attributed to a new process developed to streamline the time it takes to introduce new PBN procedures. The FAA is striving to limit the numbers of new procedures to those that are required and will actually be flown. In May 2014, the Houston Metroplex implemented and began using 60 PBN RNAV arrival and departure procedures. The North Texas Metroplex implemented and began using 80 PBN RNAV arrival and departure procedures in September 2014. In FY 2015 the Northern California Metroplex will complete implementation in April 2015 of 40 RNAV and RNP arrival and departure procedures. The Washington, DC Metroplex will complete implementation in June 2015 of 43 RNAV and RNP arrival and departure procedures. These new PBN/RNAV procedures are designed to provide greater flexibility in the NAS and to facilitate more dynamic management of air traffic.

The FAA continues to provide significantly improved access to general aviation airports through the publication of PBN approach procedures known as Area Navigation (RNAV) Wide Area Augmentation System (WAAS) Localizer Performance (LP) with Vertical Guidance (LPV). WAAS, a satellite based navigation technology, allows qualifying airports in the NAS to have vertical and horizontal guidance during all phases of a flight, regardless of weather conditions, without installing expensive legacy navigation hardware at each runway. As of February 2014, more than 3,900 WAAS LP/LPV procedures were in place at more than 1,500 airports throughout the United States.

In the mid-term, FAA is working to provide flight planners increased access to information on the status of the NAS through a shared, network-enabled information source. By moving from what today is mostly verbal exchange to information standards and sources, 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 events and congestion.

Under Data Comm, the flight crew will receive the final flight path agreement as a data message and pre-departure clearances will 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 indicating 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, are already enabling controllers to manage taxiways and runways more efficiently. Surface-movement displays and the support tools in development will help controllers manage the size of the departure queue and 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 help prevent 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 is being improved by using more precise departure courses from each runway end through Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures. As we add multiple departure paths, this 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 – is already helping airports to 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. The use of data communications for severe weather reroutes will enhance the ability of the FAA and aircraft operators to more efficiently manage the deviations weather cause. 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. The time-based flow management tool analyzes flights approaching an airport from hundreds of miles away, across air traffic control facility boundaries, and calculates scheduled arrival times to reduce low altitude delays and holding. To increase the benefit and usage of performance based procedures in the busiest terminals, the tool will provide arrival sequence and spacing guidance to allow the aircraft to fly the fuel efficient procedure, while maintaining runway throughput. These advances will improve the flow of arrival traffic by efficiently maximizing the use of existing capacity, saving fuel and reducing emissions.

Not all the benefits come through improved air traffic management. Our on-going advocacy of sustainable jet fuels through the Commercial Aviation Alternative Fuels Initiative reached a significant milestone on July 1, 2011. Standards-setting organization ASTM International approved the use of a renewable, bio-derived jet fuel. In 2012, endurance tests of a turbofan engine using this Hydroprocessed Renewable Jet fuel showed that this blend does not affect long-term engine wear or operational performance.

FAA Stakeholder Collaboration on Achieving Benefits of NextGen

When faced with tight budget constraints in FY 2013, FAA turned to our stakeholders to seek input on how they would prioritize NextGen investment. In July 2013, FAA requested that the NextGen Advisory Committee (NAC) develop recommendations related to the agency's NextGen investments. The purpose of the request was to evaluate those items of direct operational benefit to external stakeholders. The NAC reviewed current FAA plans and activities that have an effect on the implementation of NextGen and developed a prioritized list of Tier 1 (consensus on activities that should continue) and Tier 2 (consensus on activities that should continue, resources permitting) recommendations. The NAC published their report, "NextGen Priorities in a Budget Constrained Environment" in September 2013 that was consistent with previous recommendations from the NAC, as well as those made by Task Force 5 (TF5). Those results have supported the FY 2016 budget formulation process for NextGen and guided the preservation of dollars for those capabilities with preferred outcomes.

In response to a request from the House of Representatives Committee on Transportation and Infrastructure, Subcommittee on Aviation, the FAA has collaborated with the aviation industry through the NextGen Advisory Committee (NAC), a federal advisory committee, to develop a plan to implement a number of high-priority NextGen capabilities. The plan's foundation was earlier NAC work, which recommended the FAA focus on NextGen capabilities in four areas: Multiple Runway Operations, Performance Based Navigation, Surface Operations, and Data Communications. These are capabilities that will provide significant near-term benefits to National Airspace System (NAS) users.

Throughout 2014, FAA subject matter experts met with aviation industry representatives to determine what the FAA is able to accomplish over the next one to three years and what industry commitments are necessary for those activities to be successful. These meetings have enabled the FAA and industry to reach agreement on all of the "high priority, high readiness" capabilities that the NAC has recommended, with the FAA committing to specific site implementation plans and industry ensuring operator preparedness in order to take full advantage of NextGen benefits.

The FAA's *NextGen Priorities Joint Implementation Plan* summarizes the high-level commitments to which the FAA and the aviation community have agreed, and provides a timeline of capability milestones and locations. The plan is organized into the four focus areas. It is important to note that the commitments represent a subset of the overall series of programs and activities that the FAA has planned to modernize the NAS. A full executive report is located at www.faa.gov/nextgen/media/ng_priorities.pdf.

We are also continuing to make progress on responding to the RTCA NextGen Mid-Term Implementation Task Force recommendations from 2009. The FAA has completed more than one-third of the Task Force recommendations, which were provided by a consortium of 300-plus representatives from the aviation community. The following tables depict a partial illustration of the progress made in response to the Task Force recommendations. FAA provides a full summary of the NAC recommendations and related FAA responses in the NextGen Implementation Plan, June 2013 (www.faa.gov/nextgen/Implementation). The FAA is adjusting its planning as necessary to address these recommendations.

Program	RTCA Task Force	FY 2013 FY 2014	FY 2015	FY 2016 - Mid-Term
Automatic Dependent Surveillance - Broadcast (ADS-B)	NAS Access #28	▪ Completed baseline ADS–B radio station infrastructure deployment ▪ Completed TSAA MOPS ▪ Gulf of Mexico Expansion: Completed SV Design in support of International Agreement w/ Mexico ▪ As of May 2014, achieved En Route Separation Services IOC at 16 sites ▪ As of May 2014, achieved Terminal Separation Services IOC at 58 sites ▪ Achieve IOC for Ground Based Interval Management – Spacing (planned September 2014) ▪ Established FAA infrastructure that supports ground vehicle surveillance at Denver and O'Hare Airports ▪ Complete deployment and integration of the ADS-B system in the surface domain at all 35 ASDE-X sites by September 2014	▪ Pay performance based subscription charges. ▪ Begin National Deployment of Ground Based Interval Management (GIM) ▪ Achieve En Route ATC Separation Services IOC at Remaining Sites ▪ Continue to achieve Initial Operating Capability (IOC) for Terminal ATC Separation Services at sites ▪ Achieve IOC for Airport Surface Surveillance Capability (ASSC) at two sites ▪ Gulf of Mexico Expansion - First Radio Station Construction Complete	▪ Pay performance based subscription charges ▪ Continue to achieve Initial Operating Capability (IOC) for Terminal ATC Separation Services at sites ▪ Gulf of Mexico remaining radio station construction complete ▪ Gulf of Mexico expanded services operational at Houston Center (APB Milestone) ▪ Achieve IOC for Airport Surface Surveillance Capability (ASSC) at three sites ▪ Advanced Technologies and Oceanic Procedures (ATOP) Oceanic ITP operational at Oakland Center
Data Communications (Data Comm)	Data Comm #16, 17, 39, 44, 42	▪ Delivered En Route Automation ERAM Initial Test Release (ITR) ▪ Delivered TDLS V12	▪ Achieve FID for Segment 1 Phase 2 En Route Services ▪ Complete Enterprise	▪ Complete Operational Test and Evaluation (OT&E) for Segment 1 Phase 1

Program	RTCA Task Force	FY 2013 FY 2014	FY 2015	FY 2016 - Mid-Term
		Initial Test Release (ITR) ▪ Delivered Data Comm Network Service (DCNS) Build 1 to William J. Hughes Technical Center (WJHTC) to support Segment 1 Phase 1 testing ▪ Complete Data Comm Informal Integration and Interface Service Test for Segment 1 Phase 1 ▪ Finalized Segment 1 Phase 2 En Route Use Cases ▪ Finalize System Specification Documents for Segment 1 Phase 2	Service-level Integration Testing ▪ Complete integration and testing of the subsystems to deliver Data Comm services ▪ Deliver Data Comm Network Service (DCNS) Build 2 to William J. Hughes Technical Center (WJHTC) to support Segment 1 Phase 1 testing	▪ Achieve Initial Operating Capability (IOC) for Segment 1 Phase 1 Tower Services ▪ Complete In-Service Decision (ISD) for Segment 1 Phase 1 ▪ Achieve key site Operational Readiness Decision (ORD) for Segment 1 Phase 1 ▪ Complete system requirements and design effort for Segment 1Phase 2 ▪ Achieve IOC for Segment 1 Phase 2 Initial En Route Services ▪ Begin planning for ATN and Segment 2 services

System Wide Information Management (SWIM)	Surface #40, 35	▪ Provided Integrated Terminal Weather System publication
		▪ Publish Time Based Flow Management (TBFM) and Notice to Airmen (NOTAM) data
		▪ Provide terminal data for
		  ▪ Runway Visual Range
		  ▪ Surface Movement Events
		  ▪ ASDE-X
		  ▪ Tower Departure Events
		▪ Final Investment Decision (FID) for SWIM Segment 2B
		▪ Complete documentation in support of Initial Investment Decision (IID) for Common Support Services – Weather (CSS-WX) Segment
			▪ Provide traffic flow management data distribution (TFM Data replacing Aero nautical Situation Display to Industry (ASDI))
			▪ Provide Corridor Integrated Weather System (CIWS) data publication
			▪ Provide flight data publication for initial FIXM 3.0 flight data service
			▪ Provide data to NAS Information Display System (NIDS)
			▪ Provide data distribution services to Terminal Automation Management Replacement (TAMR)
				▪ Provide centralized certificate management services to the NAS for Identity and Access Management
				▪ Provide data distribution services to Terminal Flight Data Management (TFDM)
				▪ Provide data distribution services to Common Support Services – Weather (CSS-WX)
				▪ Provide data distribution services to AIM Segment 2

Collaborative Air Traffic Management Technologies (CATMT)	Integrated ATM #47	▪ Continued CATMT Work Package 3 concept engineering and planning to support: (1) modernization of the decision support tool suite, and (2) collaborative information exchange ▪ Upgraded the Traffic Flow Management System to include an initial electronic negotiation capability for	CATMT WP3: ▪ Complete development and deployment of Collaborative Information Exchange (CIX) ▪ Receive a Final Investment Decision from the FAA JRC for CATMT WP4	CATMT WP3: ▪ Complete Traffic Flow Management System Remote Site Re-Engineering effort ▪ Transition to new prime development contract ▪ Continue the analysis to develop the requirements to implement proven decision-support tools and data sharing

Program	RTCA Task Force	FY 2013 FY 2014	FY 2015	FY 2016 - Mid-Term
		more efficient flight planning ▪ Integrated and developed Route Availability Planning Tool (RAPT) ▪ Designed, developed, and deployed the next increment of the Collaborative Airspace Constraint Resolution (CACR) capability. ▪ Complete Investment Analysis Readiness Decision for CATMT Work Package 4 to support improvements to arrival and departure route planning, air traffic flow demand predictions, and traffic management initiative decision support tools.		capabilities

Best Equipped – Best Served Concept

NextGen is being 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 will receive safe and efficient services at the same high level of standards as those provided today. During FAA's transition to NextGen capabilities, unequipped aircraft currently operating in the NAS will not be excluded from the airspace, but they will not reap the benefits of NextGen.

Among the factors that determine how much and how quickly NextGen will increase efficiency, safety, and environmental performance in the NAS, equipage decisions by aircraft operators 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 Performance Measures

At the direction of the FAA's NextGen Management Board, in 2012 we developed a comprehensive set of performance metrics to gauge overall operational performance. The metrics are aligned with the International Civil Aviation Organization (ICAO) Key Performance Areas (KPA), and while not exhaustive, cover a wide range of important aspects of the Agency's operations. Although most of these metrics have been publically available for some time, a new public Web site (www.faa.gov/nextgen) has been created in order to provide increased transparency into our performance in this area.

In 2014, the FAA Administrator established a new strategic framework that was defined by four Strategic Priorities. These Strategic Priorities are the organizing foundation for the agency's business plans in the FY 2014 through FY 2018 period, and replace the FAA's former Strategic Plan (Destination 2025).

To date, NextGen targets have been defined for three of the Key Performance Areas, which align with FAA Strategic Priorities and Priority Initiatives:

- Make Aviation Safer and Smarter. NextGen provides an opportunity to be more proactive about safety and uses safety management principles to make smarter, risk-based decisions throughout the agency and with industry and global stakeholders. NextGen engages with industry on advanced performance based navigation (PBN), including procedures, safety case development and information needs, which makes our aviation system safer.

- Deliver Benefits Through Technology and Infrastructure. NextGen is redefining the NAS and is delivering benefits to system users, such as reduced fuel costs, reduced delays, and reduced environmental impact. Great technological advancements require the FAA to safely integrate new types of user technologies, such as establishing standards for unmanned aircraft systems and aircraft conflict avoidance in control airspace.

- Enhance Global Leadership. Aviation is a global industry and millions of Americans travel overseas every year. According to ICAO, the ATM system should be based on global standards and uniform principles to ensure the technical and operational interoperability of ATM systems and facilitate homogeneous and non-discriminatory global and regional traffic flows. The NextGen metric is Percentage of Commercial Aircraft from the Top 25 Aviation States Using Fully Interoperable NextGen Technologies and Procedures. The technologies and procedures referred to here are PBN, Data Comm, and ADS-B Out. Ground-based Augmentation System (GBAS) has established global standards for United States avionics vendors.

NextGen Staffing

The FAA identifies, tracks, and reports NextGen "dedicated" staffing levels. NextGen dedicated staffing is defined as employees who spend 50 percent or more of their time on NextGen-related activities. Since FAA manages NextGen across organizational structures and lines of business, a Standard Operating Procedure (SOP) that establishes processes to consistently identify and track federal employees dedicated to working on NextGen programs has been established.

Several re-organizations have occurred since the NextGen staffing baseline was initially established in FY 2011, and it has been necessary to re-establish a baseline and validate current and planned NextGen staffing levels. In the spring of 2014, FAA revalidated the staff assigned to the NextGen effort in order to determine a more accurate total of NextGen staffing levels.

The table below shows our updated NextGen "dedicated" staffing levels.

Appropriation/Organization	FY 2015 Enacted			FY 2016 Request			Change		
	FTP Positions	EOY	FTE	FTP Positions	EOY	FTE	FTP Positions	EOY	FTE
Facilities and Equipment (F&E)									
ANG:									
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Various Programs/Projects)	232	232	232	298	298	298	66	66	66
ATO:									
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Various Programs/Projects)	77	77	77	54	54	54	(23)	(23)	(23)
AFN:									
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Various Programs/Projects)				45	45	45	45	45	45
AVS:									
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Performance Based Navigation)	30	30	30	30	30	30			
Subtotal, NextGen F&E	**339**	**339**	**339**	**427**	**427**	**427**	**88**	**88**	**88**
Research, Engineering & Development (R,E&D)									
ANG:									
NextGen – Wake Turbulence; Air Ground Integration; Self Separation; Weather in the Cockpit	10	10	10	12	12	12	2	2	2
APL:									
NextGen – Environmental Research, Aircraft Technologies, Fuels and Metrics	3	3	3	4	4	4	1	1	1
Subtotal, NextGen R,E&D	**13**	**13**	**13**	**16**	**16**	**16**	**3**	**3**	**3**
Operations									
ANG: NextGen Staffing	35	35	35	52	52	52	17	17	17
ATO: NextGen Staffing	51	51	51	64	64	64	13	13	13
AVS: NextGen Staffing	-	-	-	61	61	61	61	61	61
AFN: NextGen Staffing				13	13	13	13	13	13
AOC: NextGen Staffing				1	1	1	1	1	1
APL: Integrate Environmental Performance into NextGen; Environmental / Noise Studies	10	10	10	8	8	8	(2)	(2)	(2)
Subtotal, NextGen Operations	**96**	**96**	**96**	**199**	**199**	**199**	**103**	**103**	**103**
Total NextGen Staffing	**448**	**448**	**448**	**642**	**642**	**642**	**194**	**194**	**194**
ANG	277	277	277	362	362	362	85	85	85
ATO	128	128	128	118	118	118	(10)	(10)	(10)
AVS	30	30	30	91	91	91	61	61	61
APL	13	13	13	12	12	12	(1)	(1)	(1)
AFN	-	-	-	58	58	58	58	58	58
AOC	-	-	-	1	1	1	1	1	1

The change between FY 2015 and FY 2016 does not represent a request for additional personnel. It is an internal re-classification of currently on-board staff. The increase in funding for F&E Activity 5 and Operations personnel costs displayed in the chart on page 3 reflects this reclassification. The personnel funding for the 15 RE&D positions is included in the individual RE&D program funding levels as this account does not maintain a separate personnel line item.

NextGen Challenges

NextGen's multiple capabilities are interdependent, and FAA will incorporate them into the 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 maintain safety. The logical progression of 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 planning as FAA improves 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 FAA moves forward together with NextGen.

Proper recognition and management of uncertainty must be a central feature of the 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 FAA makes 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. 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, FAA will continue to accommodate lesser-equipped operators. The FAA is examining best-equipped/best-served concepts, whereby aircraft equipped for NextGen capabilities would be served in ways that deliver the NextGen benefits. Controller training is developed to match the introduction of new capabilities and is also included as part of the safety management system process. 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, FAA gains 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 (NextGen)
Budget Narrative Reference Guide
NextGen Index of Programs

Specific funding and program requirements can be found as indicated below in Table 2.

		Amount	**Page**
	Facilities and Equipment (F&E)		**Section 3B**
1A05	NextGen – Separation Management Portfolio	$26,500,000	31
1A06	NextGen – Improved Surface/TFDM Portfolio	$17,000,000	41
1A07	NextGen – On Demand NAS Portfolio	$11,000,000	45
1A08	NextGen – Environment Portfolio	$1,000,000	50
1A09	NextGen – Improved Multiple Runway Operations Portfolio	$8,000,000	53
1A10	NextGen – NAS Infrastructure Portfolio	$11,000,000	59
1A11	NextGen – Support Portfolio	$10,000,000	65
1A12	Performance Based Navigation and Metroplex Portfolio	$13,000,000	67
2A01	En Route Automation Modernization System Enhancements and Tech Refresh	$79,400,000	76
2A11	System-Wide Information Management (SWIM)	$37,400,000	103
2A12	ADS-B NAS Wide Implementation (ADS-B)	$45,200,000	107
2A14	Collaborative Air Traffic Management (CATMT) Portfolio	$9,800,000	112
2A15	Tactical Flow Time Based Flow Management (TBFM) Portfolio	$42,600,000	117
2A17	Next Generation Weather Processor (NWP)	$7,000,000	122
2A19	Data Communications in Support of NextGen	$234,900,000	127
2B13	National Airspace System Voice System (NVS)	$53,550,000	167
2B20	Flight and Interfacility ATC Data Interface Modernization	$9,000,000	185
3A10	NextGen – System Safety Management Portfolio	$17,000,000	280
4A09	Aeronautical Information Management Program (AIM) Segment 2	$5,000,000	319
4A10	Cross Agency NextGen Management	$3,000,000	322
5A01	Personnel and Related Expenses - NextGen Staffing	$63,825,000	324
6A01	ADS-B Services and WAAS GEOs	139,400,000	326
	Total, Facilities and Equipment	**$844,575,000**	
	Research, Engineering, and Development		**Section 3C**
A11l	Unmanned Aircraft Systems Research	$9,635,000	50
A11m	NextGen – Alternative Fuels for General Aviation	$5,833,000	53
A12a	NextGen – Wake Turbulence	$8,680,000	56
A12b	NextGen – Air/Ground Integration Human Factors	$8,875,000	59
A12c	NextGen – Weather Technology in the Cockpit	$4,116,000	62
A13b	NextGen – Environmental Research, Aircraft Technologies, Fuels and Metrics	$23,823,000	72
	Total, Research, Engineering, and Development	**$60,962,000**	
	Operations		**Section 3A**
	NextGen Staffing	$20,460,000	ANG,ATO
	Unmanned Aircraft Systems	$7,800,000	ANG,ATO
	Performance Based Navigation (PBN) Metroplex Activities	$13,525,000	ANG,ATO
	Total, Operations	**$50,785,000**	
	Total, NextGen Programs	**$956,322,000**	

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SECTION 6: CAPITAL INVESTMENT PLAN

Federal Aviation Administration National Airspace System Capital Investment Plan for Fiscal Years 2016 – 2020

Overview

The Federal Aviation Administration (FAA) Capital Investment Plan (CIP) describes the planned investments in the National Airspace System (NAS) for the next five years. The Consolidated and Further Continuing Appropriation Act, 2015 (Public Law 113-235) requires submittal of a five year CIP. In the process of developing the CIP the FAA reviews information from the Nextgen Implementation Plan, NAS Enterprise Architecture, acquisition management system and National Aviation Research Plan.

This abbreviated version of the CIP contains the following information:

- Estimated funding by budget line item (BLI). The FY 2016 amounts are consistent with the FY 2016 President's budget request. The outyear funding estimates for FY 2017 through FY 2020 are based on receiving the requested FY 2016 funding and are consistent with the latest Office of Management and Budget outyear targets per statute.

- Information for Major Capital Programs. Provides the cost and schedule status on major capital investment programs. Major programs are those classified as Acquisition Category 1, 2 or 3 with a total Facilities and Equipment (F&E) cost greater than $100 million or have significant impact, complexity, risk, sensitivity, safety or security issues.

Strategic Priorities and the CIP

The FAA Administrator has established a strategic framework to define where the agency will focus its efforts. This framework includes four high-level Strategic Priorities, which are:

- **Make aviation safer and smarter** – There is an imperative to be smarter about how FAA ensures aviation safety because the aviation industry is growing more complex. At the same time, FAA has more safety data than we have ever had before. This provides an opportunity to be more proactive about safety and constantly raise the bar.

- **Deliver benefits through technology and infrastructure** – Next Generation Air Transportation System (NextGen) gives FAA the opportunity to redefine the National Airspace System for the future and prove that benefits can be delivered to the users of the system. FAA also needs to safely integrate new types of user technologies into the airspace, as well as rebalance existing services and modernize our infrastructure, which will enable reductions to costs and increased efficiency in the long run.

- **Enhance global leadership** – Aviation is a global industry. FAA has to continue to be world leaders in aviation and set the safety standard for others to measure against. FAA needs to be at the table to shape international standards to improve aviation safety and efficiency around the world.

- **Empower and innovate with the FAA's people** – The FAA's employees are the ultimate driver behind its success, and FAA needs the best and brightest talent with the appropriate leadership and technical skills to transform the FAA and the aviation system as a whole.

Important Factors Affecting Planning for the Future

Aviation plays a significant role in promoting economic growth and accounts for over five percent of the U.S. Gross Domestic Product. As NextGen modernizes the existing Air Traffic Control (ATC) system by introducing new technologies and advanced decision support tools to make air travel more efficient, safer and environmentally friendly, it supports growth in our economy.

A study by the Air Traffic Organization (ATO) Performance Analysis Service Unit, "The Economic Impact of Civil Aviation on the U.S. Economy," published in February 2014, estimated that aviation accounted for over $1.5 trillion in economic activity in 2012, which is 5.4 percent of the total U.S. economic activity. The spending on aviation-related activities supported an estimated 11.8 million jobs. In support of commercial activities, air carriers transported over 61.2 billion revenue ton-miles of air cargo. A reliable worldwide aviation network is essential for today's economy. Domestic and international commerce rely on the access and passenger and freight capacity it provides to cities around the world to sustain economic growth.

An important aspect in supporting economic growth is the ongoing effort to increase airport capacity with runway infrastructure improvements. These programs create the need for capital investment, especially at large hub airports, where flights are concentrated. The 30 large hub airports handle about 72 percent of airline enplanements. The combined total of 63 large and medium hubs supports about 88% of all U.S. passenger enplanements. Delays at large and medium hubs affect a significant number of passengers.

Key Considerations in Capital Planning

The air traffic control system requires very high reliability and availability to maintain safe operations. Aircraft must maintain separation from other aircraft both inflight and on the ground. Safe separation depends on reliable operation of communication, navigation and surveillance systems. Each system in the NAS has a high level of redundancy to support system reliability and to minimize any service disruptions. Much of this equipment must be replaced regularly to reduce the potential for system failures due to aging components that may cause deterioration in system performance. Computer systems and other technology used for air traffic control continue to face obsolescence issues. When equipment manufacturers cease production of replacement parts for legacy systems, the ability to repair and maintain these systems to their required levels of reliability may become more difficult.

The annual CIP updates the plans to modernize and expand the air traffic control and supporting systems over the next five years. The plan balances improvements in modernizing and upgrading legacy facilities and equipment with investing in future NextGen capabilities. Balance is necessary to ensure reliable and safe operation of the NAS while implementing NextGen operational improvements (OIs). Investment in legacy equipment, facilities and information technology systems must continue to ensure that required services are provided both during and after the transition to NextGen.

There are 21 Air Route Traffic Control Centers (ARTCC) that house automation equipment used by air traffic controllers to control en route air traffic. There are over 500 Air Traffic Control Towers (ATCTs) and 168 Terminal Radar Control (TRACON) facilities that control air traffic approaching, landing at and departing airports. The flow of air traffic depends on several hundred surveillance and weather radars, navigation systems for en route and airport approach guidance, and thousands of communication radios that allow pilots and air traffic controllers to be in continuous contact during an aircraft's flight. To meet availability and reliability goals, these facilities and equipment must be regularly upgraded and replaced.

CIP investments to support NAS modernization include:

- **Terminal Automation** – Older terminal systems must be upgraded to accept Automatic Dependent Surveillance-Broadcast (ADS-B) position reporting and modernized to a common automation platform to support NextGen OIs and reduce maintenance costs.

- **En Route Automation** – The En Route Automation Modernization (ERAM) platform is planned to be operational at all sites in FY 2015. System upgrades will support implementation of many NextGen operational enhancements.

- **Navigation/Landing** – The Wide Area Augmentation System (WAAS) program will augment the Global Positioning System (GPS) to support Performance Based Navigation (PBN) that allows aircraft to fly direct routes during en route operations and take advantage of more efficient PBN approach procedures to the airport.

- **Air Traffic Control Facilities** – ARTCCs, ATCTs and TRACON facilities need continual upgrading and modernization of heating, ventilating, and air conditioning, piping, plumbing, control systems and other elements of the facility to enable the installation of new automation systems and prevent deterioration.

- **Power Systems** – Emergency backup systems and aging power system components must be replaced to maintain and ensure overall power systems reliability during commercial power outages.

- **Radars and Communication Systems** – Continued investment is needed in those systems that will be retained to back up future NextGen capabilities. Primary radars are required in terminal airspace to detect aircraft that are not equipped with NextGen avionics, and voice communication will be used for time critical contact with aircraft inflight.

- **Surveillance Interface Modernization** – Replacing outmoded automation links for transferring radar data with internet protocols will increase efficiency and reduce costs.

Planning for the Future through NextGen Investments

NextGen is the ongoing, wide-ranging transformation of the NAS to ensure that future safety, capacity and environmental needs are met. NextGen is fundamentally changing the way air traffic is managed by combining new technologies for surveillance, navigation, and communications with automation system enhancements. NextGen enables precise monitoring of aircraft on the ground and inflight, allows direct routes for travel between cities, improves decision support for managing traffic flows strategically on busy routes, and uses precise navigation aids to better utilize existing airspace and runway capacity. Having already implemented many of the foundational milestones needed for this transformation, we are reaping the benfits of NextGen today.

Major programs that support the implementation of NextGen include:

- **System Wide Information Management (SWIM)** – SWIM provides the standards, hardware and software to enable information management and data sharing required to support NextGen OIs. This includes Common Support Services – Weather (CSS-Wx) which provides access for NAS users to a unified aviation weather picture.

- **ADS-B NAS Wide Implementation (ADS-B)** – ADS-B provides more accurate and timely surveillance data needed to improve the efficiency of NAS operations by increasing the precision of displays of aircraft position.

- **Data Communications in support of NextGen** – Data Comm provides data link communications between the controller and pilot to increase efficiency and reduces the potential for errors during information transfer.

- **National Airspace System Voice System (NVS)** – NVS will provide a nationwide network of digital voice switches for terminal and en route air traffic facilities and the voice switch configuration flexibility required to support NextGen OIs.

- **Collaborative Air Traffic Management (CATM)** – The CATM program develops software for strategic management of air traffic to manage high volume traffic conditions and route adjustments caused by severe weather.

- **Improved Surface Management** – Will provide tools to better manage information about airport conditions and increase the efficiency of airport surface operations. Follow-on work will allow tracking of taxiing aircraft to ensure they follow assigned taxi routes.

- **Time Based Flow Management** – Expansion of air traffic techniques to assign takeoff to landing trajectories that optimize fuel efficiency and support other flight efficiencies such as optimized profile descents and time-based metering of air traffic.

- **Separation Management** – A variety of techniques to maximize runway and airspace capacity by safely reducing and managing separation distances between aircraft in both domestic and oceanic operations.

- **Performance Based Navigation** – Designing and implementing more efficient routes for both en route and terminal operations.

FAA has completed a significant level of development work that supports progress in implementing NextGen OIs, and some have reached the point where aviation users can take advantage of them. At the request of Congress, FAA has collaborated with industry through the NextGen Advisory Committee to develop a plan to expedite the implementation of high-priority NextGen capabilities that are projected to produce significant benefits including:

- Increased use of wake categorization and other improvements for dual and independent parallel runway operations at 28 locations nationwide.

- Improving air traffic flow in major metropolitan areas by deploying Performance Based Navigation procedures that allow shorter and more direct flight routes. The targeted metroplexes are Northern California, Charlotte and Atlanta, with more to follow.

- Improving information sharing and taxi procedures for surface operations at airports. Automation improvements and collaboration with air carriers will reduce delays aircraft experience in reaching active runways and increase the hourly rate of takeoffs and landings by reducing inefficiencies in moving from the gate to the active runway.

- Replacing voice communications with data communications will be accelerated to reduce the time, and therefore the delay to operations, needed to relay non-critical air traffic information such as severe weather reroutes and reduce the potential for errors in sending and read back of flight plan clearances.

Conclusion

The programs mentioned in this overview require a significant level of planning and coordination. FAA has developed the processes and reviews necessary to bring these programs to completion. The CIP is a tool that shows what needs to be done, when it needs to be done, and the resources necessary to bring these new capabilities into operational use.

Estimated funding by budget line item (dollars in millions)

BLI Number	Capital Budget Line Item (BLI) Program	FY 2016 Budget	FY 2017 Est.	FY 2018 Est.	FY 2019 Est.	FY 2020 Est.
	Activity 1: Engineering, Development, Test and Evaluation	**$151.1**	**$220.2**	**$261.2**	**$292.9**	**$302.0**
1A01	Advanced Technology Development and Prototyping (ATDP)	$21.3	$41.1	$45.4	$37.1	$41.1
1A02	NAS Improvement of System Support Laboratory	$1.0	$1.0	$1.0	$1.0	$1.0
1A03	William J. Hughes Technical Center Facilities	$19.1	$19.0	$19.0	$19.0	$19.0
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$12.2	$10.3	$10.0	$10.0	$11.6
1A05	NextGen – Separation Management Portfolio	$26.5	$26.8	$27.0	$40.0	$42.5
1A06	NextGen – Improved Surface/Terminal Flight Data Manager (TFDM) Portfolio	$17.0	$53.0	$90.6	$116.3	$100.8
1A07	NextGen – On Demand NAS Portfolio	$11.0	$14.5	$17.0	$18.0	$32.0
1A08	NextGen – Environment Portfolio	$1.0	$1.0	$0.0	$0.0	$0.0
1A09	NextGen – Improved Multiple Runway Operations Portfolio	$8.0	$9.5	$5.0	$4.0	$5.0
1A10	NextGen – NAS Infrastructure Portfolio	$11.0	$14.0	$15.2	$13.0	$15.0
1A11	NextGen – Support Portfolio at WJHTC	$10.0	$12.0	$13.0	$13.0	$13.0
1A12	NextGen – Performance Based Navigation & Metroplex Portfolio	$13.0	$18.0	$18.0	$21.5	$21.0
	Activity 2: Procurement and Modernization of Air Traffic Control Facilities and Equipment	**$1,671.2**	**$1,651.6**	**$1,660.3**	**$1,672.0**	**$1,666.8**
	A. En Route Programs	**$659.4**	**$671.8**	**$694.0**	**$733.1**	**$684.3**
2A01	NextGen – En Route Automation Modernization (ERAM) – System Enhancements and Technology Refresh	$79.4	$59.0	$87.6	$106.1	$126.4
2A02	En Route Communications Gateway (ECG)	$2.7	$2.0	$2.0	$4.1	$2.0
2A03	Next Generation Weather Radar (NEXRAD)	$6.5	$6.3	$5.5	$5.5	$4.0
2A04	ARTCC Building Improvements/Plant Improvements	$74.2	$73.5	$73.5	$63.8	$63.5
2A05	Air Traffic Management (ATM) – Traffic Flow Management (TFM)	$13.7	$23.3	$9.2	$8.0	$8.0
2A06	Air/Ground Communications Infrastructure	$9.8	$8.2	$8.2	$8.3	$3.2
2A07	Air Traffic Control En Route Radar Facilities Improvements	$5.8	$5.2	$5.2	$5.2	$5.2
2A08	Voice Switching Control System (VSCS)	$9.9	$11.3	$12.8	$11.4	$11.7
2A09	Oceanic Automation System (OAS)	$20.0	$19.0	$27.0	$27.0	$20.0
2A10	Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$43.6	$50.0	$60.0	$62.0	$64.0
2A11	NextGen – System-Wide Information Management (SWIM)	$37.4	$40.9	$50.7	$47.1	$40.4
2A12	NextGen – Automatic Dependent Surveillance - Broadcast (ADS-B) NAS Wide Implementation	$45.2	$37.7	$27.9	$39.7	$43.5
2A13	Windshear Detection Service (WDS)	$5.2	$4.5	$1.0	$2.8	$1.0
2A14	NextGen – Collaborative Air Traffic Management Portfolio	$9.8	$14.7	$15.3	$25.3	$25.0
2A15	NextGen – Time Based Flow Management (TBFM) Portfolio	$42.6	$45.3	$39.2	$50.2	$30.0

BLI Number	Capital Budget Line Item (BLI) Program	FY 2016 Budget	FY 2017 Est.	FY 2018 Est.	FY 2019 Est.	FY 2020 Est.
2A16	ATC Beacon Interrogator (ATCBI) - Technology Refresh	$1.0	$0.0	$0.0	$0.0	$0.0
2A17	NextGen – Next Generation Weather Processor (NWP)	$7.0	$20.3	$18.3	$20.0	$16.8
2A18	Airborne Collision Avoidance System X (ACAS X)	$10.8	$8.9	$7.7	$7.7	$6.9
2A19	NextGen – Data Communication in support of NextGen	$234.9	$241.7	$242.9	$238.9	$212.6
	B. Terminal Programs	**$592.8**	**$607.0**	**$575.1**	**$520.0**	**$572.2**
2B01	Airport Surface Detection Equipment - Model X (ASDE-X)	$13.5	$8.4	$0.0	$0.0	$0.0
2B02	Terminal Doppler Weather Radar (TDWR) – Provide	$4.9	$7.4	$3.8	$3.7	$1.0
2B03	Standard Terminal Automation Replacement System (STARS) (TAMR Phase 1)	$81.1	$60.0	$52.8	$56.1	$40.0
2B04	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$159.4	$151.3	$62.5	$8.0	$0.0
2B05	Terminal Automation Program	$7.7	$12.7	$17.8	$17.8	$17.9
2B06	Terminal Air Traffic Control Facilities - Replace	$45.5	$100.5	$156.7	$181.8	$182.5
2B07	ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve	$59.0	$61.2	$60.2	$57.4	$57.2
2B08	Terminal Voice Switch Replacement (TVSR)	$6.0	$6.0	$6.0	$6.0	$6.0
2B09	NAS Facilities OSHA and Environmental Standards Compliance	$39.6	$36.0	$36.0	$36.0	$36.0
2B10	Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$3.8	$3.5	$1.2	$0.0	$0.0
2B11	Terminal Digital Radar (ASR-11) Technology Refresh and Mobile Airport Surveillance Radar (MASR)	$9.9	$6.1	$3.2	$4.4	$4.4
2B12	Runway Status Lights (RWSL)	$24.2	$4.3	$1.2	$0.0	$3.5
2B13	NextGen – National Airspace System Voice System (NVS)	$53.6	$47.7	$68.4	$32.2	$116.6
2B14	Integrated Display System (IDS)	$23.3	$10.2	$6.1	$7.1	$6.2
2B15	Remote Monitoring and Logging System (RMLS)	$4.7	$11.9	$10.4	$23.1	$16.4
2B16	Mode S Service Life Extension Program (SLEP)	$16.3	$37.4	$42.0	$37.0	$45.0
2B17	Surveillance Interface Modernization (SIM)	$23.0	$28.0	$27.0	$28.0	$25.0
2B18	Voice Recorder Replacement Program (VRRP)	$3.0	$2.0	$8.0	$11.3	$14.5
2B19	Integrated Terminal Weather System (ITWS) Technology Refresh	$5.4	$1.5	$1.8	$0.0	$0.0
2B20	Flight and Interfacility ATC Data Interface Modernization (FIADIM)	$9.0	$11.0	$10.0	$10.0	$0.0
	C. Flight Service Programs	**$14.7**	**$25.5**	**$38.1**	**$39.9**	**$24.8**
2C01	Aviation Surface Weather Observation System	$8.0	$10.0	$10.0	$10.0	$2.0
2C02	Future Flight Services Program (FFSP)	$3.0	$9.5	$21.8	$27.0	$20.0
2C03	Alaska Flight Service Facility Modernization (AFSFM)	$2.7	$2.8	$2.8	$2.8	$2.8
2C04	Weather Camera Program	$1.0	$3.2	$3.5	$0.1	$0.0
	D. Landing and Navigation Aids Programs	**$174.5**	**$142.5**	**$125.3**	**$127.5**	**$130.0**
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$4.5	$2.5	$2.5	$8.9	$8.9
2D02	Instrument Landing Systems (ILS) – Establish	$7.0	$7.0	$7.0	$10.0	$11.0

BLI Number	Capital Budget Line Item (BLI) Program	FY 2016 Budget	FY 2017 Est.	FY 2018 Est.	FY 2019 Est.	FY 2020 Est.
2D03	Wide Area Augmentation System (WAAS) for GPS	$80.6	$83.5	$78.7	$71.4	$67.0
2D04	Runway Visual Range (RVR) & Enhanced Low Visibility Operations (ELVO) Program	$6.0	$6.5	$4.0	$6.0	$6.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$3.0	$3.0	$3.0	$5.0	$5.0
2D06	Distance Measuring Equipment (DME)	$3.0	$3.0	$3.0	$5.0	$5.0
2D07	Visual Navaids - Establish/Expand	$2.0	$2.0	$2.0	$2.0	$2.0
2D08	Instrument Flight Procedures Automation (IFPA)	$3.4	$2.0	$2.0	$2.2	$3.1
2D09	Navigation and Landing Aids – Service Life Extension Program (SLEP)	$3.0	$3.0	$6.0	$7.0	$12.0
2D10	VASI Replacement – Replace with Precision Approach Path Indicator	$5.0	$5.0	$5.0	$10.0	$10.0
2D11	Global Positioning System (GPS) Civil Requirements	$27.0	$11.0	$0.0	$0.0	$0.0
2D12	Runway Safety Areas – Navigation Mitigation	$30.0	$14.0	$12.1	$0.0	$0.0
	E. Other ATC Facilities Programs	**$229.9**	**$204.8**	**$227.8**	**$251.6**	**$255.5**
2E01	Fuel Storage Tank Replacement and Management	$18.7	$19.0	$19.0	$19.0	$19.0
2E02	Unstaffed Infrastructure Sustainment	$39.6	$38.8	$43.8	$44.1	$43.8
2E03	Aircraft Related Equipment Program	$9.0	$12.0	$12.5	$13.0	$13.0
2E04	Airport Cable Loop Systems – Sustained Support	$12.0	$10.0	$10.0	$10.0	$10.0
2E05	Alaskan Satellite Telecommunication Infrastructure (ASTI)	$12.5	$1.5	$0.0	$0.0	$0.0
2E06	Facilities Decommissioning	$6.0	$6.0	$10.0	$10.0	$10.0
2E07	Electrical Power Systems – Sustain/Support	$125.0	$110.0	$125.0	$150.0	$150.0
2E08	FAA Employee Housing and Life Safety Shelter System Service	$2.5	$0.0	$0.0	$0.0	$0.0
2E09	Energy Management and Compliance (EMC)	$2.0	$2.0	$2.0	$2.0	$6.2
2E10	Child Care Center Sustainment	$1.6	$1.0	$1.0	$0.0	$0.0
2E11	FAA Telecommunications Infrastructure - 2 (FTI-2)	$1.0	$1.0	$1.0	$0.0	$0.0
2E12X	Independent Operational Test and Evaluation	$0.0	$3.5	$3.5	$3.5	$3.5
	Activity 3: Non-Air Traffic Control Facilities and Equipment	**$171.0**	**$169.8**	**$176.6**	**$154.8**	**$148.0**
	A. Support Programs	**$154.3**	**$154.8**	**$161.6**	**$139.8**	**$133.0**
3A01	Hazardous Materials Management	$26.4	$20.0	$20.0	$20.0	$20.0
3A02	Aviation Safety Analysis System (ASAS)	$20.2	$11.3	$15.3	$11.0	$18.2
3A03	Logistics Support System and Facilities (LSSF)	$4.0	$0.0	$0.0	$0.0	$0.0
3A04	National Airspace System (NAS) Recovery Communications (RCOM)	$12.0	$12.0	$12.0	$12.0	$12.0
3A05	Facility Security Risk Management	$15.0	$15.1	$15.1	$15.9	$15.0
3A06	Information Security	$12.0	$12.0	$12.0	$12.0	$12.0
3A07	System Approach for Safety Oversight (SASO)	$18.9	$23.2	$25.8	$19.5	$21.0
3A08	Aviation Safety Knowledge Management Environment (ASKME)	$7.5	$4.2	$0.0	$0.0	$0.0
3A09	Aerospace Medical Equipment Needs (AMEN)	$2.5	$3.0	$7.0	$19.6	$12.8
3A10	NextGen – System Safety Management Portfolio	$17.0	$18.0	$18.0	$18.0	$18.0

BLI Number	Capital Budget Line Item (BLI) Program	FY 2016 Budget	FY 2017 Est.	FY 2018 Est.	FY 2019 Est.	FY 2020 Est.
3A11	National Test Equipment Program	$4.0	$7.0	$4.0	$5.0	$3.0
3A12	Mobile Assets Management Program	$4.8	$2.0	$3.0	$1.8	$0.0
3A13	Aerospace Medicine Safety Information System (AMSIS)	$3.0	$22.0	$24.4	$5.0	$1.0
3A14	Tower Simulation System (TSS) Technology Refresh	$7.0	$5.0	$5.0	$0.0	$0.0
	B. Training, Equipment and Facilities	**$16.7**	**$15.0**	**$15.0**	**$15.0**	**$15.0**
3B01	Aeronautical Center Infrastructure Modernization	$15.2	$14.0	$14.0	$14.0	$14.0
3B02	Distance Learning	$1.5	$1.0	$1.0	$1.0	$1.0
	Activity 4: Facilities and Equipment Mission Support	**$225.7**	**$240.4**	**$237.4**	**$250.2**	**$265.3**
4A01	System Engineering (SE2020) and Development Support	$35.0	$35.0	$35.0	$35.0	$35.0
4A02	Program Support Leases	$46.7	$46.6	$49.7	$50.0	$62.7
4A03	Logistics Support Services (LSS)	$11.0	$11.0	$11.0	$11.0	$11.0
4A04	Mike Monroney Aeronautical Center Leases	$18.8	$19.3	$19.7	$20.2	$20.6
4A05	Transition Engineering Support	$19.2	$24.1	$19.3	$17.0	$15.0
4A06	Technical Support Services Contract (TSSC)	$23.0	$25.0	$25.0	$30.0	$30.0
4A07	Resource Tracking Program (RTP)	$4.0	$7.0	$7.8	$8.0	$8.0
4A08	Center for Advanced Aviation System Development (CAASD)	$60.0	$60.0	$60.0	$65.0	$65.0
4A09	NextGen – Aeronautical Information Management Program	$5.0	$10.4	$6.9	$11.0	$15.0
4A10	NextGen – Cross Agency NextGen Management	$3.0	$2.0	$3.0	$3.0	$3.0
	Activity 5: Personnel Compensation, Benefits and Travel	**$470.0**	**$479.7**	**$490.1**	**$496.5**	**$512.3**
5A01	Personnel and Related Expenses	$470.0	$479.7	$490.1	$496.5	$512.3
	Activity 6: Sustain ADS-B services and WAAS GEOs	**$166.0**	**$150.3**	**$144.5**	**$133.5**	**$135.6**
6A01	Sustainment of NAS Service Acquisitions	$166.0	$150.3	$144.5	$133.5	$135.6
	Note: BLI numbers with X represent outyear programs not requested in the FY 2016 President's Budget. Note: FY 2017-2020 outyear funding amounts are estimates.					
	Total Year Funding	**$2,855.0**	**$2,912.0**	**$2,970.0**	**$3,000.0**	**$3,030.0**
	Targets	**$2,855.0**	**$2,912.0**	**$2,970.0**	**$3,000.0**	**$3,030.0**

Information for Major Capital Programs

Because of the criticality of on-budget and on-time acquisitions to the efficient transition to NextGen, The Government Accountability Office (GAO) was directed to determine the status of ATO's performance in acquiring ATC systems.

In December 2007 the GAO issued its report GAO-08-42 entitled, "AIR TRAFFIC CONTROL FAA Reports Progress in System Acquisitions, but Changes in Performance Measurement Could Improve Usefulness of Information". This report documented the findings and provided recommendations to the FAA.

One of GAO's recommendation was to identify or establish a vehicle for regularly reporting to Congress and the public on FAA's overall, long-term performance in acquiring ATC systems by providing original budget and schedule baselines for each program and the reasons for any baseline revision. The table provided in this section provides the most current information for FAA's Major Active Programs and is in direct response to the GAO's recommendation.

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline			Current Baseline			Current Estimate		Comments
	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	
Automatic Dependent Surveillance Broadcast (ADS-B) – Baseline Services & Applications FY14 - 20 ACAT 1	May-12	Sep-20	$960.4	May-12	Sep-20	$960.4	Sep-20	$960.4	
Collaborative Air Traffic Management Technologies (CATMT) Work Package 2 ACAT 3	Sep-08	Sep-14	$109.5	Sep-08	Sep-14	$109.5	Mar-15	$107.7	Current Estimate vs Current Baseline: The completion date for CATMT WP2 has slipped from Sep-14 to Mar-15 resulting in a 6 month schedule delay (-8.3% variance). The slip in schedule is associated with a delay in Operational Test & Evaluation (OT&E) of Traffic Flow Management System (TFMS) Release 8 scheduled for March-April 2013. The delay results from Sequestration impacting the air traffic controllers' availability to conduct testing. OT&E was rescheduled to the next available testing window in early October 2013 but was then delayed further due to the government shutdown. This results in a cascading negative effect on the development, testing and deployment of subsequent TFMS Releases which contain CATMT WP2 functionality. The TFMS Release 11 (final APB milestone) is now projected to be completed by March 2015, 6 months later than planned.
Data Communications (Data Comm) Segment 1, Phase 1 (S1P1) ACAT 1	May-12	May-19	$741.4	May-12	May-19	$741.4	May-19	$741.4	
Data Communications (Data Comm) Segment 1, Phase 2 (S1P2), Initial Services ACAT 1	Oct-14	Feb-21	$816.7	Oct-14	Feb-21	$816.7	Feb-21	$816.7	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in Oct-14.

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Current Baseline: Current APB Date	Current Baseline: Revised Completion Date	Current Baseline: Revised Budget $M	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
En Route Automation Modernization (ERAM) ACAT 1	Jun-03	Dec-10	$2,154.6	Jun-11	Aug-14	$2,484.6	Mar-15	$2,579.7	Current Baseline vs Original Baseline: The completion date for ERAM has slipped to Aug-14 resulting in a 44 month schedule variance (-49%) to the original baseline. The budget has increased by $330M (-15.3% variance). The budget and schedule variances are associated with the following factors: (1) project plan did not factor in the risks associated with the operational complexity at the selected sites; (2) insufficient testing environment failed to identify software issues before deployment to key sites; (3) insufficient communication between the Program office and field sites; and (4) uneven stakeholder engagement during development/deployment. Current Estimate vs Current Baseline: Cost Variance - $43.9M of the variance results from transferring O&M funding to the F&E budget line to cover second level engineering cost. $51.2M of this variance is related to the schedule slip of 7 months due to sequestration. This results in a total cost variance of $95.1M (-3.8%) to the current baseline. The impact of the sequestration in March 2013 which reduced funding in the F&E and Operations accounts severely impacted the availability of resources to support site teams from March 2013 to May 2013. Specific impacts were to Subject Matter Experts (SMEs), program overtime, and travel funding, as well as the inability to proceed with any material re-planning until these teams were allowed to resume their work which occurred in late May 2013. These impacts have resulted in a schedule delay of 7 months (-5.2%) from the baseline schedule completion date of August 2014, approved by the JRC in June 2011.
ERAM System Enhancements and Technology Refresh (SETR) ACAT 1	Sep-13	Sep-17	$152.9	Sep-13	Sep-17	$152.9	Sep-17	$152.9	

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline			Current Baseline			Current Estimate		Comments
	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	
Facility Security and Risk Management (FSRM) 2 ACAT 2	Jun-11	Sep-22	$182.5	Jun-11	Sep-22	$182.5	Sep-22	$182.5	
Logistics Center Support System (LCSS) ACAT 2	Apr-10	Feb-14	$67.4	Apr-14	Apr-16	$79.4	Apr-16	$79.4	Current Baseline vs Original Baseline: The schedule delay of 24 months (-50% variance) and cost increase of $12M (-17.8% variance) is associated with the following factors: 1) Business processes developed during the Business Process Reengineering (BPR) phase did not address system interactions between functional areas; 2) delays in developing interfaces with legacy systems; 3) complexity of the tool integration required for interfaces; and 4) changes in contract and program management. In April-14, the JRC approved a Baseline Change Decision (BCD) for LCSS.
NAS Voice System (NVS) Demonstration and Qualification Phase	Sep-14	Mar-20	$294.2	Sep-14	Mar-20	$294.2	Mar-20	$294.2	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in Sept-14.
Next Generation Air-to-Ground Communication System (NEXCOM) - Segment 2, Phase 1 ACAT 2	Sep-11	Sep-18	$285.9	Sep-11	Sep-18	$285.9	Sep-18	$285.9	
Regulation and Certification Infrastructure for System Safety (RCISS) - Segment 2 ACAT 3	Oct-10	Sep-16	$90.7	Oct-10	Sep-16	$90.7	Sep-16	$90.7	

Programs	Original Baseline			Current Baseline			Current Estimate		Comments
	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	
Runway Status Lights (RWSL) ACAT 1	Jan-10	Oct-15	$327.4	Jul-13	Sep-17	$366.7	Sep-17	$366.7	**Current Baseline vs Original Baseline:** In July-13 the JRC approved a Baseline Change Decision (BCD) for the RWSL program. The JRC has determined to minimize the cost exposure to the baseline, deployment will be limited to the 16 airports that have been fully committed to date and San Francisco International airport. This results in a reduction of 6 airports (-26.1% variance) from the original 23 airports approved at the FID in Jan-10. The cost ($39.3M, -12%) and schedule (-26.1%) variances are attributed to the following factors: (1) construction plans changed due to costlier techniques by Airport Authorities; (2) limited runway/taxiway surface availability to meet installation schedules; (3) requirement changes that included increases in the light count, the switch from incandescent lights to LED, and the increased supportability for these requirements; (4) costly duct bank and shelter installations; (5) under estimation of site and depot spares costs; and (6) additional engineering development for supportability enhancements.

FAA Capital Programs
Current Information for Major Programs

	Original Baseline			Current Baseline			Current Estimate		
Programs	Original APB Date	Completion Date	Budget $M	Current APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	Comments
System Approach for Safety Oversight (SASO) Phase IIa ACAT 3	Sep-08	Sep-13	$88.0	Sep-13	Jan-16	$126.9	Jan-16	$126.9	Current Baseline vs Original Baseline: The completion date for SASO Phase IIa has slipped to Jan-16 resulting in a 28 month schedule delay (-46.7% variance). This is associated with: (1) the initial development of the prototype version of the Safety Assurance System (SAS) failing to meet user expectations; (2) subsequent SAS redesign; (3) software development delays; and (4) a new incremental testing strategy that was implemented that added additional testing to the schedule. As the issues were raised, concerns at the executive level were addressed through several means. A SAS Executive Review Board and SAS Steering Committee were established for guidance and oversight, a Technical Status (TechStat) Review of the Program was conducted and a new program management team was assigned to the program. During development testing and bug fixes it was determined that an increase in FAA automation requirements was needed to achieve the desired functionality. In addition, software development delays have led to an increase in costs, resulting in a -44.2% cost variance. In Sep-13, the Joint Resources Council (JRC) approved the Baseline Change Decision (BCD) for SASO Phase IIa.
System Wide Information Management (SWIM) Segment 1 ACAT 2	Jul-09	Sep-15	$310.2	Jul-12	Sep-15	$310.2	Sep-15	$306.4	
System Wide Information Management (SWIM) Segment 2A ACAT 2	Jul-12	Dec-17	$120.2	Jul-12	Dec-17	$120.2	Dec-17	$120.2	

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Current Baseline: Current APB Date	Current Baseline: Revised Completion Date	Current Baseline: Revised Budget $M	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
Terminal Automation Modernization and Replacement (TAMR), Phase 3, Segment 1 (P3, S1) ACAT 1	Dec-11	Oct-17	$438.0	Dec-11	Oct-17	$438.0	Oct-17	$526.7	Current Estimate vs Current Baseline: The cost increase of $88.7M (-20.3% variance) is associated with the following factors: 1) A number of new software requirements (gaps) have been identified from deploying to the first sites. These first deployments demonstrated the significant complexity of transitioning to STARS at large TRACONs which had not been considered with the original baseline and are critical for operational suitability; 2) In addition, the complexity of operations and over a decade of CARTS tailoring by sites was not understood and under-estimated; and 3) Costs were underestimated and not considered for support costs and site spares. During FY14, the JRC was notified of the current estimate to complete the program.
Terminal Automation Modernization and Replacement (TAMR), Phase 3, Segment 2 (P3, S2) ACAT 1	Sep-12	Aug-19	$462.5	Sep-12	Aug-19	$462.5	Aug-19	$505.7	Current Estimate vs Current Baseline: The cost increase of $43.2M (-9.3% variance) is associated with the impact of higher prime costs and a funding reduction in FY16, which may require additional funding to complete the program. The Program Office is reviewing the overall program and assessing potential mitigation actions to minimize the impact to the baseline. Assessments and estimates are being validated to project the amount and years of any potential shortfall. During FY14, the JRC was notified of the current estimate to complete the program.
Terminal Automation Modernization and Replacement (TAMR), Phase 1 Technology Refresh ACAT 1	Sep-12	Feb-20	$531.5	Sep-12	Feb-20	$531.5	Feb-20	$531.5	
Wide Area Augmentation System (WAAS) Phase IV, Segment 1 - Dual Frequency Operations (DFO) ACAT 1	May-14	Sep-19	$603.2	May-14	Sep-19	$603.2	Sep-19	$603.2	NOTE: New Addition to Appendix D. Final Investment Decision (FID) approved by JRC in May-14.

FAA Capital Programs
Major Programs with Completed Acquisition Phase

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Current Baseline: Current APB Date	Current Baseline: Revised Completion Date	Current Baseline: Revised Budget $M	Actual Results: Completion Date	Actual Results: Budget $M	Comments
Automatic Dependent Surveillance Broadcast (ADS-B) Segments 1 & 2 ACAT 1	Aug-07	Sep-14	$1,681.5	Mar-11	Sep-14	$1,695.1	Sep-14	$1,711.9	Actual Result vs Current Baseline: In September 2014, IOC of Surface Advisory Services was achieved at JFK, Las Vegas, and Honolulu, the final 3 sites of 35 ASDE-X sites, completing the schedule baseline. The ADS-B program is completing with a -1.0% variance to the cost baseline. The increase is due to a $6.8M funding earmark in FY 2009 to conduct a Target Level of Safety study to obtain approval for 3 nautical mile separation standards for En Route; a funding earmark of $9.3M in FY 2008 to accelerate Future Air to Air
Time Based Flow Management (TBFM) WP2 ACAT 3	Apr-10	Nov-14	$115.0	Apr-10	Nov-14	$115.0	Nov-14	$114.3	Actual Result vs Current Baseline: The national System Support Modification (SSM) for Release 4.3 was issued November 26, 2014, completing the TBFM WP2 functionality deployment.