U.S. Department of Transportation

BUDGET ESTIMATES

FISCAL YEAR 2018

FEDERAL AVIATION ADMINISTRATION

SUBMITTED FOR USE OF
THE COMMITTEE ON APPROPRIATIONS

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SECTION 1: OVERVIEW

OVERVIEW

The Federal Aviation Administration (FAA) remains the principal federal agency responsible for providing the largest, safest and most complex aerospace system in the world. Since 1958, the FAA has overseen all aspects of civil aviation in the United States, ensuring the safety of the traveling public. A safe aviation system is the lifeblood of our nation's economy. Every day, more than 50,000 commercial airliners and general aviation airplanes take off and land safely in the United States, connecting people and ideas. Aviation has become the international language of commerce, and runways have enabled inland cities to become vibrant ports. As stewards of this remarkable industry, the FAA shares an enormous responsibility to run today's aviation system while charting a safe course for our nation's airspace of the future.

Our mission is supported by our adherence to four strategic initiatives: making aviation safer and smarter; delivering benefits through technology and infrastructure; enhancing global leadership; and empowering and innovating with FAA's people. These strategic initiatives are our framework for transforming both the FAA and the aerospace system. By focusing on risk-based decision making, we are building on safety management principles to proactively address emerging safety risks at a system level. We are laying the foundation for the National Airspace System (NAS) of the future by achieving prioritized Next Generation Air Transportation System (NextGen) benefits, integrating new user entrants, and delivering more efficient, streamlined services. We are improving safety and efficiency across the globe through an approach that shapes global standards, enhances collaboration and better targets FAA resources. And lastly, we are preparing for the future by identifying, recruiting and training a workforce with the leadership, technical and functional skills to ensure the United States has the safest and most productive aviation sector.

Ten years ago we embarked on an ambitious transformation program while supporting an already aging legacy infrastructure. The FAA has made solid progress implementing NextGen and delivering more than $2.72 billion in benefits to our users, with $13 billion in benefits expected by 2020. But without a steady and flexible funding source, or access to capital for infrastructure projects, the FAA has had to make hard choices. We achieved some near-term NextGen benefits by delaying others and deferring maintenance on existing infrastructure.

Building on this foundation, now is the time to discuss how our air traffic management system could best be structured. The administration will therefore initiate a multi-year reauthorization proposal to shift the air traffic control function of the FAA to an independent, non-governmental organization, making the system more efficient and innovative while maintaining safety.

As we consider the modernization of the FAA, we are ushering in a new age of American aviation. New technologies have led to new airspace users, such as unmanned aircraft systems (UAS) and commercial space transportation. Both industries are developing at an astonishing pace. These changes in the aviation industry represent both opportunities and challenges for aviation infrastructure. Our FY 2018 request supports this continued innovation and its integration, while maintaining our superb safety record.

For FY 2018, a total funding level of $16.2 billion will enable the FAA to meet its mission, continue progress on NextGen, and enable the safe integration of new entrants like UAS and commercial space transportation. This budget furthers those goals while keeping our operational costs below FY 2016 levels. We are doing this by proposing new efficiencies that optimize our provided services at a lower cost to the traveling public. We are also streamlining some services we provide, and considering new ways to be more efficient and effective. These efficiencies are sensible and rational, and support the FAA's proud and continuing tradition of honorable service to the American people.

Operations

The FY 2018 request of $9.9 billion for Operations reflects an effort to streamline the services we provide, addressing the FAA's funding needs while accommodating today's real budgetary constraints. The Operations request includes a targeted increase of $7 million to advance the FAA's work on safely integrating Unmanned Aircraft Systems and incorporates $186 million in cost saving initiatives. The budget provides $178.9 million for uncontrollable cost increases such as pay raises, GSA rent increases, and the Department of Transportation's Working Capital Fund. The request also includes several modest base funding transfers among FAA organizations in order to better align our resources with organizational functions.

The FAA is adapting services and regulatory approaches in order to integrate UAS operations into the National Airspace System in a timely fashion and with the same level of safety and efficiency as other legacy operations. The FY 2018 budget increases Unmanned Aircraft System (UAS) funding in the Aviation Safety organization by $7 million to support the operational requirements to develop the policies, procedures, and standards for safe UAS operations in the National Airspace System. These activities include:

- Safety Standards – Analyzing the results of research and developing technology standards to protect safety
- Policy Development – Implementing an overall framework for integration
- Enforcement and Security – Working with law enforcement agencies, airports, and other government agencies (federal, state and local) to ensure public safety and security
- Outreach – Coordinating with stakeholder groups, advisory groups and other government agencies (federal, state and local) to identify UAS priorities and educate on UAS rules and guidance
- Application reviews – Reviewing applications for specific UAS operations to ensure their safety

The FAA has identified several ways to achieve significant cost savings throughout its Operations budget, including workforce reductions through attrition, improved efficiency of how the FAA delivers flight services, the transition from contract weather observers to controller-provided weather services, strategic program management of the SWIM and PERTI programs, and other cost efficiencies.

In FY 2018 the FAA expects to carefully target hiring and gradually reduce the size of our workforce through retirement and resignations. Hiring will be restricted for the non-exempt employees identified under the initial hiring policies developed in FY 2017. This exempts safety personnel, which includes air traffic controller and technician staffs within the Air Traffic Organization and safety inspectors within the Aviation Safety organization. The workforce reduction results in projected savings of $48.8 million but changes to the Administration's initial policy or to the FAA's exemptions may affect the actual savings and workforce levels. In addition to these savings, the reduced workforce will require less training at the Mike Monroney Aeronautical Center and fewer travel costs in order to train at the center, which will produce an additional cost savings of $4.4 million.

The FAA will encourage users of its flight services throughout the continental U.S. to take advantage of automated, internet-provided services. These automated services will allow the FAA to modify the scope of its Flight Service Stations program without affecting current levels of safety. The reduced dependency on direct person-to-person interaction would result in $25 million in cost efficiencies in FY 2018.

After conducting safety analyses and providing the necessary training, FAA air traffic controllers can provide certain weather services that allow the FAA to reduce its reliance on contract weather observers. This change will yield $50 million in new cost savings with no impact on safety.

The FAA will make strategic decisions to manage key programs in order to maintain current capability and achieve cost savings while allowing for improvements in future budget years. Under the System Wide Information Management (SWIM) program, the FAA sustains an advanced technology data sharing program that turns NAS data into useful information for aviation stakeholders. The budget request will produce $2 million in savings by allowing for some additional airlines to be added to the SWIM infrastructure, while maintaining the pipeline that can be added to the program in future budget years. Under the Plan, Execute, Review, Train Improve (PERTI) program, the FAA improves NAS performance and predictability. Portions of the PERTI program are in operation today, including the daily teleconferences with NAS users hosted by the Air Traffic Control System Command Center (ATCSCC). These teleconferences are used to develop and communicating performance plans several days in advance, with an overall plan to develop and execute daily operations and target goals. The budget request fully supports the current portion of the PERTI program, and achieves $3.5 million in savings by scheduling additions to the program in future budget years.

Throughout FY 2018, the FAA will continue to streamline its operations in order to achieve cost savings. The FAA has been able to achieve such cost savings through office consolidations and reduced leases, by cutting back on nonessential travel, equipment, and supplies, and through continued review of its contracts. In FY 2018, the FAA expects to find cost savings of $38.8 million in the Air Traffic Organization, and $13.3 million in savings in the Office of Aviation Safety.

Facilities & Equipment (F&E)

The FY 2018 budget request of $2.8 billion includes funding for the near-term priorities identified by the NextGen Advisory Committee as well as valuable system and facility infrastructure.

Approximately $1.9 billion of this request maintains existing NAS infrastructure. This includes $490 million to help bring FAA facilities into a state of good repair. This funding will help the FAA keep the maintenance backlog from growing and ensure that the systems and the staff housed within facilities remain safe and operational. Continued progress to further reduce the backlog will require ongoing support over several years and must be accompanied by divestiture and decommissioning of infrastructure to reduce the ground-based footprint of the NAS wherever feasible. The request also supports the ongoing sustainment and technology refresh of systems, ranging from radars to weather sensors/systems to navigation aids and satellite leases, necessary to support NAS services in the FY 2018 timeframe and beyond. Some of these systems must remain in place as backup for the FAA's satellite based capabilities.

The F&E NextGen portfolio for FY 2018 is $867.9 million, which fully supports programs such as Automatic Dependent Surveillance – Broadcast (ADS-B), En Route Automation Modernization Technology Refresh, Data Communications terminal and en route services, the second segment of System Wide Information Management (SWIM) and the NAS Voice System, which will replace legacy voice switches by 2025.

The request 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 provides $90 million in funding for Terminal Flight Data Manager (TFDM) that will collect, distribute, and update flight information in the airspace around an airport. TFDM 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. $40.5 million is requested for Time Based Flow Management (TBFM), which enables the performance-based navigation program to maximize traffic flow into and out of the busy metropolitan airspaces and corresponding airports.

The integration of both UAS and commercial space into the NAS are also reflected in the F&E budget request. For UAS, $19 million is included to help develop an Unmanned Traffic Management system, a separate but complementary system to the Air Traffic Management system. For commercial space, $4.5 million is requested to allow FAA to automate launch and reentry operations that are currently manual in nature, time consuming, and require vast sections of commercial airspace to be closed off. The FAA will also initiate a pilot program related to space traffic management that will enable FAA to move toward the goal of monitoring space traffic and reducing the risk of space traffic incidents.

Research, Engineering & Development

The FY 2018 Research, Engineering and Development (RE&D) request for $150 million supports research and development initiatives essential to maintaining the highest levels of safety for the U.S. aviation system. This funding level includes $54.1 million for NextGen research, including programs on the safe integration of UAS into the NAS, information security, wake turbulence, and weather technology. The budget request includes a total of $88.8 million for research in essential safety areas, including $7 million focused on research activities to increase aircraft fire safety such as fire tests for interior materials, fire detection and suppression systems, fire-fighting procedures and guidance material, and safeguards to protect against fires involving lithium batteries, fuel cells, and hazardous materials. Other safety-related research areas include propulsion systems, advanced materials, aircraft icing, and continued airworthiness. The budget request also includes $1.8 million to continue to investigate improvements for the safe integration of commercial space operations into the NAS.

Grants-in-Aid for Airports

The FY 2018 budget request of $3.4 billion 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). This request supports our continued focus on safety-related development projects, including runway safety area improvements, runway incursion reduction, aviation safety management, and improving infrastructure conditions.

The FY 2018 request provides $111.8 million for Personnel & Related Expenses. While the request reflects and overall reduction in the workforce through attrition, it includes targeted hiring of safety inspectors to build the FAA's capacity to ensure airport compliance with safety regulations. It also provides $4.5 million to fund requirements to develop and upgrade airports' national data systems to enable interface and enhanced analytical tools for systems such as System of Airport Reporting (SOAR), Certification and Compliance Management Information System (CCMIS), and Airports Geographic Information System (AGIS).

The Airport Technology Research program is funded at $33.2 million, including a $2 million increase for pavement advanced material testing, and $15 million is requested to continue the Airport Cooperative Research program. Funding for the research programs will continue to support enhanced safety and standard pavement research efforts as well as increased studies for noise abatement and environment impacts.

Conclusion

Every day, tens of thousands of commercial flights, operating from a vast network of airports spanning 3.8 million square miles in the U.S. alone, will take off and land safely. The vast majority of flights will leave their gates on time and arrive on time. They will operate throughout their journeys under the watchful eyes of professional air traffic controllers in an air transportation system that is second to none.

In this age of globalization, America has a clear opportunity to lead the way, investing in our future and preparing our world class aviation system to meet increasing demands. America relies on civil aviation. A cornerstone of our nation's economy, it contributes approximately $1.5 trillion annually to the national economy, provides 12 million jobs, and constitutes 5.4 percent of the gross domestic product.

The FY 2018 budget will enable us to continue protecting and expanding this vital economic engine, while operating the safest and most complex aerospace system in the world.

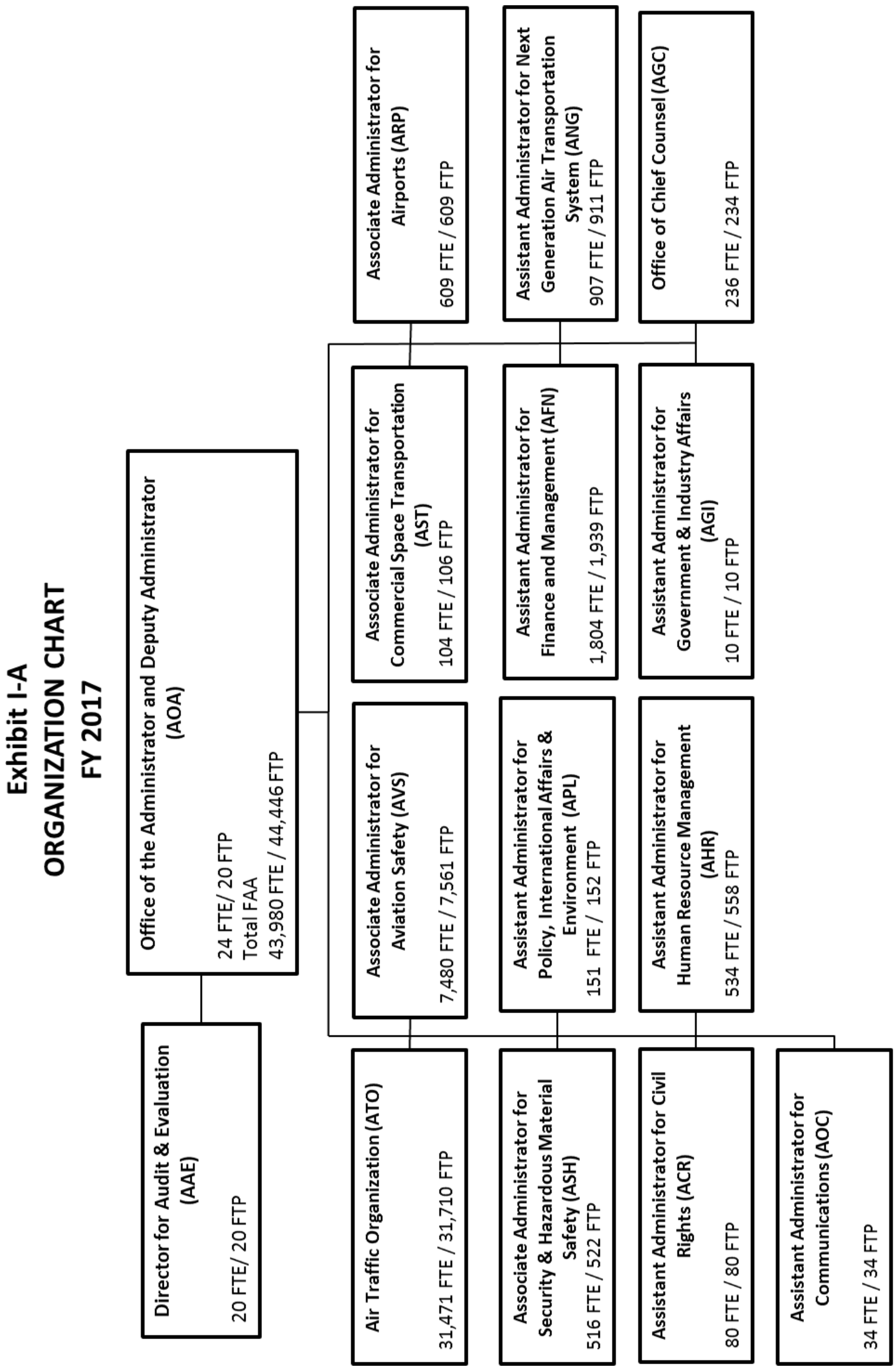
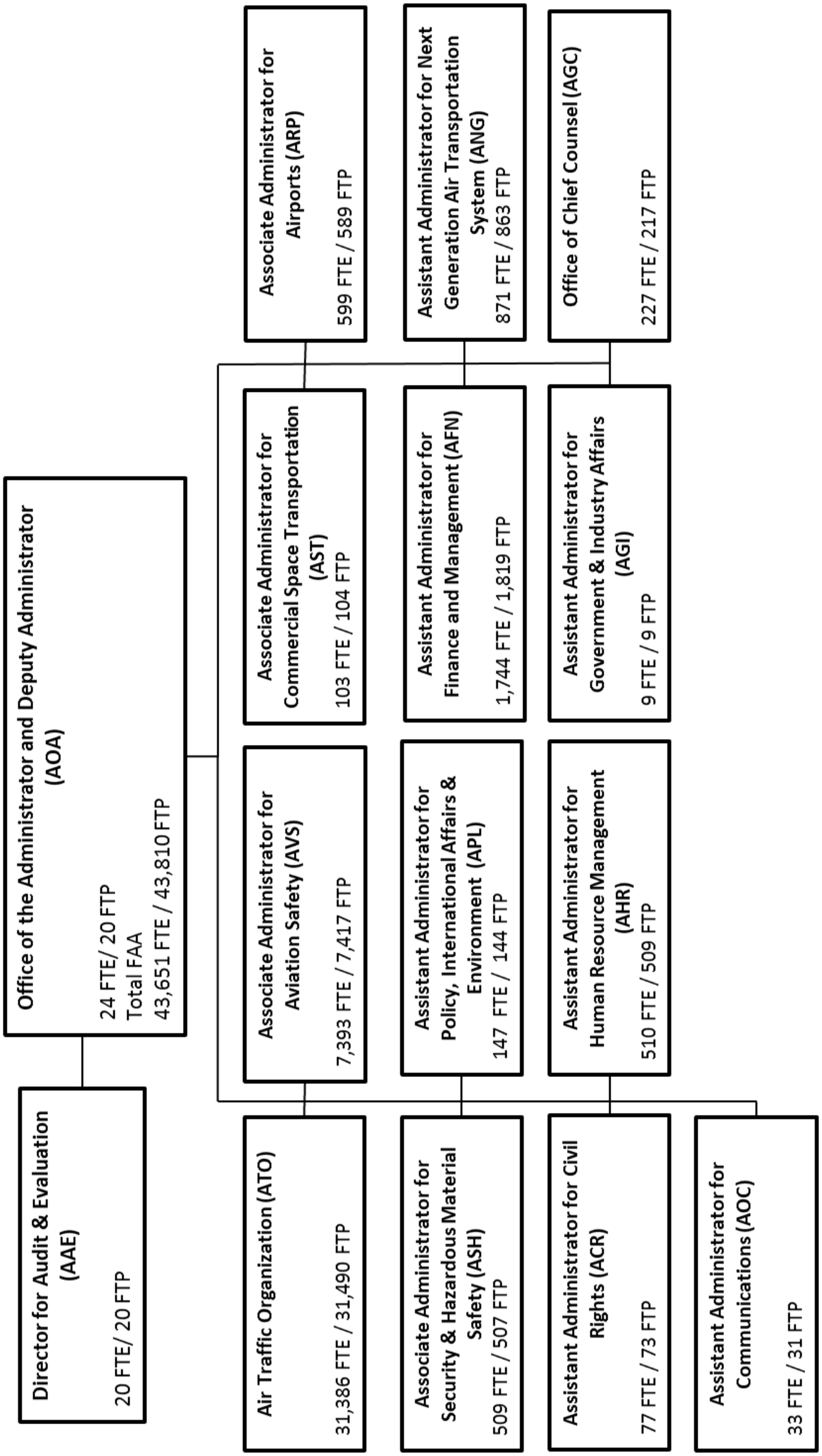


Exhibit I-A
ORGANIZATION CHART
FY 2017
Office of the Administrator and Deputy Administrator (AOA)
24 FTE/ 20 FTP
Total FAA
43,980 FTE / 44,446 FTP
Director for Audit & Evaluation (AAE)
20 FTE/ 20 FTP
Associate Administrator for Airports (ARP)
609 FTE / 609 FTP
Assistant Administrator for Next Generation Air Transportation System (ANG)
907 FTE / 911 FTP
Office of Chief Counsel (AGC)
236 FTE / 234 FTP
Associate Administrator for Commercial Space Transportation (AST)
104 FTE / 106 FTP
Assistant Administrator for Finance and Management (AFN)
1,804 FTE / 1,939 FTP
Assistant Administrator for Government & Industry Affairs (AGI)
10 FTE / 10 FTP
Associate Administrator for Aviation Safety (AVS)
7,480 FTE / 7,561 FTP
Assistant Administrator for Policy, International Affairs & Environment (APL)
151 FTE / 152 FTP
Assistant Administrator for Human Resource Management (AHR)
534 FTE / 558 FTP
Air Traffic Organization (ATO)
31,471 FTE / 31,710 FTP
Associate Administrator for Security & Hazardous Material Safety (ASH)
516 FTE / 522 FTP
Assistant Administrator for Civil Rights (ACR)
80 FTE / 80 FTP
Assistant Administrator for Communications (AOC)
34 FTE / 34 FTP

Exhibit I-B
ORGANIZATION CHART
FY 2018



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SECTION 2: BUDGET SUMMARY TABLES

EXHIBIT II-1

FY 2018 COMPARATIVE STATEMENT OF NEW BUDGET AUTHORITY
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	FY 2016 ACTUAL	FY 2017 ANNUALIZED CR	FY 2017 ENACTED	FY 2018 REQUEST
Operations	$9,909,724	$9,890,886	$10,025,852	$9,890,886
Rescission				
Subtotal	**$9,909,724**	**$9,890,886**	**$10,025,852**	**$9,890,886**
Facilities and Equipment	$2,855,000	$2,849,573	$2,855,000	$2,766,200
Recission	($5,375)			
Cancellation				($31,200)
Subtotal	**$2,849,625**	**$2,849,573**	**$2,855,000**	**$2,735,000**
Research, Engineering and Development	$166,000	$165,684	$176,500	$150,000
Rescission				
Subtotal	**$166,000**	**$165,684**	**$176,500**	**$150,000**
Grants-in-Aid for Airports				
Contract Authority (AATF)	$3,350,000	$3,350,000	$3,350,000	$3,350,000
Rescission				
Subtotal	**$3,350,000**	**$3,350,000**	**$3,350,000**	**$3,350,000**
Obligation Limitation [Non-Add]	[$3,350,000]	[3,343,631]	[3,350,000]	[3,350,000]
Overflight Fees	$121,180	$121,000	$121,000	$119,000
Overflight Fees (Transfer to EAS)	($113,362)	($121,000)	($121,000)	($119,000)
TOTAL	**$16,283,167**	**$16,256,143**	**$16,407,352**	**$16,125,886**
Appropriations	$16,288,542	$16,256,143	$16,407,352	$16,157,086
Rescissions	($5,375)	$0	$0	$0
Cancellations	$0	$0	$0	($31,200)

EXHIBIT II-2

FY 2018 TOTAL BUDGETARY RESOURCES BY APPROPRIATION ACCOUNT
FEDERAL AVIATION ADMINISTRATION
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

ACCOUNT NAME	FY 2016 ACTUAL	FY 2017 ANNUALIZED CR	FY 2017 ENACTED	FY 2018 REQUEST
Operations	**9,909,724**	**9,890,886**	**10,025,852**	**9,890,886**
Air Traffic Organization (ATO)	7,506,934	7,491,026	7,559,785	7,491,938
Aviation Safety (AVS)	1,258,411	1,256,019	1,298,482	1,257,981
Commercial Space Transportation (AST)	17,800	17,766	19,826	17,905
Finance & Management (AFN)	760,500	759,054	771,342	758,192
NextGen (ANG)	60,089	59,975	60,155	59,041
Security and Hazardous Materials Safety (ASH)	99,239	100,688	107,161	100,961
Staff Offices	206,751	206,358	209,101	204,868
Facilities & Equipment	**2,855,000**	**2,849,573**	**2,855,000**	**2,766,200**
Engineering, Development, Test and Evaluation	156,050	150,032	156,960	145,600
Air Traffic Control Facilities and Equipment	1,832,201	1,800,710	1,791,710	1,718,800
Non-Air Traffic Control Facilities and Equipment	171,000	182,930	182,930	193,000
Facilities and Equipment Mission Support	225,700	237,400	237,400	225,000
Personnel and Related Expenses	470,049	478,501	486,000	483,800
Research, Engineering & Development	**166,000**	**165,684**	**176,500**	**150,000**
Improve Aviation Safety	95,969	97,783	105,370	88,752
Improve Efficiency	22,589	20,550	22,243	18,232
Reduce Environmental Impacts	41,897	41,817	43,187	37,648
Mission Support	5,545	5,534	5,700	5,368
Grants-in-Aid for Airports	**3,350,000**	**3,343,631**	**3,350,000**	**3,350,000**
Grants-in-Aid for Airports	3,191,900	3,185,832	3,185,934	3,189,927
Personnel & Related Expenses	107,100	106,896	107,691	111,863
Airport Technology Research	31,000	30,941	31,375	33,210
Airport Cooperative Research Program	15,000	14,972	15,000	15,000
Small Community Air Service	5,000	4,990	10,000	0
TOTAL:	**16,280,724**	**16,249,774**	**16,407,352**	**16,157,086**

EXHIBIT II-4

FY 2018 BUDGET AUTHORITY
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	Mandatory/ Discretionary	FY 2016 ENACTED	FY 2017 ANNUALIZED CR	FY 2017 ENACTED	FY 2018 REQUEST
Operations	**D**	**$9,909,724**	**$9,890,886**	**$10,025,852**	**$9,890,886**
General		$1,987,724	$1,983,946	$852,852	$1,790,886
AATF		$7,922,000	$7,906,940	$9,173,000	$8,100,000
Facilities & Equipment (AATF)	**D**	**$2,849,625**	**$2,849,573**	**$2,855,000**	**$2,735,000**
Research, Engineering & Development (AATF)	**D**	**$166,000**	**$165,684**	**$176,500**	**$150,000**
Grants in Aid for Airports (AATF)	**M**	**$3,350,000**	**$3,350,000**	**$3,350,000**	**$3,350,000**
Aviation User Fees	**M**	**$121,180**	**$121,000**	**$121,000**	**$119,000**
Aviation User Fees (transfer to EAS)	**M**	**($113,362)**	**($121,000)**	**($121,000)**	**($119,000)**
		---------------	---------------	---------------	---------------
TOTAL:		**$16,283,167**	**$16,256,143**	**$16,407,352**	**$16,125,886**
[Mandatory]		$3,357,818	$3,350,000	$3,350,000	$3,350,000
[Discretionary]		$12,925,349	$12,906,143	$13,057,352	$12,775,886
		---------------	---------------	---------------	---------------
[General]		$1,987,724	$1,983,946	$852,852	$1,790,886
[AATF]		$14,287,625	$14,272,197	$15,554,500	$14,335,000

Note: Totals may not add due to rounding.

EXHIBIT II-5

FY 2018 OUTLAYS
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	FY 2016 ACTUAL	FY 2017 ANNUALIZED CR	FY 2018 REQUEST
Operations	**$9,760,309**	**$10,133,000**	**$10,130,000**
General	$1,838,309	$2,226,000	$2,030,000
AATF	$7,922,000	$7,907,000	$8,100,000
Facilities & Equipment	**$2,591,000**	**$2,832,000**	**$2,829,000**
Aviation Insurance Revolving Account (M)	**($15,655)**	**($70,000)**	**($81,000)**
Research, Engineering & Development	**$159,000**	**$182,000**	**$178,000**
Grants-in-Aid for Airports	**$3,125,445**	**$3,413,000**	**$3,479,000**
Aviation User Fees (Overflight) (M)	**$0**	**$0**	**$0**
Franchise Fund	**($58,866)**	**($9,000)**	**$9,000**
TOTAL:	**$15,561,233**	**$16,481,000**	**$16,544,000**
[Mandatory]	($15,655)	($70,000)	($81,000)
[Discretionary]	$15,576,888	$16,551,000	$16,625,000

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

Operations	FY 2016 Actual	FY 2017 Annualized CR	Baseline Changes: Annualization of 2017 Pay Raises	Annualization of 2017 FTE	2018 Pay Raises	Compensable Days (260 days) no change	GSA Rent	WCF Increase/ Decrease	Transition from F&E to Ops	Inflation/ Deflation	FY 2018 Baseline Estimate	Program Increases/ Decreases	FY 2018 Request
PERSONNEL RESOURCES (FTE)													
Direct FTE	39,978	40,483									40,483	-292	40,191
FINANCIAL RESOURCES													
ADMINISTRATIVE EXPENSES													
Salaries and Benefits	$6,974,971	$7,090,412	$36,619		$101,032						$7,228,063	($48,864)	$7,179,199
Travel	$155,010	$152,722							$1,672		$154,394	($12,658)	$141,736
Transportation	$24,325	$30,224									$30,224	$0	$30,224
GSA Rent	$126,503	$110,259					$2,513		$3,097		$115,869	($3,400)	$112,469
Rental Payments to Other	$63,731	$47,386									$47,386	$0	$47,386
Communications, & Utilities	$300,482	$266,957							$2,700		$269,657	($1,100)	$268,557
Printing	$6,237	$6,438									$6,438	$0	$6,438
Other Services	$2,071,575	$2,034,340						$1,502	$28,159		$2,064,001	($107,763)	$1,956,238
Supplies	$123,120	$90,004							$1,636		$91,640	($5,205)	$86,435
Equipment	$56,665	$52,193							$60		$52,253	$0	$52,253
Land and Strructure	$1,697	$2,443									$2,443	$0	$2,443
Grants, Claims and Subsidies	$2,423	$5,808									$5,808	$0	$5,808
Insurance Claims and Indemnities	$2,985	$1,700									$1,700	$0	$1,700
Admin Subtotal	**$9,909,724**	**$9,890,886**	**$36,619**	**$0**	**$101,032**	**$0**	**$2,513**	**$1,502**	**$37,324**	**$0**	**$10,069,876**	**($178,990)**	**$9,890,886**
PROGRAMS													
Air Traffic Organization (ATO)	$7,506,934	$7,491,026	$28,386 `		$77,760			($789)	$27,409		$7,623,792	($131,854)	$7,491,938
Aviation Safety (AVS)	$1,258,411	$1,256,019	$5,472		$15,510			$374	$9,915		$1,287,290	($29,309)	$1,257,981
Commercial Space Transportation (AST)	$17,800	$17,766	$77		$227						$18,070	($165)	$17,905
Finance and Management (AFN)	$760,500	$759,054	$1,307		$3,754		$2,513	$445			$767,073	($8,881)	$758,192
NextGen (ANG)	$60,089	$59,975	$150		$416						$60,541	($1,500)	$59,041
Security and Hazardous Materials Safety (ASH)	$99,239	$100,688	$384		$1,061			($56)			$102,077	($1,116)	$100,961
Staff Offices	$206,751	$206,358	$843		$2,304			$1,528			$211,033	($6,165)	$204,868
Programs Subtotal	**$9,909,724**	**$9,890,886**	**$36,619**	**$0**	**$101,032**	**$0**	**$2,513**	**$1,502**	**$37,324**	**$0**	**$10,069,876**	**($178,990)**	**$9,890,886**
TOTAL	**$9,909,724**	**$9,890,886**	**$36,619**	**$0**	**$101,032**	**$0**	**$2,513**	**$1,502**	**$37,324**	**$0**	**$10,069,876**	**($178,990)**	**$9,890,886**

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

Facilities & Equipment	FY 2016 Enacted	FY 2017 Annualized CR	Baseline Changes: Annualization of 2017 Pay Raises	Baseline Changes: Annualization of 2017 FTE	Baseline Changes: 2018 Pay Raises	Baseline Changes: Compensable Days (260 days) no change	Baseline Changes: GSA Rent	Baseline Changes: WCF Increase/ Decrease	Baseline Changes: Inflation/ Deflation	FY 2018 Baseline Estimate	Program Increases/ Decreases	FY 2018 Request
PERSONNEL RESOURCES (FTE)												
Direct FTE	2,629	2,639									-23	2,616
FINANCIAL RESOURCES												
ADMINISTRATIVE EXPENSES												
Salaries and Benefits	413,336	423,732	2,225		6,038					431,995	-3,491	428,504
Travel	42,046	39,369							394	39,763	133	39,896
Transportation	2,709	2,124							21	2,145	-78	2,067
GSA Rent	0	22							0	22	0	22
Rental Payments to Others	33,272	30,372							304	30,676	3,977	34,653
Communications & Utilities	28,557	46,998							469	47,467	-2,223	45,244
Printing	14	21							0	21	0	21
Other Services:	1,979,333	2,005,773							20,058	2,025,831	-96,275	1,929,556
-WCF	49	48							1	49	0	49
Supplies	19,117	19,155							192	19,347	-1,205	18,142
Equipment	211,636	201,403							2,014	203,417	-10,627	192,790
Lands and Structures	118,525	80,510							805	81,315	-6,104	75,211
Grants, Claims, Subsidies and Interest	6,407	46							0	46	-1	45
Admin Subtotal	**2,855,001**	**2,849,573**	**2,225**	**0**	**6,038**	**0**	**0**	**0**	**24,258**	**2,882,094**	**-115,894**	**2,766,200**
PROGRAMS												
Engineering, Development, Test and Evaluation	156,050	150,032							1,500	151,532	-5,932	145,600
Air Traffic Control Facilities and Equipment	1,832,201	1,800,710							18,007	1,818,717	-99,917	1,718,800
Non-Air Traffic Control Facilities and Equipment	171,000	182,930							1,830	184,760	8,240	193,000
Facilities and Equipment Mission Support	225,700	237,400							2,374	239,774	-14,774	225,000
Personnel & Related Expenses	470,049	478,501	2,225		6,038	0			547	487,311	-3,511	483,800
Programs Subtotal	**2,855,000**	**2,849,573**	**2,225**	**0**	**6,038**	**0**	**0**	**0**	**24,258**	**2,882,094**	**-115,894**	**2,766,200**
TOTAL	**2,855,001**	**2,849,573**	**2,225**	**0**	**6,038**	**0**	**0**	**0**	**24,258**	**2,882,094**	**-115,894**	**2,766,200**

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

Research, Egineering & Development	FY 2016 Actual	FY 2017 Annualized CR	Baseline Changes: Annualization of 2017 Pay Raises	Baseline Changes: Annualization of 2017 FTE	Baseline Changes: 2018 Pay Raises	Baseline Changes: Compensable Days (260 days) no change	Baseline Changes: GSA Rent	Baseline Changes: WCF Increase/ Decrease	Baseline Changes: Inflation/ Deflation	FY 2018 Baseline Estimate	Program Increases/ Decreases	FY 2018 Request
PERSONNEL RESOURCES (FTE)										0		0
Direct FTE	249	249								249	-4	245
FINANCIAL RESOURCES												
ADMINISTRATIVE EXPENSES												
Salaries and Benefits	$38,462	$39,362	$157		$563					$40,083	($672)	$39,411
Travel	$1,800	$1,585							$16	$1,601		$1,601
Transportation	$41	$78							$1	$79		$79
GSA Rent										$0		$0
Communications, & Utilities	$14	$14								$14		$14
Printing	$4	$4								$4		$4
Other Services:	$105,790	$104,752							1048	$105,800	(16,996)	$88,804
-WCF										$0		$0
Supplies	$1,482	$1,482							$15	$1,497		$1,497
Equipment	$1,220	$1,219							$12	$1,231		$1,231
Grants, Claims & Subsidies	$17,188	$17,188							$172	$17,359		$17,359
Admin Subtotal	**$166,000**	**$165,684**	**$157**	**$0**	**$563**	**$0**	**$0**	**$0**	**$1,263**	**$167,668**	**($17,668)**	**$150,000**
PROGRAMS												
Improve Aviation Safety	$95,969	$97,783	$126		$452				$661	$99,023	($10,272)	$88,752
Economic Competitivess	$22,589	$20,550	$7		$24				$188	$20,769	($2,538)	$18,232
Environmental Sustainability	$41,897	$41,817	$11		$39				$391	$42,258	($4,610)	$37,648
Mission Support	$5,545	$5,534	$13		$47				$23	$5,617	($249)	$5,368
Programs Subtotal	**$166,000**	**$165,684**	**$157**	**$0**	**$563**	**$0**	**$0**	**$0**	**$1,263**	**$167,668**	**($17,668)**	**$150,000**
TOTAL	**$166,000**	**$165,684**	**$157**	**$0**	**$563**	**$0**	**$0**	**$0**	**$1,263**	**$167,668**	**($17,668)**	**$150,000**

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 2016 Actual	FY 2017 Annualized CR	Baseline Changes: Annualization of 2017 Pay Raises	Annualization of 2017 FTE	2018 Pay Raises	GSA Rent	WCF Increase/ Decrease	Inflation/ Deflation	FY 2018 Baseline Estimate	Program Increases/ Decreases	FY 2018 Request
PERSONNEL RESOURCES (FTE)											
Direct FTE	589	609							609	-10	599
FINANCIAL RESOURCES											
ADMINISTRATIVE EXPENSES											
Salaries and Benefits	89,888	91,443	480	0	1,303				93,226	-1,500	91,726
Travel	2,953	3,125						31	3,156		3,156
Transportation	264	123						1	124		124
GSA Rent	102	103						1	104		104
Rental Payments to Others	880	781						8	789		789
Communications, Rent & Utilities	496	262						3	265		265
Printing	497	27						0	27		27
Other Services:								0	0		0
-WCF	134	142					-9	0	133		133
-Advisory and Assistance Services	25,254	23,956						240	24,196	-123	24,073
-Other	30,558	30,166						302	30,468	6,500	36,968
Supplies	653	1,111						11	1,122		1,122
Equipment	973	1,224						12	1,236		1,236
Lands and Structures	1,003	491						5	496		496
Grants, Claims & Subsidies	3,191,308	3,185,667						0	3,185,667	4,095	3,189,762
Insurance Claims and Indemnities	1	1						0	1		1
Interest and Dividends	36	19						0	19		19
Financial transfers	5,000	4,990						0	4,990	-4,990	0
Admin Subtotal	**3,350,000**	**3,343,631**	**480**	**0**	**1,303**	**0**	**-9**	**614**	**3,346,018**	**3,982**	**3,350,000**
PROGRAMS											
Grants	3,191,900	3,185,832	0	0	0		0	0	3,185,832	4,095	3,189,927
Personnel and Related Expenses	107,100	106,896	460	0	1,249		-9	193	108,788	3,075	111,863
Airport Technology Research	31,000	30,941	19	0	52		0	273	31,285	1,925	33,210
Airport Cooperative Research	15,000	14,972	1	0	2		0	148	15,123	-123	15,000
Small Community Air Service	5,000	4,990			0		0	0	4,990	-4,990	0
Programs Subtotal	**3,350,000**	**3,343,631**	**480**	**0**	**1,303**	**0**	**-9**	**614**	**3,346,018**	**3,982**	**3,350,000**
TOTAL	**3,350,000**	**3,343,631**	**480**	**0**	**1,303**	**0**	**-9**	**614**	**3,346,018**	**3,982**	**3,350,000**

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

	FY 2016 ACTUAL	FY 2017 ANNUALIZED CR	FY 2018 REQUEST
DIRECT:			
Facilities & Equipment	49	48	49
Grants-in-Aid for Airports	133	143	134
Operations	45,189	52,738	54,572
TOTAL	**$ 45,371**	**$ 52,929**	**$ 54,755**

Footnote:
F&E and Grants-in-Aid for Airports funding only support E-gov Initiatives

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

	FY 2016 ACTUAL	FY 2017 ANNUALIZED CR	FY 2018 REQUEST
DIRECT FUNDED BY APPROPRIATION			
Operations	39,978	40,483	40,191
Facilities & Equipment	2,594	2,639	2,616
Research, Engineering & Development	238	249	245
Grants-in-Aid for Airports	589	609	599
SUBTOTAL, DIRECT FUNDED	43,399	43,980	43,651
REIMBURSEMENTS / ALLOCATIONS / OTHER			
Reimbursements and 'Other'			
Operations	219	236	236
Aviation Insurance Revolving Fund	4	4	4
Facilities & Equipment	64	68	68
Grants-in-Aid for Airports	-	1	1
Administrative Services Franchise Fund	1,627	1,731	1,697
Allocations from other Organizations			
SUBTOTAL, REIMBURSE./ALLOC./OTH.	1,914	2,040	2,006
TOTAL FTEs	**45,313**	**46,020**	**45,657**

Note: Staffing levels for FY 2018 reflect a proposal to reduce the FAA's workforce through attrition based on initial hiring processes developed in FY 2017. However, changes to the Administration's initial policy or the FAA's exemptions under this policy may affect the agency's actual workforce levels in FY 2018.

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

	FY 2016 ACTUAL	FY 2017 ANNUALIZED CR	FY 2018 REQUEST
DIRECT FUNDED BY APPROPRIATION			
Operations	39,936	40,902	40,285
Facilities & Equipment	2,648	2,698	2,687
Research, Engineering & Development	231	257	249
Grants-in-Aid for Airports	589	609	589
SUBTOTAL, DIRECT FUNDED	43,404	44,466	43,810
REIMBURSEMENTS / ALLOCATIONS / OTHER			
Reimbursements and 'Other'			
Operations	108	175	175
Aviation Insurance Revolving Fund	2	4	4
Facilities & Equipment	24	39	4
Grants-in-Aid for Airports	-	2	2
Administrative Services Franchise Fund	1,597	1,701	1,667
Allocations from other Organizations			
SUBTOTAL, REIMBURSE./ALLOC./OTH.	1,731	1,921	1,852
TOTAL POSITIONS	**45,135**	**46,387**	**45,662**

Note: Staffing levels for FY 2018 reflect a proposal to reduce the FAA's workforce through attrition based on initial hiring processes developed in FY 2017. However, changes to the Administration's initial policy or the FAA's exemptions under this policy may affect the agency's actual workforce levels in FY 2018.

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

	FY 2016 ACTUAL	FY 2017 ESTIMATE	FY 2018 ESTIMATE
USER FEE			
Civil Aviation Registry Fees	1,620	1,600	1,600
Foreign Repair Station/Certification Fees	10,339	10,000	10,000
Aeronautical Charting Fees	4,813	330	46
Overflight Fees	109,962	113,296	119,129
Unmanned Aircraft Systems Registry Fees	1,101	1,000	1,000
Total User Fees	**127,835**	**126,226**	**131,775**

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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, $9,890,886,000 of which $8,100,000,000 shall be derived from the Airport and Airway Trust Fund: Provided, That not later than 60 days after the submission of the President's budget request, the Administrator of the Federal Aviation Administration shall transmit to Congress an annual update to the report submitted to Congress in December 2004 pursuant to section 221 of Public Law 108–176: Provided further, That not later than 60 days after the submission of the President's budget request, the Administrator shall transmit to Congress a companion report that describes a comprehensive strategy for staffing, hiring, and training flight standards and aircraft certification staff in a format similar to the one utilized for the controller staffing plan, including stated attrition estimates and numerical hiring goals by fiscal year: 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.

Note.—A full-year 2017 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Further Continuing Appropriations Act, 2017 (P.L. 114–254). The amounts included for 2017 reflect the annualized level provided by the continuing resolution.

Program and Financing (in millions of dollars)

Identification code: 69-1301-0-1-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Obligations by program activity:			
0001	Air Traffic Organization (ATO)	7,506	7,502	7,490
0002	NextGen	60	60	59
0003	Finance & Management	761	761	760
0004	Regulation & Certification	1,267	1,267	1,269
0005	Commercial Space Transportation	18	18	22
0006	Security & Hazardous Materials Safety	99	101	101
0007	Staff Offices	207	206	205
0100	Direct Program Activities Subtotal	9,918	9,915	9,906
0799	Total Direct Obligations	9,918	9,915	9,906
0801	Operations (Reimbursable)	140	159	160
0900	Total new obligations, unexpired accounts	10,058	10,074	10,066
	Budget resources:			
1000	Unobligated balance brought forward, Oct. 1	43	53	33
1021	Recoveries of prior year unpaid obligations	5	1	....
1050	Unobligated balance (total)	48	54	33
	Budget authority:			
	Appropriations, discretionary:			
1100	Appropriation	1,988	1,984	1,791
	Spending authority from offsetting collections, discretionary,			
1700	Collected	8,007	8,069	8,262
1701	Change in uncollected payments, Federal sources	78	....	....
1750	Spending auth from offsetting collections, disc (total)	8,085	8,069	8,262
1900	Budget authority (total)	10,073	10,053	10,053
1930	Total budgetary resources available	10,121	10,107	10,086
	Memorandum (non-add) entries:			
1940	Unobligated balance expiring	-10	....	....
1941	Unexpired unobligated balance, end of year	53	33	20
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct. 1	1,503	1,615	1,393
3010	New Obligations, unexpired accounts	10,058	10,074	10,066
3011	Obligations ("upward adjustments"), expired accounts	41	....	....
3020	Outlays (gross)	-9,904	-10,295	-10,292
3040	Recoveries of prior year unpaid obligations, unexpired	-5	-1	....
3041	Recoveries of prior year unpaid obligations, expired	-78	....	....
3050	Unpaid obligations, end of year	1,615	1,393	1,167
	Uncollected payments:			
3060	Uncollected pymts, Fed sources, brought forward, Oct 1	-126	-140	-140
3070	Change in uncollected pymts, Fed sources, unexpired	-78	....	....
3071	Change in uncollected pymts, Fed sources, expired	64	....	....
3090	Uncollected pymts, Fed sources, end of year	-140	-140	-140
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	1,377	1,475	1,253
3200	Obligated balance, end of year	1,475	1,253	1,027
	Budget authority and outlays, net:			
	Discretionary:			
4000	Budget authority, gross	10,073	10,053	10,053
	Outlays, gross:			
4010	Outlays from new discretionary authority	8,621	8,866	8,866
4011	Outlays from discretionary balances	1,283	1,429	1,426
4020	Outlays, gross (total)	9,904	10,295	10,292
	Offsets against gross budget authority and outlays:			

Identification code: 69-1301-0-1-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Offsetting collections (collected) from:			
4030	Federal sources	-8,034	-8,043	-8,236
4033	Non-Federal sources	-26	-26	-26
4034	Offsetting governmental collections	-6	....	....
4040	Offsets against gross budget authority and outlays (total)	-8,066	-8,069	-8,262
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pymts, Federal sources, unexpired	-78	....	....
4052	Offsetting collections credited to expired accounts	59	....	....
4060	Additional offsets against budget authority only (total)	-19	-28	-28
4070	Budget authority, net (discretionary)	1,988	1,984	1,791
4080	Outlays, net (discretionary)	1,838	2,226	2,030
4180	Budget authority, net (total)	1,988	1,984	1,791
4190	Outlays, net (total)	1,838	2,226	2,030
	Memorandum (non-add) entries:			
5093	Unavailable balance, SOF: Offsetting collections	1	1	1
5095	Unavailable balance, EOY: Offsetting collections	1	1	1

For 2018, the Budget requests $9,891 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 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Direct obligations:			
	Personnel compensation:			
11.1	Full-time permanent	4,549	4,608	4,649
11.3	Other than full-time permanent	30	29	30
11.5	Other personnel compensation	406	429	437
11.9	Total personnel compensation	4,985	5,066	5,116
12.1	Civilian personnel benefits	1,992	2,022	2,061
13.0	Benefits for former personnel	2	2	2
21.0	Travel and transportation of persons	157	153	142
22.0	Transportation of things	24	30	30
23.1	Rental payments to GSA	111	110	112
23.2	Rental payments to others	56	47	47
23.3	Communications, utilities, and miscellaneous charges	290	267	269
24.0	Printing and reproduction	7	8	8
25.1	Advisory and assistance services	603	656	646
25.2	Other services from non-Federal sources	1,479	1,401	1,324
26.0	Supplies and materials	129	90	86
31.0	Equipment	67	53	53
32.0	Land and structures	7	2	2
41.0	Grants, subsidies, and contributions	7	6	6
42.0	Insurance claims and indemnities	2	2	2
99.0	Direct obligations	9,918	9,915	9,906
99.0	Reimbursable obligations	140	159	160
99.9	Total new obligations	10,058	10,074	10,066

Employment Summary

Identification code: 69-1301-0-1-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
1001	Direct civilian full-time equivalent employment	39,978	40,483	40,191
2001	Reimbursable civilian full-time equivalent employment	219	236	236

EXHIBIT III-1

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

	FY 2016 ACTUAL	FY 2017 ANNUALIZED CR	FY 2018 REQUEST	CHANGE FY 2017-2018
Air Traffic Organization (ATO)	7,506,934	7,491,026	7,491,938	912
Aviation Safety (AVS)	1,258,411	1,256,019	1,257,981	1,962
Commercial Space (AST)	17,800	17,766	17,905	139
Finance & Management (AFN)	760,500	759,054	758,192	(862)
NextGen (ANG)	60,089	59,975	59,041	(934)
Security and Hazardous Materials Safety (ASH)	99,239	100,688	100,961	273
Staff Offices	206,751	206,358	204,868	(1,490)
TOTAL	**$9,909,724**	**$9,890,886**	**$9,890,886**	**$0**
FTEs				
Direct Funded	39,978	40,483	40,191	(292)
Reimbursable, allocated, other	219	236	236	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.

EXHIBIT III-1a

OPERATIONS
SUMMARY ANALYSIS OF CHANGE FROM FY 2017 TO FY 2018
Appropriations, Obligations, Limitations, and Exempt Obligations
($000)

ITEM		Change from FY 2017 to FY 2018 $000	Change from FY 2017 to FY 2018 FTE
FY 2017 Annualized CR	**$**	**9,890,886**	**40,483**
Administrative Adjustments to Base:	$	137,651	-
Annualization of FY 2017 FTE	$	-	-
Annualization of FY 2017 Pay Raise	$	36,619	-
FY 2018 Pay Raise	$	101,032	-
GSA Rent	$	2,513	-
Working Capital Fund	$	1,502	-
Non-Pay Inflation	$	-	-
Transition from F&E to Ops	$	37,324	-
SUBTOTAL, ADJUSTMENTS TO BASE	**$**	**178,990**	**-**
PROGRAM REDUCTIONS			
Workforce Reduction Through Attrition	$	(48,864)	(326)
CONUS Flight Service Stations	$	(25,000)	-
Contract Weather Savings	$	(50,000)	-
Academy Savings	$	(4,358)	-
AVS Savings Target	$	(13,463)	-
Program/Service Reductions	$	(38,805)	
SWIM	$	(2,000)	
PERTI	$	(3,500)	
SUBTOTAL, PROGRAM REDUCTIONS	**$**	**(185,990)**	**(326)**
NEW OR EXPANDED PROGRAMS:			
UAS Requirements	$	7,000	-
*Flight Program Operations	$	-	34
SUBTOTAL, NEW OR EXPANDED PROGRAMS	**$**	**7,000**	**34**
FY 2018 REQUEST	**$**	**9,890,886**	**40,191**

*Flight Program Operations includes 34 FTP/FTE transferring from the Air Traffic Organization (ATO) Franchise Fund account to ATO's Operations account.

Operations Summary
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$9,890,886**	**40,902**	**673**	**40,483**
Adjustments to Base	**$178,990**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	101,032	0	0	0
Annualization of FY 2017 Pay Raise 2.1%	36,619	0	0	0
GSA Rent	2,513	0	0	0
FY 2017 Transition from F&E to OPS	37,324	0	0	0
Working Capital Fund	1,502	0	0	0
Other Changes	**-$185,990**	**-651**	**-75**	**-326**
Workforce Reduction Through Attrition	-48,864	-651	0	-326
CONUS Flight Service Stations	-25,000	0	0	0
Contract Weather Savings	-50,000	0	0	0
Academy Savings	-4,358	0	0	0
AVS Savings Target	-13,463	0	0	0
Program/Service Reductions	-38,805	0	0	0
SWIM	-2,000	0	0	0
PERTI	-3,500	0	0	0
Discretionary Adjustments	**$7,000**	**0**	**0**	**0**
UAS Requirements	7,000	0	0	0
Base Transfers	**$0**	**34**	**0**	**34**
FY 2017 Flight Standard Services Staffing	0	0	0	0
FY 2017 Security and Hazardous Materials Safety Staffing	0	0	0	0
FY 2017 Civil Rights Staffing	0	0	0	0
Global Leadership Initiative	0	0	0	0
Flight Program Operations	0	34	0	34
FY 2018 Request	**$9,890,886**	**40,285**	**598**	**40,191**

Base Transfer Summary
($000)

	LOB/SO	FTE	FTP	Funding	LOB/SO	FTE	FTP	Funding
FY 2017 Flight Standard Services Staffing	ATO	-1	-1	-$189	AVS	1	1	$189
FY 2017 Security and Hazardous Materials Safety Staffing	ATO	-1	-1	-$92	ASH	1	1	$92
FY 2017 Civil Rights Staffing	ATO	-1	-1	-$257	ACR	1	1	$257
Global Leadership Initiative	ANG	-1	-1	-$250	APL	1	1	$250
*Flight Program Operations	AVS/ ANG	-34	-34	-$15,221	ATO	68	68	$15,221
Total		**-38**	**-38**	**-$16,009**		**72**	**72**	**$16,009**

*The Flight Program Operations transfer includes 34 FTP/FTE from the Air Traffic Organization (ATO) Franchise Fund account to ATO's Operations account.

Staffing Summary -- FY 2016 - FY 2018

			Type	FY2016 Actual	FY2017 Annualized CR	FY2018 Request
Air Traffic Organization		ATO	FTP	29,241	29,786	29,546
			OTFTP	612	462	462
			FTE	29,429	29,606	29,519
Associate Administrator for Aviation Safety		AVS	FTP	7,300	7,406	7,266
			OTFTP	16	125	50
			FTE	7,173	7,329	7,244
Associate Administrator for Commercial Space Transportation		AST	FTP	93	106	104
			OTFTP	1	2	2
			FTE	84	104	103
Assistant Administrator for Finance and Management		AFN	FTP	1,632	1,789	1,671
			OTFTP	22	21	21
			FTE	1,631	1,654	1,595
Assistant Administrator for Next Generation Air Transportation System		ANG	FTP	188	201	186
			OTFTP	5	7	7
			FTE	192	201	191
Associate Administrator for Security and Hazardous Materials Safety		ASH	FTP	486	522	507
			OTFTP	3	-	-
			FTE	465	516	509
Staff Offices	Assistant Administrator for Human Resource Management	AHR	FTP	503	558	509
			OTFTP	2	31	31
			FTE	499	534	510
	Office of the Administrator and Deputy	AOA	FTP	17	20	18
			OTFTP	3	4	4
			FTE	21	24	23
	Assistant Administrator for Audit and Evaluation	AAE	FTP	19	20	20
			OTFTP	-	-	-
			FTE	19	20	20
	Assistant Administrator for Civil Rights	ACR	FTP	71	80	73
			OTFTP	4	4	4
			FTE	73	80	77
	Asst. Administrator for Government and Industry Affairs	AGI	FTP	8	10	9
			OTFTP	-	-	-
			FTE	8	10	9
	Assistant Administrator for Communications	AOC	FTP	30	34	31
			OTFTP	1	1	1
			FTE	30	34	33
	Office of Chief Counsel	AGC	FTP	216	234	217
			OTFTP	5	9	9
			FTE	221	236	227
	Asst. Administrator for Policy, International Affairs and Environment	APL	FTP	132	136	128
			OTFTP	3	7	7
			FTE	133	135	131
Total			FTP	39,936	40,902	40,285
			OTFTP	677	673	598
			FTE	39,978	40,483	40,191

Resource Summary -- FY 2016 - FY 2018 ($000)

			FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request
	Air Traffic Organization (ATO)	pcb	$ 5,406,925	$ 5,456,940	$ 5,544,698
		o/o	$ 2,100,009	$ 2,034,086	$ 1,947,240
	ATO Total		**$ 7,506,934**	**$ 7,491,026**	**$ 7,491,938**
	Associate Administrator for Aviation Safety (AVS)	pcb	$ 1,042,424	$ 1,088,493	$ 1,096,826
		o/o	$ 215,987	$ 167,526	$ 161,155
	AVS Total		**$ 1,258,411**	**$ 1,256,019**	**$ 1,257,981**
	Associate Administrator for Commercial Space Transportation (AST)	pcb	$ 14,605	$ 15,929	$ 16,068
		o/o	$ 3,195	$ 1,837	$ 1,837
	AST Total		**$ 17,800**	**$ 17,766**	**$ 17,905**
	Assistant Administrator for Finance and Management (AFN)	pcb	$ 248,930	$ 263,555	$ 259,735
		o/o	$ 511,570	$ 495,499	$ 498,457
	AFN Total		**$ 760,500**	**$ 759,054**	**$ 758,192**
	Assistant Administrator for NextGen Air Transportation System (ANG)	pcb	$ 28,434	$ 29,197	$ 28,263
		o/o	$ 31,655	$ 30,778	$ 30,778
	ANG Total		**$ 60,089**	**$ 59,975**	**$ 59,041**
	Associate Administrator for Security and Hazardous Materials Safety (ASH)	pcb	$ 73,031	$ 74,458	$ 74,787
		o/o	$ 26,208	$ 26,230	$ 26,174
	ASH Total		**$ 99,239**	**$ 100,688**	**$ 100,961**
Staff Offices	Assistant Administrator for Human Resource Management (AHR)	pcb	$ 74,498	$ 72,509	$ 70,284
		o/o	$ 26,708	$ 28,505	$ 29,897
	AHR Total		**$ 101,206**	**$ 101,014**	**$ 100,181**
	Office of the Administrator and Deputy (AOA)	pcb	$ 3,527	$ 3,415	$ 3,321
		o/o	$ 552	$ 656	$ 656
	AOA Total		**$ 4,079**	**$ 4,071**	**$ 3,977**
	Assistant Administrator for Audit and Evaluation (AAE)	pcb	$ 2,927	$ 3,184	$ 3,245
		o/o	$ 327	$ 64	$ 64
	AAE Total		**$ 3,254**	**$ 3,248**	**$ 3,309**
	Assistant Administrator for Civil Rights (ACR)	pcb	$ 9,892	$ 10,283	$ 10,152
		o/o	$ 2,076	$ 1,662	$ 1,662
	ACR Total		**$ 11,968**	**$ 11,945**	**$ 11,814**
	Assistant Administrator for Government and Industry Affairs (AGI)	pcb	$ 1,482	$ 1,293	$ 1,240
		o/o	$ 74	$ 260	$ 260
	AGI Total		**$ 1,556**	**$ 1,553**	**$ 1,500**
	Assistant Administrator for Communications (AOC)	pcb	$ 5,969	$ 6,158	$ 6,070
		o/o	$ 342	$ 141	$ 141
	AOC Total		**$ 6,311**	**$ 6,299**	**$ 6,211**
	Office of the Chief Council (AGC)	pcb	$ 38,127	$ 39,099	$ 38,565
		o/o	$ 6,659	$ 5,602	$ 5,738
	AGC Total		**$ 44,786**	**$ 44,701**	**$ 44,303**
	Assistant Administrator for Policy, International Affairs and Environment (APL)	pcb	$ 24,200	$ 25,899	$ 25,945
		o/o	$ 9,391	$ 7,628	$ 7,628
	APL Total		**$ 33,591**	**$ 33,527**	**$ 33,573**
Grand Total			**$ 9,909,724**	**$ 9,890,886**	**$ 9,890,886**

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AIR TRAFFIC ORGANIZATION (ATO)

Air Traffic Organization (ATO)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$7,491,026**	**29,786**	**462**	**29,606**
Adjustments to Base	**$132,766**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	77,760			
Annualization of FY 2017 Pay Raise 2.1%	28,386			
FY 2017 Transition from F&E to OPS	27,409			
Working Capital Fund	-789			
Other Changes	**-$146,537**	**-305**	**0**	**-152**
Workforce Reduction Through Attrition	-22,874	-305		-152
CONUS Flight Service Stations	-25,000			
Contract Weather Savings	-50,000			
Academy Savings	-4,358			
Program/Service Reductions	-38,805			
SWIM	-2,000			
PERTI	-3,500			
Base Transfers	**$14,683**	**65**	**0**	**65**
FY 2017 Flight Standard Services Staffing	-189	-1		-1
FY 2017 Security and Hazardous Materials Safety Staffing	-92	-1		-1
FY 2017 Civil Rights Staffing	-257	-1		-1
Flight Program Operations	15,221	68		68
FY 2018 Request	**$7,491,938**	**29,546**	**462**	**29,519**

Executive Summary: Air Traffic Organization (ATO)

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

The FY 2018 request of $7,491,938,000 and 29,546 FTP / 29,519 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 $28,386,000 for the annualized cost of the FY 2017 pay increase, $77,760,000 for the 2018 pay raise, and $27,409,000 for FY 2017 Transition to Operations and Maintenance (TOM) costs. Included in the request is a change of -$789,000 for Working Capital Fund adjustments; -$22,874,000 for Workforce Reduction through Attrition; -$25,000,000 for Flight Service Stations (CONUS) cost savings; -$50,000,000 for Contract Weather Cost Savings; -$4,358,000 for Academy Savings; -$3,500,000 for PERTI Cost Savings; -$2,000,000 for SWIM Cost Savings; -$38,805,000 in Program/Service Reductions; and $14,683,000 for base transfer adjustments.

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. We are more than 30,000 professional employees committed to providing safe and efficient air traffic control services. Many of our 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. Our 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.

FAA's ATO provides air traffic services for the Nation and is fully committed to the agency's mission. We handle 26,775 scheduled passenger flights per day at US airports and help transport over 946 million passengers per year; a vital part of the Nation's economy. In total, the ATO handles 44,000 IFR (Instrument Flight Rules) flights per day, and manages 145,703 operations (including departures, arrivals and over-flights) per day at FAA and contract towers. FAA data shows that civil aviation accounted for over $1.6 trillion in total economic activity, supporting 5.1 percent of U.S. Gross Domestic Product. Earning over $446.8 billion a year, 10.6 million people are employed in aviation-related fields.

Safety is ATO's highest priority. While the system is already exceedingly safe, we are making it safer by moving to a proactive safety culture in which every individual in ATO is committed to assessing and mitigating risks. While safety is paramount, we are also taking steps to enable growth and changes in aviation.

ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

ATO's eight service organizations include:

Air Traffic Services (AJT): Air Traffic Services provides air traffic control operations from 21 En-route, 542 terminal, and four 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, which 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 253 contract towers located at the

Nation's airports. Terminal area operations are conducted by controllers at 160 TRACON facilities, which routinely handle aircraft within 40 miles of an airport.

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.

Technical Operations (AJW): 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.

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 design, development, acquisition, installation, maintenance, restoration, modification, certification and oversight of vendor supplied NAS services and vendor maintenance programs;
- Facilities maintenance; and
- Engineering and assignment of aeronautical frequency spectrum.

Our core work is performed by the System Support Centers, 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.

Technical Operations leads the day-to-day defense and protection of the NAS by providing governance and requirements to enhance cybersecurity; coordinate threat information sharing and inter-agency collaboration; tailor cybersecurity business and acquisition strategies to support the rapid delivery of tools, applications, and other capabilities to defend the critical infrastructure from the evolving threat and; authorize systems to operate within the NAS domain.

System Operations (AJR): 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:

- NAS Operations
- Security
- Flight Service
- International
- Performance and Data Analysis

Safety and Technical Training (AJI): Safety and Technical Training provides the ATO with the Safety, Technical Training, Policy & Performance, and Standardization expertise necessary to help enable air traffic controllers, technicians, engineers and support personnel's daily efforts to keep aircraft safe, separated, and on time.

AJI safety programs are responsible for ensuring the safety of the National Airspace System (NAS) through reporting, mitigating, and monitoring risks. This strategy includes gathering input from front line employees, deploying technology to gather data, improving analysis to identify risk and implementing corrective actions to mitigate identified hazards. AJI ensures that national safety management policies are clearly defined, communicated, and adhered to; conducts audits and operational assessments of NAS changes and new technologies; and provides safety analysis and data management capability. We manage safety policy development, reduce fatigue risks through a comprehensive fatigue risk management system, facilitate an ongoing ATO safety culture transformation that leads to improved safety performance, and are the focal point for reducing the risk of runway collisions and excursions in the NAS.

AJI is the only organization within ATO that provides technical training to controllers, technicians, and engineers. We provide a national training program to 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.

The work of ATO Safety and Technical Training benefits the Department of Transportation's (DOT) goal of Safety and will assist in preventing the loss of human life, reduction in transportation-related injuries and fatalities and is the lead for two of FAA's Priority Goals – Runway Incursion Rate and Hazards Mitigation.

Mission Support Services (AJV): The Mission Support Services mission is to provide policy, technical expertise and analyses, critical support services and regulatory guidance across a broad range of activities directly related to the safe and efficient operation of the National Airspace System (NAS). Core work includes:

- Oversight and support for NAS procedures and changes which affect operations and special activities with the NAS.
- Development and dissemination of digital Aeronautical Charts, Instrument Flight Procedures (IFPs), aeronautical data, and related aeronautical navigation products.
- Aeronautical chart and data revisions, and development and maintenance of Radar Video Maps (RVMs) in response to increasing requirements of Unmanned Aircraft Systems (UAS) Integration.
- Inspections, evaluations, safety risk management, accident and incident information gathering and reporting services, and support for National Airspace System (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 and program implementation management support services.
- Facilitate the development of enterprise solutions and implement changes necessary to integrate new entrants into the NAS, covering a wide array of technical challenges with a focus on UAS and Commercial Space integration across the ATO.
- Develops, validates, integrates, and prioritizes new Air Traffic Management concepts and requirements across the enterprise, ensuring future changes to the NAS are operationally sound.

Management Services (AJG): The Management Services organization provides leadership and guidance in the areas of financial management, people services, business planning, technical labor relations and employee engagement and leadership development for the ATO. This shared services model was designed to decrease the administrative burden on our operating service units and improve the overall efficiency and effectiveness of the ATO. Management Services strives to maximize economies of scale by promoting standardization of processes, providing budget formulation and execution, overseeing ATO administrative policy, providing personnel actions and technical labor advice and leading ATO-specific employee development and succession planning efforts on behalf of our customers, who collectively operate and maintain the National Airspace System.

Management Services directly supports 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 serve as a centralized point of contact for other FAA partners to develop strategies for implementing solutions within ATO.

Program Management Organization (AJM): 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 was created after a comprehensive look at whether the agency was positioned strategically for success as we implement NextGen. The study, known as Foundation for Success, examined how our internal structures and processes could be improved to support NextGen. It was determined that better collaboration across lines of business would help us advance our initiatives more seamlessly and effectively.

Flight Program Operations (AJF): Flight Program Operations is responsible for all aspects of flight program safety, administration, operations, training, and maintenance. The FAA operates and maintains 46 owned/exclusive-use leased aircraft performing four primary missions: aviation safety training (currency and proficiency for AVS pilots); flight inspection of airspace infrastructure; and research, development, test and evaluation (RDT&E); and transportation (disaster/emergency and National Transportation Safety Board (NTSB) Go Team response). Flight program consolidation realigns employees, aircraft, and resources from the following legacy flight programs: Flight Inspection Flight Program (AJW-3), Washington Flight Program (AJW-36), William J. Hughes Technical Center (WJHTC) Flight Program (ANG-E17), and AFS Flight Program (AFS-60) into the new Flight Program Operations organization, resulting in a single FAA Flight Program. Flight Program Operations is also the sole provider of flight program services for ATO and Office of Aviation Safety (AVS) participants, as well as internal and external customers (including the NextGen Office (ANG)).

What Does This Funding Level Support?

ATO operates the most complex and technically advanced air traffic control system in the world. In FY 2018, an operating budget of $7,491,938,000 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 our 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.

While the system is already exceedingly safe, ATO is making it safer by moving to a proactive safety culture in which every individual in ATO is committed to assessing and mitigating risks. While safety is paramount, we are also taking steps to enable growth and changes in aviation.

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**, we track the commercial fatal accident rate, general aviation fatal accidents, rate of runway incursions, and operational errors. For **economic competitiveness**, we track average daily airport capacity, on-time arrivals, and adjusted operational availability. In the area of **finance**, we measure program performance using schedule and budget metrics. In **international leadership**, we synchronize Next Generation Air Transportation System (NextGen) systems and technologies with international standard setting organizations. For **organizational excellence**, we measure 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 our efforts at reducing fatal accident rates, deploying systems and procedures to reduce serious runway incursions, and conducting training programs aimed at reducing operational errors.

Budget Summary

Air Traffic Organization (ATO)
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	5,410,814	5,456,940	5,544,698	87,758
Program Costs	2,096,120	2,034,086	1,947,240	-86,846
Total	**$7,506,934**	**$7,491,026**	**$7,491,938**	**$912**
FTE	**29,411**	**29,606**	**29,519**	**-87**

The FY 2018 request of $7,491,938,000 and 29,546 FTP / 29,519 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 $28,386,000 for the annualized cost of the FY 2017 pay increase, $77,760,000 for the 2018 pay raise, and $27,409,000 for FY 2017 Transition to Operations and Maintenance (TOM) costs. Included in the request is a change of -$789,000 for Working Capital Fund adjustments; -$22,874,000 for Workforce Reduction through Attrition; -$25,000,000 for Flight Service Stations (CONUS) cost savings; -$50,000,000 for Contract Weather Cost Savings; -$4,358,000 for Academy Savings; -$3,500,000 for PERTI Cost Savings; -$2,000,000 for SWIM Cost Savings; -$38,805,000 in Program/Service Reductions; and $14,683,000 for base transfer adjustments.

Funding details for ATO's eight service units:

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Air Traffic Services (AJT)	3,975,476	4,024,156	4,042,132	17,976
Technical Operations (AJW)	1,715,819	1,590,613	1,602,469	11,856
System Operations (AJR)	297,248	249,112	221,775	-27,337
Safety and Technical Training (AJI)	250,193	199,260	195,034	-4,226
Mission Support Services (AJV)	289,166	282,461	281,389	-1,072
Management Services (AJG)	227,578	217,115	178,738	-38,377
Program Management (AJM)	751,454	840,453	862,420	21,967
Flight Programs (AJF)		87,856	107,981	20,125
Total	**$7,506,934**	**$7,491,026**	**$7,491,938**	**$912**

Budget Summary (cont.)

Air Traffic Organization (ATO)
($000)

FY17 Transition to Operations and Maintenance:

Program	Service Unit	Amount
G05C.01-01, G05C.01-04 System Wide Information Management (SWIM)	AJM	10,929
A03.05-01 Integrated Display System – Replacement (IDSR)	AJM	4,271
G02S.01-01, G02S.03-01 Surveillance and Broadcast Services (SBS)	AJM	3,936
G02A.01-03/-06 Time Based Flow Management (TBFM) Work Package (WP) 2/3	AJM	1,951
G01A.01-01 ERAM FUSE – NextGen ABRR/PDRR/ERAM SWIM interface (Application Sustainment License)	AJM	2,423
A04.01-01Terminal Automation Modernization/Replacement (TAMR) Phase 1 G4 Technology Refresh (G4TR)	AJM	946
S11.01-02 Runway Status Lights (RWSL)	AJW	1,418
F31.01-01Mobile Assets Management Program (MAMP)	AJW	817
F24.01-02 Facility Security Risk Management (FSRM)	AJW	718
Total Transition to Operations and Maintenance		**$27,409**

Other Changes:

Workforce Reduction (-$22.9 million): Workforce Reduction through attrition is a cost savings initiative in which hiring will be restricted as we gradually reduce the size of our workforce by not replacing personnel lost through retirement or resignation. Safety critical staff, including air traffic controllers, are exempt from any hiring restrictions.

Academy Savings (-$4.4 million) is where savings will be realized through a reduction in academy travel costs at the Mike Monroney Aeronautical Center, based on the hiring restrictions planned for the non-exempt workforce.

CONUS Flight Service Stations (-$25 million) is a plan to modify the scope/scale of this program by encouraging users to utilize more automated, internet provided services, which will not impact current levels of safety. The reduced dependency on direct person to person interaction will result in significant cost efficiencies. We will discontinue some of the services provided by the Flight Service Stations (FSS), reducing the need for pilot-to-specialist interaction from five fixed locations (Prescott, AZ; Fort Worth, TX; Ashburn, VA; Raleigh, NC; and Miami, FL).

Contract Weather Observer (CWO) Savings (-$50 million) is among several programs FAA plans to streamline to achieve operational cost efficiencies. The FAA has identified multiple airports currently serviced by CWO that have similar traffic, weather and operational complexity profiles to 391 other airports currently serviced by Limited Aviation Weather Reporting Station (LAWRS) controllers. Safety analyses have been conducted to determine where LAWRS –controller provided weather observations can replace CWO contractors. The FAA believes the transition from CWO-provided to LAWRS-controller provided weather observations at these sites will yield a cost savings with no impact on safety.

Program Service Reductions (-$38.8 million) encompasses all programmatic cost efficiencies within the ATO. Cost efficiencies in contract support services will be achieved by utilizing procurement vehicles that enable multiple tasks to be performed within a single contract, and streamlining and standardizing the service acquisition process. Travel will be reevaluated with a goal of reducing non-mission critical travel as well as the frequency and number of personnel supporting mission critical travel. We are also exploring the way in which we will review internal policies and procedures for acquiring supplies across the agency, including the overhead rates associated with procuring parts for NAS systems and equipment.

SWIM (-$2 million) is an advanced technology data sharing program that turns NAS data into useful information for aviation stakeholders. In FY 2018, FAA will add fewer new users (on-ramping) to the SWIM infrastructure. Some airlines that are in the pipeline to be connected to the SWIM portal will be impacted.

PERTI (-$3.5 million) Plan, Execute, Review, Train Improve (PERTI) provides the ATO with multi-disciplinary support, processes, and analytics to improve NAS performance and predictability. The NAS Traffic Flow Management Initiative is a high priority ATO strategic initiative that is an integral part of FAA's commitment to process improvement. Portions of the PERTI program are in operation today, including the daily telcons with users, hosted by the Air Traffic Control System Command Center (ATCSCC), which are aimed at forming and communicating the performance plan several days in advance. The overall plan is used to develop and execute daily operations and target goals. The level of funding provided will allow this portion of PERTI to continue to operate and schedules additions to the program in future years.

Detailed Justification for the - Vice President Air Traffic Services, AJT

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

**FY 2018 – Air Traffic Services – Budget Request
($000)**

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	3,754,199	3,809,206	3,877,182	67,976
Program Costs	221,276	214,950	164,950	-50,000
Total	**$3,975,476**	**$4,024,156**	**$4,042,132**	**$17,976**
FTE	**19,107**	**18,711**	**18,687**	**-24**

The FY 2018 budget request for Air Traffic Services is $4,042,132,000 and 18,776 FTP / 18,687 FTE. It provides for $19,814,791 for the annualized cost of the FY 2017 pay increase, $54,280,213 for FY 2018 pay raise, -$6,119,000 for Workforce Reduction through Attrition, and -$50,000,000 for Contract Weather Cost Savings.

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.

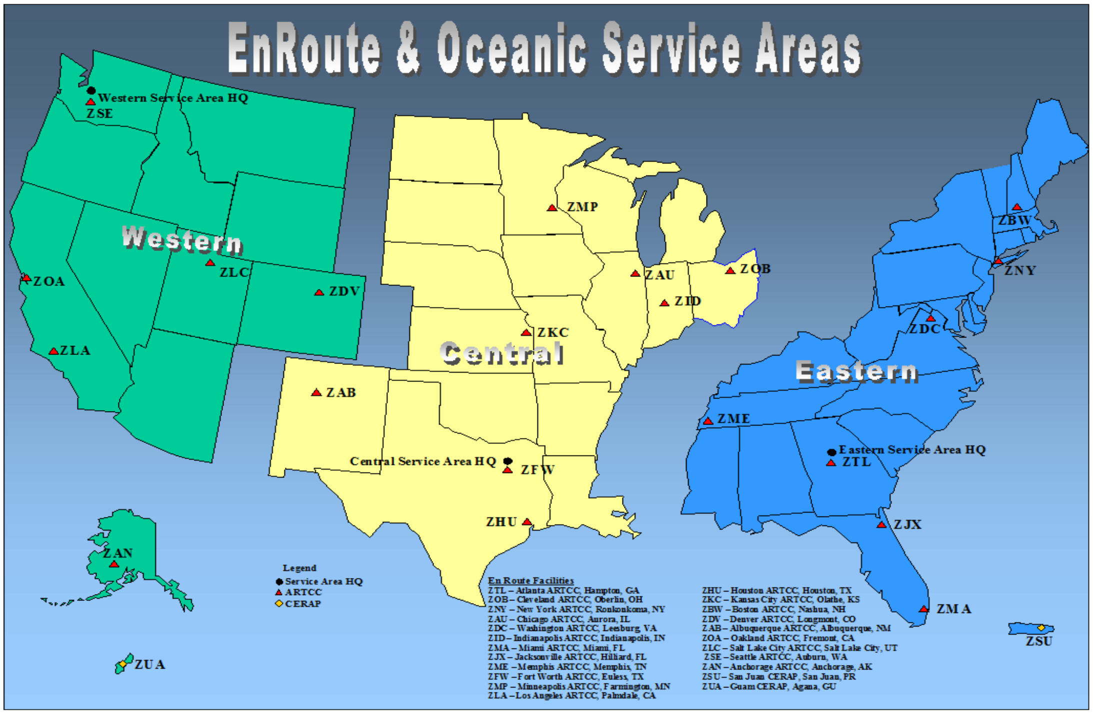
Air Traffic Services is unique in that it is not redundant or duplicative of any other Federal, state, local, or private effort. There is no overlap between FAA's management of the NAS and any other entity. While other entities provide air traffic control services (e.g., Department of Defense and Contract Towers), they do so only under FAA's authority and oversight. The responsibility to operate all air traffic activity within the NAS is carried on through-out the ATO, with Air Traffic Services managing airport and arrival/departure operations near the airport and en-route traffic between airports.

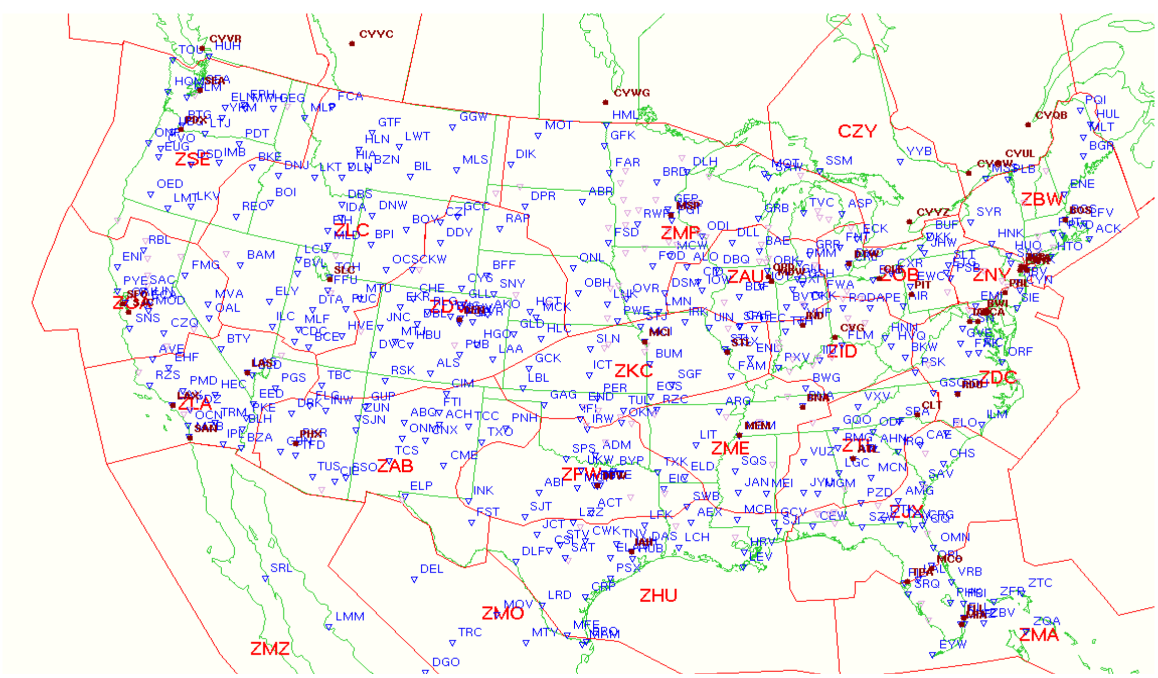
What is this Program and Why is it Necessary?

FAA's ATO handles 26,775 scheduled passenger flights per day at US airports and helps transport over 946 million passengers per year. In total, the ATO handles 44,000 IFR (Instrument Flight Rules) flights per day, and manages 145,703 operations (including departures, arrivals and over-flights) per day at FAA and contract towers. This activity is at the core of the U.S. aviation industry which contributes 5.1 percent of the total U.S. economy. The 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 four 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.

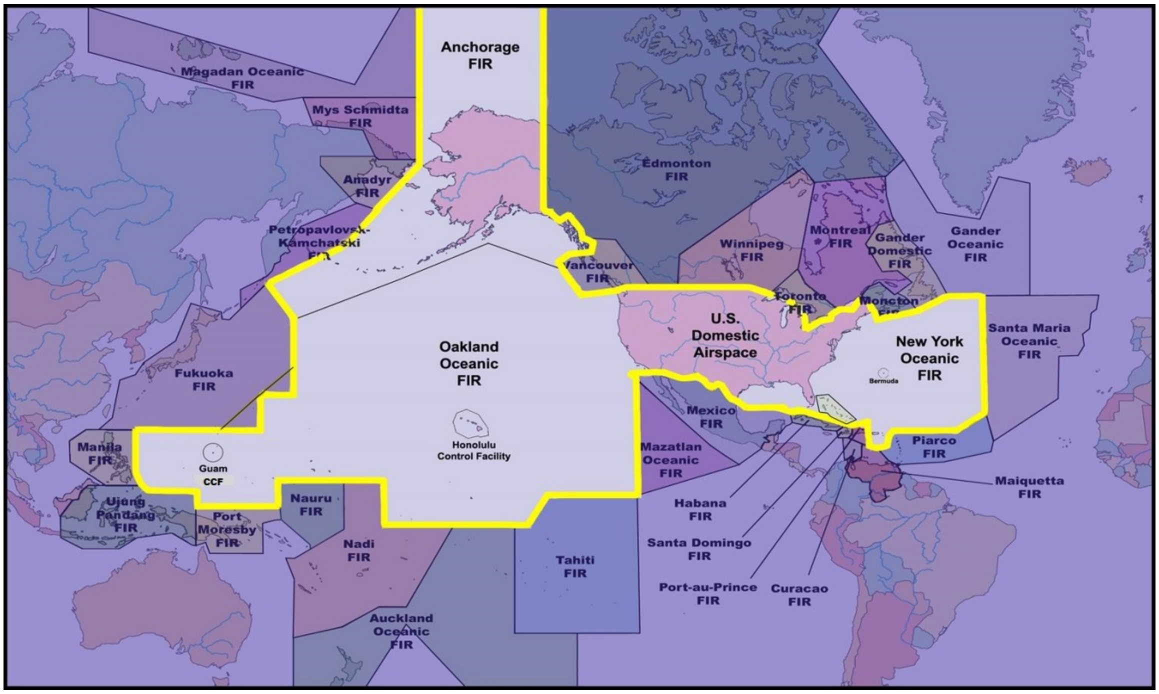
The en-route domain provides service by controllers at 21 air route traffic control centers (ARTCCs) and two combined control facilities, which interface with more than 18 air navigation service providers. Terminal air traffic control (ATC) services include both airport surface operations and terminal area operations. Airport surface operations are conducted by controllers at 263 federal and 253 contract towers located at the Nation's airports. Terminal area operations are conducted by controllers at 160 TRACON facilities, which routinely handle aircraft within 40 miles of an airport.

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 2017, planned accomplishments for Air Traffic Services include:

Air Traffic Services	▪ Develop superior performance standards through action plans made at the local facility level. Maintaining security standards through the local safety council's efforts, AJT will monitor and address identified safety issues in a timely manner. ▪ 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. ▪ Use 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 efforts to improve the ATO's Air Traffic Services' (Terminal and En Route) SMS for the delivery of safe air traffic through participation in conducting compliance assessments at service area facilities, on-going participation of internal audits, and by conducting analysis of safety data for the purpose of proposing solutions to major safety risk concerns in the Terminal and En Route environments. ▪ Continue to participate in research to improve safety and increase throughput using wake turbulence monitoring, operational procedures, and controller tools.

What Does This Funding Level Support?

ATO operates the most complex and technically advanced air traffic control system in the world. In FY 2018, an operating budget of $4,042,132,411 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 our 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.

FY 2018 funding will support 18,776 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 2018, 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 58,006 arrivals and departures per day in FY 2018 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.

Air Traffic Services 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.

By the end of FY 2018 anticipated accomplishments for Air traffic Services include:

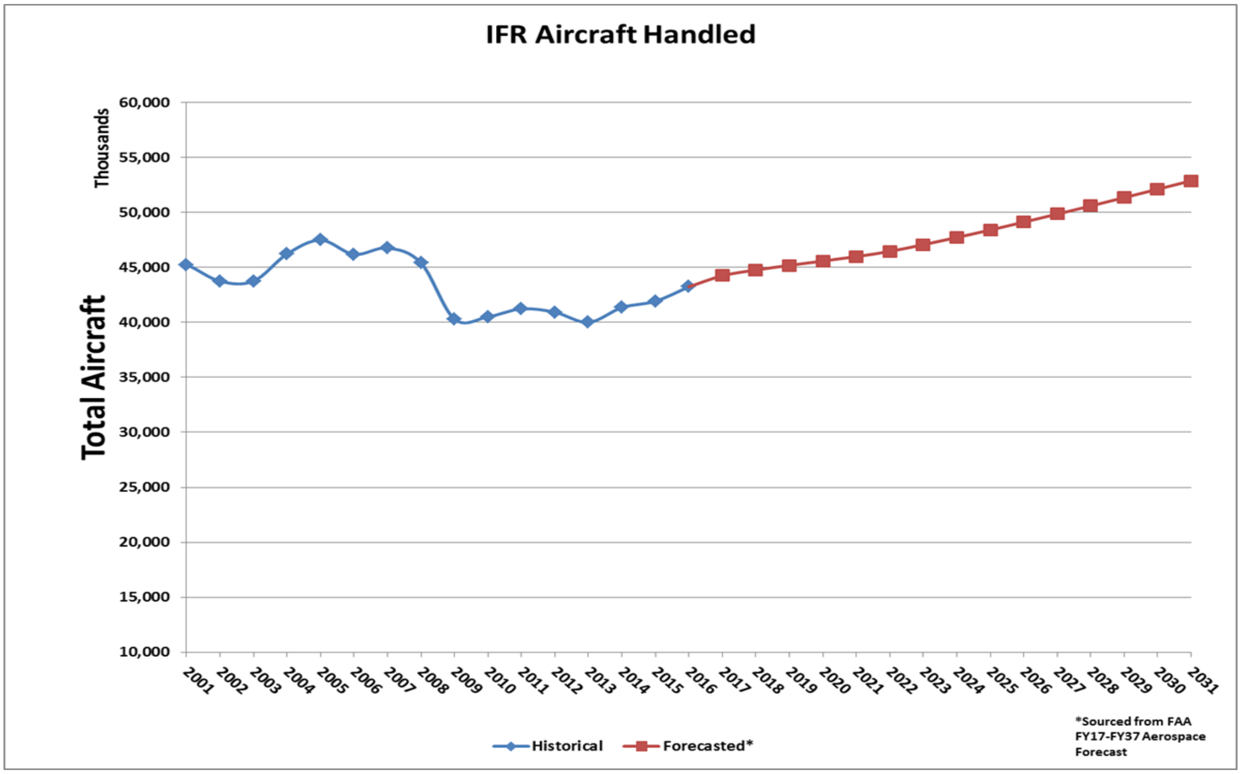
Air Traffic Services	▪ Continue efforts to improve the ATO's Air Traffic Services' (Terminal and En Route) SMS for the delivery of safe air traffic through participation in conducting compliance assessments at service area facilities, on-going participation of internal audits, and by conducting analysis of safety data for the purpose of proposing solutions to major safety risk concerns in the terminal and En Route environments. ▪ 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. ▪ Continue to participate in research to improve safety and increase throughput using wake turbulence monitoring, operational procedures, and controller tools. ▪ Ensure terminal facilities can maximize airspace design for arrivals and departures by supporting a study to assess the viability of reducing the separation minima from obstructions including assessing any reductions of separation minima for obstruction and terrain that is based upon new radar capabilities or NextGen technologies for terminal approach controls including validation of analyses for operations near obstructions and near terrain.

Contract Weather Observer (CWO) Savings (-$50 million) is among several programs FAA plans to streamline to achieve operational cost efficiencies. The FAA has identified multiple airports currently serviced by CWO that have similar traffic, weather and operational complexity profiles to 391 other airports currently serviced by Limited Aviation Weather Reporting Station (LAWRS) controllers. Safety analyses have been conducted to determine where LAWRS –controller provided weather observations can replace CWO contractors. The FAA believes the transition from CWO-provided to LAWRS-controller provided weather observations at these sites will yield a cost savings with no impact on safety.

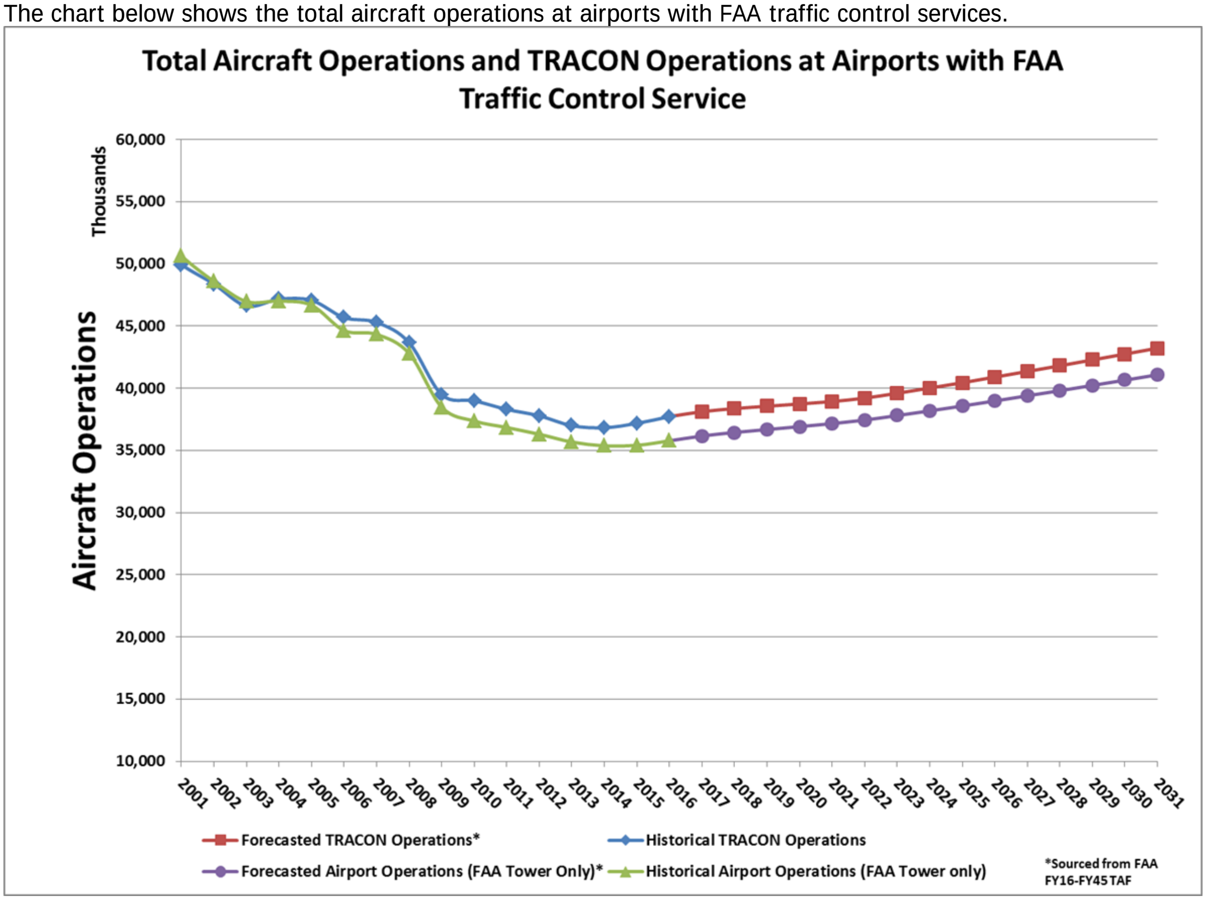
What Benefits will be provided to the American Public through this request?

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).



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.

Air Traffic Services Scope of Operations

Number of Flights Handled Annually	16,045,495
Number of Air Traffic Controllers	14,500
Number of Facilities Operated	567
Amount of Airspace	59 Million Square Miles-
Amount of Space Over Water	24 Million Square Miles

Detailed Justification for the – Vice President Technical Operations, AJW

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

FY 2018 – Technical Operations Services – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	1,068,395	1,039,063	1,051,951	12,888
Program Costs	647,425	551,551	550,518	-1,033
Total	**$1,715,819**	**$1,590,613**	**$1,602,469**	**$11,856**
FTE	**7,762**	**7,536**	**7,479**	**-57**

The FY 2018 budget request for Technical Operations Services is $1,602,469,008 and 7,470 FTP / 7,479 FTE. It provides $5,340,158 for the annualized cost of the FY 2017 pay increase, $14,628,714 for the FY 2018 pay raise, and $2,953,000 for the FY 2017 Transition to Operations and Maintenance (TOM). The request transfers all resources (including staff) associated with FAA flight program operations to the new Flight Programs (AJF) service unit, which includes $92,759,922 and 246 FTP (including a transfer of 34 FTP from the Franchise Fund), Also reflected in the budget is -$92,000 for 1FTP/1FTE Hazardous Materials Safety base transfer, -$257,142 for 1FTP/1FTE Technical Operations Services (AJW-17) base transfer, and -$6,731,607 for Workforce Reduction through Attrition.

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 753 staffed locations (Towers, Centers, Automated Flight Service Centers (AFSS), and System Support Centers) and owns and operates over 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?

The FAA handles 26,775 scheduled passenger flights per day at US airports and helps transport over 946 million passengers per year; a vital part of the Nation's economy. In total, the ATO handles 44,000 IFR (Instrument Flight Rules) flights per day, and manages 145,703 operations (including departures, arrivals and over-flights) per day at FAA and contract towers. FAA data shows that civil aviation accounted for over $1.6 trillion in total economic activity, supporting 5.1 percent of U.S. Gross Domestic Product. Earning over $446.8 billion a year, 10.6 million people are employed in aviation-related fields.

ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

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	2,449
		Communications	18,925
Towers	649	Infrastructure	23,959
Centers	23	Mission Support	3,497
AFSS	16	Navigation	13,630
Other Staffed Facilities	65	Surveillance	2,325
Non-staffed Facilities	12,450	Weather	2,344
Total – Facilities	**13,203**	**NAS Systems/Services**	**67,129**

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.

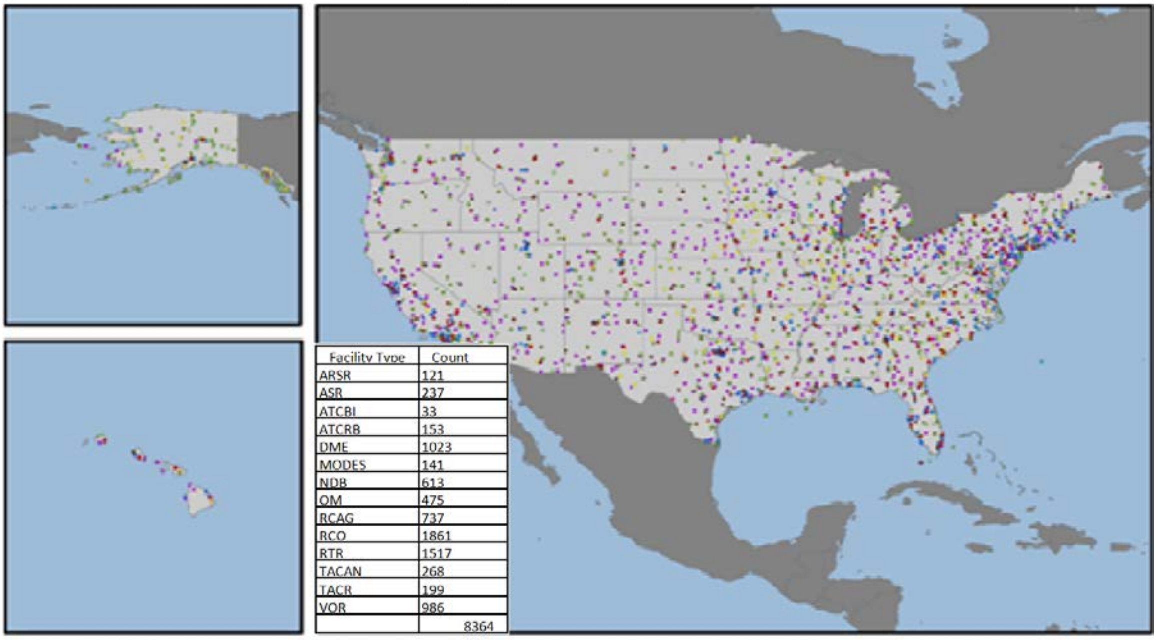
Technical Operations supports the delivery of safe and efficient flight services to customers through responsive and cost effective maintenance of NAS facilities, systems, and equipment, and by providing operational oversight of leased services. The work consists of:

- NAS system design, development, acquisition, installation, maintenance, restoration, modification, certification and oversight of vendor supplied NAS services and vendor maintenance programs;
- Flight 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.

Technical Operations leads the day-to-day defense and protection of the NAS by providing governance and requirements to enhance cybersecurity; coordinate threat information sharing and inter-agency collaboration; tailor cybersecurity business and acquisition strategies to support the rapid delivery of tools, applications, and other capabilities to defend the critical infrastructure from the evolving threat and; authorize systems to operate within the NAS domain.

Our core work is performed by the System Support Centers, 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	237
ATCBI	33
ATCRB	153
DME	1023
MODES	141
NDB	613
OM	475
RCAG	737
RCO	1861
RTR	1517
TACAN	268
TACR	199
VOR	986
	8364

These graphics represent 8,364 of 76,453 facilities and equipment maintained by the FAA. Produced by AJW-1B March 2017

What Does This Funding Level Support?

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 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 2018 request at this level will allow Technical Operations to continue to maintain NAS availability and system integrity and to achieve these initiatives:

Technical Operations Services	▪ 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. ▪ Provide continuous NAS information to external aviation partners by monitoring, restoring, and directing restoration of the systems and networks providing the information. ▪ Sustain reliability 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, restoration activities and oversight of leased services. ▪ Improve incident detection within the NAS infrastructure environment and improve cyber incident response. ▪ 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 reliability 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.

Total requested Transition to Operations and Maintenance (TOM):

Programs	Amount	FTP	FTE
S11.01-02 Runway Status Lights (RWSL)	1,418,000	-	-
F31.01-01Mobile Assets Management Program (MAMP)	817,000	-	-
F24.01-02 Facility Security Risk Management (FSRM)	718,000	-	-
Total	**$2,953,000**	**-**	**-**

S11.01-02 Runway Status Lights (RWSL) - RWSL integrates 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. This system's automation and integrated lights provides a traffic light system similar to what you would find on city streets for the taxiways and runways on busy airports. This is a new capability. Six locations: Las Vegas (LAS), St. Paul (MSP), Cleveland (CLT), Ft. Lauderdale (FLL), Detroit (DTW), and New York (LGA) were installed and had operational readiness in FY 2015. This request totals $1,418,000:

- $1,000,000 (Second Level Maintenance) for 24/7 contract support of the RWSL controlling automation hardware and software. This includes contract engineers to provide direct operational support via telephone technical assistance and/or on-site restoration efforts to resolve problems with the commissioned facilities. Their support also includes: design of modifications and performance of system optimization to improve the operational performance of the equipment, verification that proposed software changes made by the prime contractor do not impact the operational capabilities of the system, and development of test plans and procedures to conduct system level testing of the performance of the software upgrades.
- $93,646 (Integrated Logistics Support) for replacement light bulbs, light fixtures, and spares.
- $324,338 (Physical Infrastructure Support) for increased power costs.

F31.01-01 Mobile Assets Management Program (MAMP) - MAMP provides for the continuity, restoration, or augmentation of NAS operations at FAA operational facilities. Many facilities that make up the NAS have mobile varieties as well, i.e. mobile engine generator, mobile RADAR and mobile communications outlet. The deployment of these mobile assets provide continued availability of air traffic control services and navigation while the permanent asset is out of service due to disaster or long term maintenance. For example, a mobile ATCT was deployed at Napa, CA, after an earthquake at that location put the ATCT out of commission. It will remain in service until the permanent ATCT is repaired. Also, sometimes mobile ATCT's are deployed for one time increases in air traffic for special events, such as, golf tournaments, air shows, or auto races. This program provides for a central location for storage, maintenance, and deployment for mobile assets. In FY 2015, one Deployable Air Traffic Control Facility

(DATCF) was deployed and made available for service in FY 2015, which will require funds for operations and maintenance in FY 2017. This request totals $817,000:

- $629,495 (1st Level Engineering/Maintenance) for Corrective Maintenance contract support for repairs made on site, as well as, tune ups and preventative checkups of hardware. This includes associated travel, transportation, and supplies.
- $20,000 (2nd Level Engineering) for contract support for Software Maintenance and Integration Support.
- $7,585 (Recurring Training) training on the varied mobile assets and systems for the Air Transportation System Specialists.
- $4,500 (Integrated Logistics Support) for supplies, spares, etc.
- $155,000 (Physical Infrastructure Support) for the facility rent and upkeep to store the mobile assets until needed.

F24.01-02 Facility Security Risk Management (FSRM) - FSRM 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 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). The funding requested will provide for the ongoing operation and maintenance of the physical infrastructure that supports the access control security systems purchased and placed in service in FY 2015. There were 87 FSRM Access Control Security Systems installed in FY 2015.

- $718,000 (Physical Infrastructure Support) for contract maintenance of card readers, cameras, x-ray machines, and vehicle barriers.

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 Reliability 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.

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

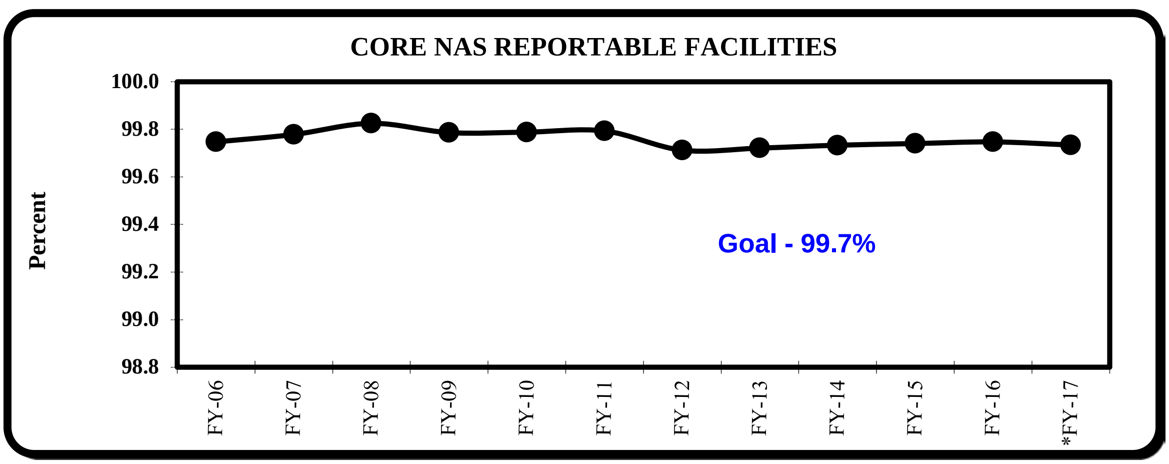
Systems Maintenance Field Maintenance Performance Indicators

Fiscal Year	Number of Facilities**	Adjusted Operational Availability	Reliability
2008	22,611	99.62%	99.84%
2009	22,804	99.53%	99.85%
2010	22,419	99.58%	99.84%
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	26,450	99.44%	99.85%
2016	26,367	99.45%	99.84%
2017*	26,270	99.38%	99.85%

*FY 2017 data thru 02/28/17
**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)

Adjusted Availability for Nation's Core Airports
(Reportable Facilities)
FY 2017 Goal (Maintain reliability of Nation's Core Airports
NAS reportable facilities at 99.70%)

Target: 99.70%
FYTD: 99.86%
Jan 17: 99.87%
Feb 17: 99.85%
Feb 16: 99.81%



For the month of February 2017, we are above the goal for reliability. Compared to January 2016, the reliability for the NAS Reportable Facilities increased by 0.020%.

Compared to February 2016, the reliability for the Core Airports (reportable facilities) increased by 0.038%.

Note: Data Source – NASPAS **(The NASPAS database is validated continuously)**Fiscal Year 17 through February 28, 2017

Detailed Justification for the - Vice President System Operations, AJR

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

FY 2018 – System Operations Services – Budget Request ($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	94,147	89,834	90,997	1,163
Program Costs	203,101	159,278	130,778	-28,500
Total	**$297,248**	**$249,112**	**$221,775**	**-$27,337**
FTE	**444**	**462**	**458**	**-4**

The FY 2018 budget request for System Operations Services is $221,774,575 and 457 FTP / 458 FTE. It provides $467,300 for the annualized cost of the FY 2017 pay increase, $1,280,111 for the FY 2018 pay raise, -$584,615 for Workforce Reduction through Attrition, -$25,000,000 for Flight Service Stations (CONUS) cost savings, and -$3,500,000 for PERTI Cost Savings.

Systems Operations (AJR) provides a broad range of operational services to the 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 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?

The ATO handles 26,775 scheduled passenger flights per day at US airports and helps transport over 946 million passengers per year; a vital part of the Nation's economy. In total, the ATO handles 44,000 IFR (Instrument Flight Rules) flights per day, and manages 145,703 operations (including departures, arrivals and over-flights) per day at FAA and contract towers. FAA data shows that civil aviation accounted for over $1.6 trillion in total economic activity, supporting 5.1 percent of U.S. Gross Domestic Product. Earning over $446.8 billion a year, 10.6 million people are employed in aviation-related fields.

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:

- NAS Operations
- Security
- Flight Service
- International
- Performance and Data Analysis

The **NAS Operations Directorate's** primary responsibility is managing the strategic aspects of Air Traffic Management. This responsibility is carried out primarily though the FAA's Air Traffic Control System Command Center (ATCSCC). The Command Center exercises operational 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 ATO Contingency Group identifies and implements strategies that ensure the ATC system can quickly recover after loss of a major facility. The Airport Surface Efficiency Group (ASEG) within AJR-1 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.

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 on the safety and efficiency of the National Airspace System. 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. The directorate plays a key role in the Laser Mitigation Program, Global Positioning System (GPS) testing, and data release policy and filtering, management of national exercises management, classified programs, Special Interest Flights (SIF) policy and tracking, Open Skies implementation, Crisis Response and Emergency Operations, and support multiple automation systems.

The **Flight Service Directorate** collects and disseminates aeronautical and meteorological information and provides customized pre-flight and in-flight briefings to domestic and international General Aviation communities, military aircraft, air carriers, and federal and local law enforcement. In support of the fundamental transformation to a smaller, more efficient NAS with increased safety and user benefits, Flight Services will modernize its services and delivery methodologies and leverage technology.

ATO International strives to improve air traffic safety and efficiency through an integrated, data-driven approach which shapes and influences global standards, enhances collaboration and harmonization while better utilizing ATO resources. This requires extensive multilateral and bilateral consultation in international forums with global partners, civil aviation authorities and other air navigation service providers. ATO International is also committed to leading global and regional efforts to foster air navigation solutions while advocating for seamless cross-border solutions which result in operational efficiency gains for providers and reduced fuel consumption for operators. ATO International is the single clearing house for the ATO in regards to achieving the FAA's Global Leadership Initiatives such as the Caribbean traffic flow management and collaborative decision-making initiative.

The **Performance Analysis Directorate,** assesses the operational performance of the National Airspace System (NAS), identifies future trends in the aviation industry, and develops data policy and plans to support a robust quantitative modeling and analysis environment. The Performance Analysis Directorate develops and coordinates FAA operational metrics to produce an understanding about how the NAS can be more efficient and safe. The Directorate develops and executes ATO operational data management policies, practices and procedures, performs fast-time simulation modeling of airports and airspace, engages with FAA's international counterparts towards improving global operational performance and provides overall program management, concept development, and operational review analysis for Plan Execute Review Train Improve (PERTI) initiatives.

In addition to maintaining a high level of daily performance in FY 2017, key Systems Operations outputs include:

System Operations Services	▪ ATCSCC improvements in critical information-sharing with aviation stakeholders to more effectively manage flight diversions during severe weather events. ▪ Monitor the NAS average daily airport capacity for the Nation's Core Airports of 58,006 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. ▪ Award a new Flight Service follow-on contract. ▪ Develop policy and procedures for implementation 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. ▪ The collection, storage, maintenance of numerous NAS operational data sources and provide data services/products to internal/external ATO customers ▪ Provide integrated standards, policies and practices to effectively manage data, data release and information assets for the NAS. ▪ The strategic, tactical and economic reporting and shortfall analysis of the NAS and Airport operational performance through data mining metrics, fast-time simulation modeling, delay impact and capacity analysis. ▪ Provide operational engagement for PERTI in order to improve operations through analytics, planning and internal/external stakeholder engagement. ▪ Identify and implement strategies that ensure the ATC system can quickly recover after loss of a major facility.

What Does This Funding Level Support?

Funding the FY 2018 request at this level will allow System Operations to maintain the National Airspace System (NAS) by accomplishing the following initiatives which will continue to improve NAS efficiency, safety, and security. Key outcomes include:

System Operations Services	• Execute 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 Utilize the Collaborative Trajectory Options Program giving flight operators flexibility to propose multiple trajectories or routes when weather or other factors impact air traffic flow. Incorporate commercial space launches into the NAS. • 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. • Modernize Flight Service and improve safety through automation efficiencies for users and flight service specialists.

	• Execute the program for aircraft owners that blocks display of their flight information in the Aircraft Situation Display to Industry data feed. • Support ATO implementation of ICAO's Global Air Navigation Plan (GANP), the Aviation System Block Upgrade (ASBU) initiative and Global Air Safety Plan (GASP). • Provide direct technical support and strategic guidance to operational facilities that interface with foreign air navigation service providers. • Ensure harmonization of domestic U.S. air traffic operations and Next Generation Air Transportation. • System (NextGen) technologies, procedures, and standards with the global civil aviation community. • Support ATO implementation of ICAO's Global Air Navigation Plan (GANP), the Aviation System Block Upgrade (ASBU) initiative and Global Air Safety Plan (GASP). • Facilitate execution of the ATO International Strategic Plan and coordinate ATO international activities with other lines of business. • Continue to support the ATO and represent the FAA as the focal point for strategic NAS operational and global economic analysis. • Implement PERTI initiatives, planning and review for immediate operational results. • Support operational assessment of Airport capacity and construction • Provide the ATO with managed comprehensive and interactive access to operational data, data services, and analytical tools in support of daily requirements, strategic analysis and planning. • Provide overall program management of the airport slot and schedule management program consisting of: Day-to-day processing of slot applications, and airport slot policy development. • Serve as liaison for airport construction, specifically construction at slot constrained airports and produce a three-year outlook for airport construction to enable better planning around complex airport construction projects on a quarterly basis. • Provide operational sponsorship of the Terminal Flight Data Manager program and works with flight operators, airport operators and ATC to ensure successful integration of the three T's (TFDM, TBFM, and TFMS) relative to the successful deployment of the S-CDM concept. • Improve contingency operations/readiness of the Air Traffic Control system so the system can quickly recover when a major facility is disabled.

CONUS Flight Service Stations (-$25 million) is a plan to modify the scope/scale of this program by encouraging users to utilize more automated, internet provided services, which will not impact current levels of safety. The reduced dependency on direct person to person interaction will result in significant cost efficiencies. We will discontinue some of the services provided by the Flight Service Stations (FSS), reducing the need for pilot-to-specialist interaction from five fixed locations (Prescott, AZ; Fort Worth, TX; Ashburn, VA; Raleigh, NC; and Miami, FL).

PERTI (-$3.5 million) Plan, Execute, Review, Train Improve (PERTI) provides the ATO with multi-disciplinary support, processes, and analytics to improve NAS performance and predictability. The NAS Traffic Flow Management Initiative is a high priority ATO strategic initiative that is an integral part of FAA's commitment to process improvement. Portions of the PERTI program are in operation today, including the daily telcons with users, hosted by the Air Traffic Control System Command Center (ATCSCC), which are aimed at forming and communicating the performance plan several days in advance. The overall plan is used to develop and execute daily operations and target goals. The level of funding provided will allow this portion of PERTI to continue to operate and schedules additions to the program in future years.

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

The flying public benefits directly by the work System Operations will perform with the dollars requested. System Operations' management of air traffic to minimize NAS delays and congestion delivers an efficient and safe mode of transportation to travelers. Coordination with law enforcement agencies protects the flying public from security threats and natural hazards. General Aviation communities benefit from the aeronautical and meteorological information that System Operations disseminates. By developing and coordinating FAA operational metrics, System Operations develops recommendations for improving NAS capacity and system efficiency to reduce delays at specific airports and in high volume corridors. The flying public also benefits from the work System Operations is doing internationally to harmonize standards for ATM services.

The NAS Operations provides strategic and tactical NAS oversight, and regulates real-time air traffic when constraints such as weather, runway closures, equipment outages, security issues or other impacting conditions affect the NAS. The ATCSCC provides a network-centric platform from which the agency manages and recovers from large-scale disaster recovery events and infrastructure outages.

The Airport Surface Efficiency Group's work to improve surface operations will lead to efficiencies that will save fuel, reduce emissions and provide a better flying experience to the public. As the industry affairs lead, the Group participates with aviation industry stakeholders in Collaborative Decision Making (CDM) forums to coordinate and improve various facets of airport surface operations. ASEG provides overall program management of the airport slot and schedule management program.

The International Directorate will:

- Coordinate and facilitate the ATO strategic vision and supporting activities in the Europe, Africa, and Middle East regions, as well as global forums dealing with cross-regional air traffic initiatives, policies, and standards; to include supporting ATO participation in Civil Air Navigation Services Organization (CANSO) Operations Standing Committee and Safety Standing Committee
- Facilitate meetings of ATO personnel with international counterparts on various topics as needed
- International Civil Aviation Organization Planning and Implementation Regional Groups (PIRGs)
- Asia-Pacific Air Traffic Flow Management Steering Group (ATFMSG)
- Asia-Pacific Initiative to reduce Emissions (ASPIRE)
- Future Air Transportation System (FATS) working group with Japan

The Performance Analysis Directorate analyzes the performance of the NAS and provides data to senior management and operational personnel. This analysis and data allows the ATO to improve its operations, making the NAS and its users more efficient. The directorate's investments in improved data and analysis will help reduce costs for and improve the flying experience of the American public.

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

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

FY 2018 – Safety and Technical Training Services – Budget Request ($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	83,323	83,646	83,778	132
Program Costs	166,870	115,614	111,256	-4,358
Total	**$250,193**	**$199,260**	**$195,034**	**-$4,226**
FTE	**538**	**534**	**523**	**-11**

The FY 2018 budget request for Safety and Technical Training is $195,034,394 and 515 FTP / 523 FTE. This provides $435,111 for the annualized cost of the FY 2017 pay increase, $1,191,932 for the FY 2018 pay raise, -$1,494,431 for Workforce Reduction through Attrition, and -$4,358,000 for Academy Savings.

AJI provides the ATO with the Safety, Technical Training, Policy & Performance, and Standardization expertise necessary to help enable air traffic controllers, technicians, engineers and support personnel's daily efforts to keep aircraft safe, separated, and on time. AJI safety programs are responsible for ensuring the safety of the National Airspace System (NAS) through reporting, mitigating, and monitoring risks. This strategy includes gathering input from front line employees, deploying technology to gather data, improving analysis to identify risk and implementing corrective actions to mitigate identified hazards. AJI ensures that national safety management policies are clearly defined, communicated, and adhered to; conducts audits and operational assessments of NAS changes and new technologies; and provides safety analysis and data management capability. We manage safety policy development, reduce fatigue risks through a comprehensive fatigue risk management system, facilitate an ongoing ATO safety culture transformation that leads to improved safety performance, and are the focal point for reducing the risk of runway collisions and excursions in the NAS.

AJI is the only organization within ATO that provides technical training to controllers, technicians, and engineers. We provide a national training program to 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.

What is this Program and Why is it Necessary?

The ATO handles 26,775 scheduled passenger flights per day at US airports and helps transport over 946 million passengers per year; a vital part of the Nation's economy. In total, the ATO handles 44,000 IFR (Instrument Flight Rules) flights per day, and manages 145,703 operations (including departures, arrivals and over-flights) per day at FAA and contract towers. FAA data shows that civil aviation accounted for over $1.6 trillion in total economic activity, supporting 5.1 percent of U.S. Gross Domestic Product. Earning over $446.8 billion a year, 10.6 million people are employed in aviation-related fields.

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 safety and will assist in preventing the loss of human life, reduction in 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, surface and technical safety occurrences; conducts in-depth analysis of airborne, surface and technical 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 2017, the accomplishments for Safety and Technical Training will include:

Safety and Technical Training Services	• 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) 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 requirements for new RAP functionality to address the risk associated with Minimum Vectoring Altitude (MVA) Violations and Traffic Alert and Collision Avoidance (TCAS) system Resolution Advisories (RA). • Approving a collaborative plan to create a voluntary safety reporting program for ATO Technicians, enabling the Agency to learn more about the technical risks existent within an increasingly automated NAS; and then develop targeted mitigation(s). • Conducting field evaluations to determine if the Closed Runway

	Operation Prevention Device (CROPD) can accept contextual inputs, such as NOTAMs, Airport Surface Detection Equipment (ASDE) and Automatic Dependent Surveillance - Broadcast (ADS-B) beyond only speech recognition. • Enabling more effective risk analysis, mitigation, and safety performance monitoring by evolving the predictive risk assessment methodology into a risk continuum to assess the potential for fatal accident attributed to air traffic control • Presenting the benefits of and expanding our Confidential Information Share Program (CISP) internationally to identify potential safety hazards through the exchange of partner information. • Incorporating Human Performance methods into safety investigations and evaluations to understand incident and accident root causes. • Continuing to employ a Service Integrity Risk Analysis Process (SI-RAP) to develop a data baseline and analyze reported problems with the air traffic technical systems and services. • Training sufficient numbers of trained/qualified individuals to meet operational needs based on the controller and technician work force plans • Complete the Implementation Plan for the ATO Learning Content Management System (LCMS) • Developing/revising priority training for Air Traffic and Technical Operations and deploy annual controller recurrent training • Evolving the current annual Hazard Risk Mitigation program to focus agency resources on mitigating risk until an acceptable level is achieved (Continuous Top 5) • Developing analytical tools and processes to identify, track, and monitor emerging trends or risk in the NAS.

What Does This Funding Level Support?

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 of Safety and Technical Training programs impact the development and implementation of NextGen. Controllers and technicians need significant training to operate and maintain NextGen systems. Safety and Technical Training are working in partnership with the NextGen program office to ensure training is an integral part of the transformation of the NAS and in the development and implementation of NextGen systems. 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 2018, key outcomes expected to be achieved with the requested resources:

Safety and Technical Training Services	• Reduce runway incursions due to increased analysis of Category C and D events before they evolve into more significant issues. • Increase runway safety awareness by automating processes related to support the requirements of the Runway Safety Action Team (RSAT). • Improve operational safety environment for ATO technicians as a result of a fully implemented voluntary safety reporting program. • Improve understanding of national and international airspace system operations through creating stronger global alliances. • Improve litigation support to the FAA's Office of Chief Counsel, Aircraft Accident Litigation and Enforcement Divisions by reducing the Aircraft Accident Package development time via upgraded automated tools. • Improve Air Traffic On-the-Job Instruction (OJTI) by developing a plan for facility Training Standards. • Improve safety data collection and continuity with upgraded facility Safety Reporting Tools. • Improve operational safety across the NAS by continuing to evaluate efficiencies for Arrival Departure Windows (ADW) for Non-intersecting Converging Runway Operations (CRO). • Initiate migration and development of training curriculum into the Learning Content Management System (LCMS) • Provide sufficient numbers of trained/qualified individuals to meet operational needs based on the controller and technician work force plans • Develop/revise priority training for Air Traffic and Technical Operations and deploy annual controller recurrent training • Leverage relationships with Center of Excellence (COE) partners to identify innovative training requirements and implement training solutions for Technicians and controllers • Develop guidance to ensure the FAA will comply with ICAO Fatigue regulation proposed to take effect in 2020. • Conduct analysis of fatigue levels at sample facilities. • Embed Human Factors in to incident and event analysis across the NAS. • Enhance National Runway Safety Plan long term initiatives and focusing on safety mitigation strategies. • Improve 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)). • Improve 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. • Improve 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. Improve 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. • Implement advanced analytical capabilities using Bayesian modeling, text mining techniques, and Key Performance Indicator (KPI) trends to support effective risk management. • Mature safety management principles to proactively address emerging safety risk by using consistent, data-informed approaches to make smarter, system-level, risk-based decisions. • Implement a more effective risk analysis, mitigation, and safety performance monitoring

Academy Savings (-$4.4 million) will be realized through a reduction in academy travel costs at the Mike Monroney Aeronautical Center, based on lower staffing levels caused by the planned restrictions to non-exempt workforce hiring.

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

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

FY 2018 – Mission Support Services – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	193,641	188,955	187,884	-1,071
Program Costs	95,525	93,505	93,505	0
Total	**$289,166**	**$282,461**	**$281,389**	**-$1,072**
FTE	**1,368**	**1,314**	**1,278**	**-36**

The FY 2018 budget request for Mission Support Services is $281,389,447 and 1,250 FTP / 1,278 FTE. It provides $982,910 for the annualized cost of the FY 2017 pay increase and $2,692,563 for the FY 2018 pay raise. It also includes -$189,000 for 1FTP/FTE Flight Standard Service base transfer, and -$4,557,531 for Workforce Reduction through Attrition.

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. Core work includes:

- Oversight and support for NAS procedures and changes which affect operations and special activities with the NAS.
- Development and dissemination of digital aeronautical charts, IFPs, aeronautical data, and related aeronautical navigation products.
- Aeronautical chart and data revisions, and development and maintenance of RVMs in response to increasing requirements of UAS Integration.
- 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 and program implementation management support services.

What is this Program and Why is it Necessary?

The ATO handles 26,775 scheduled passenger flights per day at US airports and helps transport over 946 million passengers per year; a vital part of the Nation's economy. In total, the ATO handles 44,000 IFR (Instrument Flight Rules) flights per day, and manages 145,703 operations (including departures, arrivals and over-flights) per day at FAA and contract towers. FAA data shows that civil aviation accounted for over $1.6 trillion in total economic activity, supporting 5.1 percent of U.S. Gross Domestic Product. Earning over $446.8 billion a year, 10.6 million people are employed in aviation-related fields.

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 policy, technical expertise, regulatory guidance, and conducts analyses on a broad range of activities directly related to the safe and efficient operation of the National Airspace System (NAS). Airspace Services is responsible for developing airspace rules, standards and policy, and administers regulatory policy within the NAS (rulemaking and environmental policy); managing key, large-scale airspace projects and NAS initiatives to respond to evolving needs in order to maintain safety and efficiency; developing and implementing policy for new technology, such as UAS and commercial space; conducting formal aeronautical studies on existing or proposed construction to mitigate potential hazards to air navigation; providing airspace policy guidance within FAA aviation stakeholders and industry; and providing technical expertise and information to Congress to support regulatory development.

The **Aeronautical Information Services Directorate** is the authoritative government source for collecting, validating, storing, maintaining, and disseminating aeronautical data for the U.S. and its territories. The directorate designs, updates, and maintains terminal and Enroute IFPs, and airspace for aeronautical navigation within the NAS. Aeronautical Information Services arranges for the publication of aeronautical maps and charts, RVMs, and foundational aeronautical navigation data necessary for safe and efficient aircraft operations. The directorate promotes safe visual and instrument flight rule operations by consulting with pilots and other Communities of Interest in the development and publication of aeronautical products. The aeronautical charts, data, and related products and services promote safe and efficient aeronautical navigation and air commerce within the NAS.

The **Operational Concepts, Validation, & Requirements Directorate** develops, integrates and prioritizes ATO requirements based on operational needs. Through structured service analysis, it identifies, coordinates, and interprets the end users' needs. Based on these needs and applying its operational, technical, and project management expertise, it develops operational requirements and validates new concepts. It then leads emerging capabilities through the Acquisition Management System (AMS) Concept and Requirements Definition and Investment Analysis phases, after which it ensures continuity of requirements through the subsequent phases of the AMS lifecycle.

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.

The **Emerging Technologies Integration (ETI) Directorate** assists the ATO in understanding and implementing the changes necessary to integrate new entrants into the NAS. The current focus is on UAS and Commercial Space operations, two of the Administrator's top six priority objectives to be advanced over the next year. The integration of these technologies is a difficult challenge and ETI facilitates the information flow between COO, DCOO, and Officers Group on the implementation status, challenges, and solutions. ETI chairs the ATO UAS Leadership Team and Commercial Space Integration Team and encourages ATO enterprise solutions to ETI challenges.

By the end of FY 2017, significant accomplishments for Mission Support Services will include the following:

Mission Support Services	▪ Development of the Federal Notices to Airmen (NOTAM) system including 120 additional deployments of the NOTAM Manager to public use airports. ▪ Develop and publish 170 Wide Area Augmentation System (WAAS) Localizer Performance with Vertical Guidance (LPV)/ Localizer Performance (LP) procedures. ▪ Complete all required modifications, revisions, and updates to Terminal and Enroute IFPs through the issuance of critical amendments, NOTAMs, periodic IFP reviews, review and analysis of existing obstacles and all proposed new obstacles, and revising aeronautical navigation products as necessary to ensure currency and safety in the NAS. ▪ Complete all required revisions to Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) Aeronautical Charts, Airport Diagrams, and Terminal Procedure Publications (TPPs). ▪ Create and maintain ATC RVMs, Minimum Safe Altitude ATC facility RVMs, Minimum Safe Altitude Warning (MSAW) system data files, and Minimum Vectoring Altitude (MVA) maps in response to Terminal Automation Modernization and Replacement (TAMR) deployment. ▪ Complete all required updates on UAS Facility Maps, National Security maps, FAA Extension, Safety, and Security Act of 2016 (FESSA) maps, and all related data in support of Low Altitude Authorization and Notification Capability (LAANC) and changing UAS requirements. ▪ 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 policy guidance to support Time Based Flow Management as an integral system in the NAS to support NextGen's mission and ensure future capabilities are implemented consistently. ▪ Implement WAKE RECAT 2.0 at Minneapolis TRACON and 2 more key sites. ▪ Complete update to FAA Order 7200.23, Unmanned Aircraft Systems and Advisory Circular 91-57.A. ▪ Expand and Improve Community Involvement (CI) for Metroplex and single site projects. Supplement general guidance contained in the FAA's Community Involvement Manual with specific guidance tailored for PBN practitioners on roles and responsibilities in the execution of community involvement activities throughout an airspace project. ▪ Deliver roles and responsibilities to support PBN NAS Navigation Strategy commitments. ▪ Lead the preliminary Performance Based Navigation high altitude route redesign activity to replace conventional, ground based routes with satellite based routings along the Atlantic Coast of the USA. ▪ Initiate change to Air Traffic Control separation standards for Established on Required Navigation Performance (EoR) procedure designs for simultaneous independent approaches to dual and triple parallel runways. ▪ Complete the Southern California Metroplex Procedure Implementation Phase and Cleveland/Detroit Metroplex procedure design after considering community feedback. ▪ Conduct over 120,000 aeronautical studies on proposed and existing obstacles, specify marking and lighting to protect the NAS, and determine whether those obstacles represent a hazard to navigable airspace or airport capacity. ▪ Support the Optimization of Airspace and Procedures in the Metroplex (OAPM) project by providing procedural support to the integration of airspace design and associated activities, including traffic flow analysis and facilitated design and procedural optimization.

	▪ Expand the use of Performance Based Navigation through the enhancement of Time Based Flow Management tools such as implementing Integrated Departure and Arrival Capability (IDAC), and Ground Based Interval Management Spacing (GIMS-S) at two additional sites throughout the National Airspace System. ▪ Deliver the ATO Roadmap for Space Operations Integration in the NAS. ▪ Develop UAS Facility Maps (UASFMs) to allow small UAS (sUAS) aircraft to safely operate in controlled airspace in response to Part 107 rule, requiring small UAS to receive authorizations/waivers prior to operating in controlled airspace.

What Does This Funding Level Support?

Funding requested in FY 2018 will provide continued Mission Support Services contributions in the transition to NextGen. Funding will also allow continued development of PBN criteria and procedures, along with additional staffing at headquarters and service centers for continued development of cornerstone documents, safety studies, and research needed for the safe integration of UAS and commercial space operations into the NAS.

FY 2018 funding for Mission Support Services will:

Mission Support Services	▪ Continue Metroplex implementation activities at additional locations throughout the NAS. ▪ Develop and publish 170 WAAS LPV/LP procedures. ▪ Complete all required modifications, revisions, and updates to Terminal and Enroute IFPs through the issuance of critical amendments, NOTAMs, periodic IFP reviews, review and analysis of existing obstacles and all proposed new obstacles, and revising aeronautical navigation products as necessary to ensure currency and safety in the NAS. ▪ Complete all required revisions to IFR and VFR Aeronautical Charts, Airport Diagrams, and TPPs. ▪ Complete all required obstacle evaluations studies for proposed new construction to protect existing IFP's and any future IFP development to ensure the safety of aeronautical navigations and efficient utilization of the NAS. ▪ Create and maintain ATC RVMs, Minimum Safe Altitude ATC facility RVMs, MSAW system data files, and MVA maps in response TAMR deployment. ▪ Complete all required updates on UAS Facility Maps, National Security maps, FESSA maps, and all related data in support of LAANC and changing UAS requirements. Research and respond to IFP inquiries, periodic review evaluations of IFPs and Aeronautical Radio incorporated (ARINC) coding of IFPs. ▪ Develop standards and procedures to support 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). ▪ Support the expansion of Controller-Pilot Data Link Communications (CPDLC) in En Route operations throughout the NAS. ▪ Continue the expansion of WAKE RECAT to additional sites throughout the NAS. ▪ Continue expansion of TBFM and its capabilities to additional

	locations. ▪ Deliver UAS Facility Maps (UASFMs) to public to allow small UAS aircraft to safely operate in controlled airspace in response to Part 107 rule, requiring small UAS to receive authorizations/waivers prior to operating in controlled airspace. ▪ Develop UAS Implementation Plan for integration of UAS into the NAS. ▪ Stand up UAS in Controlled Airspace Aviation Rulemaking Committee. ▪ Deliver the next iteration of the ATO Roadmap for Space Operations Integration in the NAS to further delineate short, mid, and long range activities ▪ Deliver the ATO Evolution Strategy for integration of space operations in 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 policy guidance to support Time Based Flow Management as an integral system in the NAS to support NextGen's mission and ensure future capabilities are implemented consistently. ▪ Support expansion of Performance Based Navigation through the enhancement of Time Based Flow Management tools (e.g. Integrated Departure and Arrival Capability (IDAC), and Ground Based Interval Management Spacing (GIMS-S)) at two additional sites throughout the National Airspace System. ▪ Develop standards and procedures to support the integration of unmanned aircraft into the NAS. ▪ Implement WAKE RECAT 2.0 at Minneapolis TRACON and 2 more key sites. ▪ Complete activities in support of the Investment Analysis Readiness Decision for the Common Support Service – Flight Data capital investment, which is designed to modernize the existing flight plan system to a flexible and standards-based based approach to the creation, exchange, and use of flight data across the enterprise. ▪ Deploy the next version of the international Flight Exchange Model, the international data standard for flight data in the global ATM community. ▪ Conduct concept validation activities for terminal (e.g. terminal work package 1), en route (en route enhancements 1), and traffic flow management (time-based flow management work package 4, collaborative air traffic management technologies work package 5) operational area. ▪ Confirm new operational needs (as they are identified by field personnel) and develop solution concept of operations to address those needs. ▪ Prioritize and integrate emerging concepts and requirements ▪ Support the expansion of Controller-Pilot Data Link Communications (CPDLC) in En Route operations throughout the NAS. ▪ Continue implementation of WAKE RECAT to additional sites throughout the NAS. ▪ Continue support of TBFM and its capabilities at targeted locations.

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. We protect navigable airspace and increase efficiency through aeronautical studies to identify effects of potential construction projects on the NAS. Safety is improved through better procedures, awareness and mitigating 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 1,945 RNAV SIDs/STARs; 716 RNP Authorization Required (AR) instrument approach procedures (including lines of minima); and 265 Q/T/TK Routes in addition to Global Navigation Satellite System Minimum En Route Altitude (GNSS MEA) RNAV routes as of March 2, 2017. The use of these procedures has already provided significant efficiency and safety benefits to operators. Additionally, advancements in avionics, surveillance, navigational procedures, and the sharing of information allows for the predictability and repeatability needed for the best decisions made by flight operators and air traffic controllers alike. Continued evolution of Time Based Flow Management (TBFM) is needed to optimize capabilities and realize the benefits of Performance Based Navigation.

The Airspace Services Directorate establishes the foundation for navigable airspace through regulations and policy. This includes environmental assessments and polices to manage effective airspace use. Airspace Services will complete regulatory development for sUAS operations over urban areas, extended line of sight operations and beyond line of sight operations. This will expand the use of unmanned aircraft while deliberation completes on the sUAS rulemaking actions.

Detailed Justification for the - Vice President Management Services, AJG

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

**FY 2018 – Management Services – Budget Request
($000)**

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	117,993	117,098	118,315	1,217
Program Costs	109,585	100,016	60,422	-39,594
Total	**$227,578**	**$217,115**	**$178,738**	**-$38,377**
FTE	**216**	**248**	**241**	**-7**

The FY 2018 budget request for Management Services is $178,737,500 and 235 FTP / 241 FTE. It provides $609,125 for the annualized cost of the FY 2017 pay increase and $1,668,623 for the FY 2018 pay raise. Included in the request is a change of -$789,000 for Working Capital Fund adjustments, -$1,061,021 for Workforce Reduction through Attrition, and -$38,805,000 in Program/Service Reductions.

The Management Services organization provides leadership and guidance to ATO to help attract and maintain a diverse, productive, professional workforce. Management Services develops diversity and inclusion strategies specifically for ATO and serves as ATO's center of expertise for financial and human resources, training, knowledge, and best practices for all diversity and inclusion efforts.

Management Services supports human capital by providing programs customized for the specific, real-time needs of the operation, to include: leadership development, succession planning and career planning programs/services. We recruit, develop, and retain a diverse and collaborative workforce by providing career progression planning and leadership development programs along with personnel and organizational policies that meet the needs of our highly skilled workforce. Management Services provides technical requirements, forecasting and on-boarding for the ATO's highly specialized technical workforce. The organization also serves as the liaison with FAA's Human Resources department for personnel actions and policy specific to the ATO, employee engagement initiatives and the development, deployment and administration of corporate Talent Management programs and services.

Management Services supports organizational excellence by developing and maintaining the ATO's budget, and providing the formulation, execution and tracking oversight to ensure financial performance stays on track. Management Services oversees contracts and space management for the ATO, and also serves as the central point of contact for FAA's Finance Services department.

What is this Program and Why is it Necessary?

The ATO handles 26,775 scheduled passenger flights per day at US airports and helps transport over 946 million passengers per year; a vital part of the Nation's economy. In total, the ATO handles 44,000 IFR (Instrument Flight Rules) flights per day, and manages 145,703 operations (including departures, arrivals and over-flights) per day at FAA and contract towers. FAA data shows that civil aviation accounted for over $1.6 trillion in total economic activity, supporting 5.1 percent of U.S. Gross Domestic Product. Earning over $446.8 billion a year, 10.6 million people are employed in aviation-related fields.

ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

Management Services ensures 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 2017, significant accomplishments for Management Services will include:

Management Services	▪ 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 support NAS efficient streamlined services. Success will be measured by meeting the hiring goals: the FY17 hiring goal for air traffic controllers is 1781, and 360 technicians. ▪ The institution of real-time placement of new air traffic controllers to facilities that have immediate need including the ability to quickly adapt to changed priorities. Success will be measured in the number of facilities who move from below 85% of target to above. ▪ A national program to prepare air traffic controllers, technicians, front line managers, and operations managers for success in their next level of leadership responsibility. Success will be the number of participants who are promoted in the ensuing 2 years. ▪ A Recruitment and Outreach Program to attract a diverse applicant pool for ATO mission-critical occupations. Success will be an increase in under-represented demographics. ▪ A space strategy to co-locate offices and reduce the ATO space footprint and annual lease costs. Success will be measured by the efficiency achieved. ▪ Serve as the ATO primary point of contact in Term and Mid Term Bargaining at the national level. ▪ Represent ATO in the processing of grievances at the national level for eight unions. ▪ Customized delivery of Talent Management programs/services that met the real-time needs of the operation to include: o Continuous Leadership Development, Leaders Teaching Leaders (CLD-LTL) delivered to 3,290 air traffic and technical operations managers by 81 trained operational senior managers; o Continuous Leadership Development, Virtual Learning (CLD-VL) available for all ATO employees; o Technical Operations Leadership Development Program delivered to 2-4 Cohorts of aspiring 1st level technical operations managers; o Succeeding in Your First Year (SYFY) delivered to 336 new air traffic and technical operations; o Operational Supervisors Workshop delivered to 572 air traffic and technical operations managers; o Succession Planning Program will graduate 2 Cohorts of 34 air traffic and technical operations managers; o Career Services Center provided career training/support to 700 employees; and o Career Planning Program will have had ~3,800 Career Plans built (19,000 since 2013). ▪ Delivery of the FAA enterprise-level 5-year Capital Investment Plan. ▪ Continued delivery of a pro-active organizational effectiveness program fostering a collaborative culture between ATO management

	and labor union leadership and in the field at air traffic facilities. ▪ A customer service program that builds customer service skills and awareness and measures point-of-service delivery customer experience as well as monitors the value of services at the strategic level. ▪ Business plans to track and communicate progress throughout the year to ensure programmatic plans stay on track. ▪ Manage $7 billion of ATO funds for payroll and operations. ▪ Provide ATO budget formulation, presentation, and execution services in support of FY17, FY18, and FY19 budgets. ▪ Support Agency small business goals by awarding $16 million to small and disadvantaged businesses.

What Does This Funding Level Support?

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 provides 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 2018 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 at ATO service units to identify and reduce or eliminate barriers to maintaining a professional, model workplace.

FY 2018 funding for Management Services will:

Management Services	• 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, hire and train the number of controllers and technicians required to operate and maintain the NAS. 2018 hiring goal is 1701 air traffic controllers and 360 technicians. • 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. Measurement will be an increase in under-represented demographics. • Develop and implement an integrated strategy in managing labor relationships and liaison activities across ATO organizations and bargaining units. • Serve as the ATO primary point of contact in Term and Mid Term Bargaining at the national level. • Represent ATO in the processing of grievances at the national level for eight unions. • Continue the consolidation of ATO space leases to result in savings in Operations dollars for reinvestment in the operation of the National Airspace System. Metric will be the efficiencies realized. • Promote ATO Career Progression Plan tools accessible to 100 percent of the ATO population. • Delivery of customized Talent Management programs/services that met the real-time needs of the operation to include: o Continuous Leadership Development, Leaders Teaching Leaders (CLD-LTL) will continue delivery to air traffic and technical operations managers by trained operational senior managers;

	o Continuous Leadership Development, Virtual Learning (CLD-VL) available for all ATO employees; o Continuous Leadership Development, Leadership Workshop (CLD-LW) will pilot and deploy to 1st and 2nd level air traffic and technical operations managers; o Air Traffic Leadership Development Program (ATLDP) will pilot and deploy to aspiring 1st level air traffic frontline managers; o Technical Operations Leadership Development Program will continue delivery to aspiring 1st level technical operations managers; o Succeeding in Your First Year (SYFY) will continue delivery to new air traffic and technical operations managers; o Operational Supervisors Workshop will continue delivery to air traffic and technical operations managers; o Succession Planning Program will be delivered to one Cohort of aspiring 2nd level managers; o Career Services Center will continue to provide career training/support to employees; and o Career Planning Program expanded to include 100 positions and 150 pathways (target 5,000 additional Career Plans built for 24,000 since 2013). • Continue the customer service strategy to uplevel skills, enhance service provision and track best practice measures. • Continue the FAA enterprise-wide 5-year Capital Investment Plan. • Continue pro-active change management to foster a collaborative culture by enhancing collaborative skills of personnel resources from front line air traffic facilities to senior levels between ATO management and labor union leadership. • Deliver and measure progress on the ATO's FY18 Business plan. • Manage $7.5 billion of ATO funds for payroll and operations. • Provide ATO budget formulation, presentation, and execution services in support of FY18, FY19, and FY20 budgets. • Support Agency small business goals.

Program Service Reductions (-$38.8 million) encompasses all programmatic cost efficiencies within ATO. Cost efficiencies in contract support services will be achieved by utilizing procurement vehicles that enable multiple tasks to be performed within a single contract, and streamlining and standardizing the service acquisition process. Travel will be reevaluated with a goal of reducing non-mission critical travel as well as the frequency and number of personnel supporting mission critical travel. We are also exploring the way in which we will review internal policies and procedures for acquiring supplies across the agency, including the overhead rates associated with procuring parts for NAS systems and equipment.

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 services. Air traffic controller and technician candidates must continue to enter the pipeline so that they are trained and certified prior to supporting the NAS. Management Services develops staffing strategies and plans, selects recruits, and places candidates through our FAA Academy in Oklahoma City, OK or at our Air Traffic facilities thorough the U.S. and territories.

Management Services works to create a comprehensive training approach to ensure ATO employees have the right competencies and skills for current and future work. 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.

Federal Aviation Administration Safety Workforce New Hires

	FY 2015 Actual	FY 2016 Actual	FY 2017 Actual to Date	FY 2017 Planned	FY 2018 Planned
Air Traffic Controllers	1,345	1,680	823	1,781	1,701
Technicians	292	348	107	360	360

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

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

FY 2018 – Program Management Organization – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	99,117	94,391	93,902	-489
Program Costs	652,337	746,062	768,518	22,456
Total	**$751,454**	**$840,453**	**$862,420**	**$21,967**
FTE	**576**	**556**	**540**	**-16**

FAA's Program Management Organization (PMO) request is $862,419,392 and 528 FTP / 540 FTE. It provides $491,006 for the annualized cost of the FY 2017 pay increase, $1,345,052 for the FY 2018 pay raise, -$2,325,795 for Workforce Reduction through Attrition, $24,456,000 for FY 2017 Transition to Operations and Maintenance (TOM) for new systems entering the NAS, and -$2,000,000 SWIM Cost Savings.

What is this Program and Why is it Necessary?

The ATO handles 26,775 scheduled passenger flights per day at US airports and helps transport over 946 million passengers per year; a vital part of the Nation's economy. In total, the ATO handles 44,000 IFR (Instrument Flight Rules) flights per day, and manages 145,703 operations (including departures, arrivals and over-flights) per day at FAA and contract towers. FAA data shows that civil aviation accounted for over $1.6 trillion in total economic activity, supporting 5.1 percent of U.S. Gross Domestic Product. Earning over $446.8 billion a year, 10.6 million people are employed in aviation-related fields.

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 was created after a comprehensive look at whether the agency was positioned strategically for success as we implement NextGen. The study, known as Foundation for Success, examined how our internal structures and processes could be improved to support NextGen. It was determined that better collaboration across lines of business would help us advance our initiatives more seamlessly and effectively.

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. We maintain approximately 8,500 pieces of equipment at nearly 67,000 facilities. Headquarters and Technical Center employees are responsible for sustainment management, engineering, production, logistics, testing, training, and systems and procedures implementation. Since the mid-1990s, we have fielded modern air traffic control, communications, display, and weather systems for controller use. Major acquisition programs such as En Route Automation Modernization (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 saving money for 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 2017, PMO's significant accomplishments will include:

Program Management Services	• Providing instructional services to support the Air Traffic Controller (ATC) projected hiring of 1781 new controllers to keep pace with expected attrition and traffic. • Converting the Air Traffic (AT) Basics course from an Instructor Led Training (ILT) course to a Web-Based Training (WBT) for delivery to ATCs. • Providing the data backbone for NextGen and supporting Collaborative Decision Making (CDM) and NextGen Advisory Council (NAC) initiatives by continuing the IT network necessary for efficient transmission of this data, as well as maintaining availability and preventing outages. • Providing modern, secure telecommunications services required by FAA modernization initiatives including NextGen-enabling programs such as System Wide Information System (SWIM), NAS Voice Switch (NVS), and DataComm. • Improving 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. • Continued sustainment of operational WAAS. Maintaining en route, Terminal, and oceanic air traffic systems in a state which will not degrade the services provided to the flying public. • Continue the national roll out of Ground Based Interval Management for Spacing (GIM-S).

What Does This Funding Level Support?

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 2018 submission will continue the transition to NextGen. 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.

By the end of FY 2018, PMO's anticipated accomplishments include:

Program Management Services	• Providing instructional services to support ATC hiring and keep pace with expected attrition and traffic growth. • Maintenance of the NOTAM Manager. • Providing the data backbone for NextGen and supporting CDM and NAC initiatives by continuing the IT network necessary for efficient transmission of this data, as well as maintaining availability and prevent outages. • Continued sustainment of operational WAAS. Maintain en route and oceanic air traffic systems in a state which will not degrade the services provided to the flying public. • Sustain terminal air traffic systems in a state which will not degrade the services provided to the flying public. • Continue national roll out of Ground Based Interval Management for Spacing (GIM-S).

Total requested Transition to Operations and Maintenance (TOM):

Programs	Amount	FTP	FTE
G05C.01-01, G05C.01-04 System Wide Information Management (SWIM)	10,929,000	-	-
A03.05-01 Integrated Display System – Replacement (IDSR)	4,271,000	-	-
G02S.01-01, G02S.03-01 Surveillance and Broadcast Services (SBS)	3,936,000	-	-

Programs	Amount	FTP	FTE
G02A.01-03/-06 Time Based Flow Management (TBFM) Work Package (WP) 2/3	1,951,000	-	-
G01A.01-01 ERAM FUSE – NextGen ABRR/PDRR/ERAM SWIM interface (Application Sustainment License)	2,423,000	-	-
A04.01-01Terminal Automation Modernization/Replacement (TAMR) Phase 1 G4 Technology Refresh (G4TR)	946,000	-	-
Total	**$24,456,000**	**-**	**-**

G05C.01-01, G05C.01-04 System Wide Information Management (SWIM) - SWIM is an information management and data sharing system for NextGen. In FY 2015, SWIM NAS Enterprise Messaging Services (NEMS) nodes were deployed in Oakland (ZOA), Anchorage (ZAN), New York (ZNY), Jacksonville (ZJX) and NEMS SWIM Flight data Publication Service (SFDPS) facilities in Salt Lake (SLC) and Atlanta (ATL). The Program also implemented enterprise messaging via the NEMS for new service providers and facilitated the transition by Segment 1 SWIM Implementing Programs (SIPs) to using the NEMS. This request for Segment 1 and 2a totals $10,929,000:

- $2,105,930 (1st Level Engineering/Maintenance) for Corrective Maintenance contract support for 24/7 repairs made on site as well as tune ups and preventative checkups of hardware. This includes associated travel, transportation, and supplies.
- $8,763,069 (2nd Level Engineering) for Second Level Maintenance contract support for 24/7 of hardware and software. This includes contract engineers to provide direct operational support via telephone technical assistance and/or on-site restoration efforts to resolve problems with the commissioned facilities. Their support also includes: design of modifications and performance of system optimization to improve the operational performance of the equipment, verification that proposed software changes made by the prime contractor do not impact the operational capabilities of the system, and development of test plans and procedures to conduct system level testing of the performance of the software upgrades.
- $60,000 (Infrastructure Support) for additional power costs.

A03.05-01 Integrated Display System (IDS) Replacement – IDS Replacement is a local and wide area network information dissemination and display system that consolidates information from several FAA and National Weather Service (NWS) weather subsystems onto a single display and distributes the data to air traffic controllers and airspace managers at TRACON and Tower (ATCTs) facilities. The IDS-R program not only provides for the replacement but also provides for enhanced capabilities of the legacy Integrated Display Systems-4 (IDS-4) with current technology. In FY 2015, 20 individual sites were installed. This request totals $4,271,000:

- $557,474 (1st Level Engineering/Maintenance) for contract support for direct field-level maintenance of hardware.
- $1,312,175 (2nd Level Engineering) for 24/7 support of hardware and software maintenance. This includes contract engineers to provide direct operational support via telephone technical assistance and/or on-site restoration efforts to resolve problems with the commissioned facilities. Their support also includes: design of modifications and performance of system optimization to improve the operational performance of the equipment, verification that proposed software changes made by the prime contractor do not impact the operational capabilities of the system, and development of test plans and procedures to conduct system level testing of the performance of the software upgrades.
- $1,027,026 (Telecommunications) for costs that have increased due to increased data requirements and redundancy.
- $440,567 (Integrated Logistics Support) for Commercial Depot Logistics Services (CDLS) for replenishment of spares.
- $933,361 (Physical Infrastructure Support) for increased power requirements.

G02S.01-01, G02S.03-01 Surveillance and Broadcast Services (SBS) – ADS-B is an advanced surveillance technology that provides highly accurate and comprehensive surveillance information. Recently installed components include: Surveillance and Broadcast Services Monitor (SBSM) which provides status monitoring for all equipment and services provided to the FAA by Exelis under the surveillance and Broadcast Services (SBS) contract (Dual redundancy at WJHTC and MMAC (OEX)), Service Availability Prediction Tool (SAPT) which is the system used to determine the anticipated availability of aircraft onboard equipment, Wide-Area Multilateration (WAM) system which is a surveillance system that supports critical air traffic control services (three systems – Colorado, Juneau, Alaska (INU), and Dual redundancy at MMAC (OEX)), and SBS which monitors aircraft avionics for compliance with the rule for SBS and provides reports to Flight Standards Service (AFS) for their compliance work. SBS baseline surveillance service also includes ADS-B coverage for the US portion of the Gulf of Mexico request, which supports expansion of three additional ADS-B radio stations in Mexico to provide full Gulf of Mexico coverage. Funding provides for First and Second Level Maintenance and Logistics Support. This request totals $3,936,000:

- $1,206,159 (1st Level Engineering/Maintenance) for 24/7 Corrective Maintenance contract support for repairs, tune ups, and checkups for the new facilities and services commissioned in FY 2015. This includes increased travel and transportation costs for these new locations.
- $2,610,277 (2nd Level Engineering) for 24/7 maintenance contract support of hardware and software. This includes contract engineers to provide direct operational support via telephone technical assistance and/or on-site restoration efforts to resolve problems with the commissioned facilities. Their support also includes: design of modifications and performance of system optimization to improve the operational performance of the equipment, verification that proposed software changes made by the prime contractor do not impact the operational capabilities of the system, and development of test plans and procedures to conduct system level testing of the performance of the software upgrades.
- $120,000 (Integrated Logistics Support) for activities and replenishment spares to support all fielded SBS systems. This includes ordering, replenishing, exchanging, receiving, tracking, cataloging, and inventory management of replenishment spares needed in order to operate and maintain the SBS systems at both the site, and depot levels.

G02A.01-03/-06 Time Based Flow Management (TBFM) - TBFM WP3 will implement additional NextGen concepts, such as Terminal Spacing and Sequencing (TSS), which provides efficient sequencing and runway assignment by extending time based metering to the runway and expansion of the Integrated Departure/Arrival Capability (IDAC). In FY 2015, IDAC has been installed at 5 ARTCCs: Los Angeles (ZLA), Indianapolis (ZID), Cleveland (ZOB), Washington, DC (ZDC), and Boston (ZBW). This request totals $1,951,000:

- $1,653,000 (2nd Level Engineering) for second level maintenance and associated travel, and supplies. This includes contract engineers to provide direct operational support via telephone technical assistance and/or on-site restoration efforts to resolve problems with the commissioned TBFM facilities. Their support also includes: design of modifications and performance of system optimization to improve the operational performance of the NAS TBFM facilities, verification that proposed software changes made by the prime contractor do not impact the operational capabilities of the system, and development of test plans and procedures to conduct system level testing of the performance of the software upgrades.
- $298,000 (Telecommunications) for costs for the IDAC and TSS services has increased due to increased data requirements and redundancy.

G01A.01-01 En Route Automation Modernization (ERAM) FUSE – NextGen ABRR/PDRR/ERAM SWIM Interface (Application Sustainment and License) – This is a NextGen CATM portfolio initiative which required modifications to hardware and software in both ERAM and TFMS system. The ERAM SWIM interface was developed to disseminate PreDeparture Reroute (PDRR) and Airborne Reroute (ABRR) information from the Traffic Flow Management system (TFMS) to ARTCCs. When Air traffic controllers change the routes of aircraft due to weather it changes the aircrafts flight plan. When this is a last minute change to the flight plan the information needs to be shared throughout the NAS. The SWIM system can communicate these changes, but because ERAM and TFMS run on different software languages it requires software to translate into both software languages. The interface was placed in service at 20 ARTCC sites in FY 2015. The primary interface uses SOA application "Redhat Fuse" software. The SWIM program office, under the Site

Implementing Program (SIP) paid for the SW development and FUSE licenses from FY 2013 to FY 2016. This system is not replacing an existing system, but is an enhancement to the current system. This request totals $2,423,000:

- $523,000 (2nd Level Engineering) for second level maintenance providing SWIM interface with ERAM and TFMS facilities. This includes contract engineers to provide direct operational support via telephone technical assistance and/or on-site restoration efforts to resolve problems with the commissioned facilities. Their support also includes: design of modifications and performance of system optimization to improve the operational performance of the equipment, verification that proposed software changes made by the prime contractor do not impact the operational capabilities of the system, and development of test plans and procedures to conduct system level testing of the performance of the software upgrades.
- $1,900,000 (Physical Infrastructure Support) for increased costs for "Redhat Fuse" license and version upgrades and hardware logistics costs.

A04.01-01 Terminal Automation Modernization/Replacement (TAMR) Phase 1 G4 Technology Refresh (G4TR) – The current scope of the TAMR Phase 1 program is to technologically refresh and enhance systems already deployed. The Terminal Automation System (STARS) has been deployed at some locations for years. The current Air traffic controller workstation is called a G1 which is being replaced by G4 work stations. The G4 workstations will have increased capabilities. The modernization will also be less likely to fail due to the creation more redundant backups. One of the backups is a completely redundant telephone network for each G4 workstation. Eight sites were upgraded in FY 2015. These sites were Seattle (S46), New Orleans (MSY), Tampa (TPA), Salt Lake (S56), Ft. Lauderdale (FXE), Miami (MIA), Philadelphia (PHL), and Cleveland (CLE). This increases the leased telecommunications costs from that of the original system.

- $946,000 (Telecommunications) for increased costs associated with separate wiring requirements for G-4 backup redundancy for systems at the 6 facilities replaced in FY 2015.

SWIM (-$2 million) is an advanced technology data sharing program that turns NAS data into useful information for aviation stakeholders. In FY 2018, FAA will add fewer new users (on-ramping) to the SWIM infrastructure. Some airlines that are in the pipeline to be connected to the SWIM portal will be impacted.

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.

The FAA will undertake groundbreaking system enhancements and improvements in the upcoming years. A sampling of these system implementations is ERAM, STARS/TAMR, ADS-B, and DataComm. Implementation of these systems will prepare the NAS and American public to fully utilize the technological advances provided by NextGen. NextGen will improve the safety of the NAS by providing near real-time flight data information, reduced flight times, better communications channels, and more accurate flight tracking. The PMO provides the program management expertise to consistently and effectively implement these programs. Through PMO leadership, coordination and direction, the American public will begin to take advantage of the benefits of NextGen.

Detailed Justification for the - Vice President Flight Program Operations, AJF

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

FY 2018 – Flight Program Operations – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses		34,747	40,689	5,942
Program Costs		53,109	67,292	14,183
Total		**$87,856**	**$107,981**	**$20,125**
FTE		**314**	**314**	**-**

What is this Program and Why is it Necessary?

The FY 2018 budget proposes the creation of a new service unit under the ATO to consolidate six flight programs that currently operate under multiple Lines of Businesses and Staff Offices across the FAA that perform varied missions. The request transfers all resources (including staff) associated with FAA flight program operations out of the ATO Technical Operations ($92,759,922, 246 FTP including a transfer of 34 FTP from the Franchise Fund), Office of Aviation Safety ($14,407,000, 30 FTP, 30 FTE) and NextGen Office ($512,000, 4 FTP, 4FTE) organizations.

The ATO handles 26,775 scheduled passenger flights per day at US airports and helps transport over 946 million passengers per year; a vital part of the Nation's economy. In total, the ATO handles 44,000 IFR (Instrument Flight Rules) flights per day, and manages 145,703 operations (including departures, arrivals and over-flights) per day at FAA and contract towers. FAA data shows that civil aviation accounted for over $1.6 trillion in total economic activity, supporting 5.1 percent of U.S. Gross Domestic Product. Earning over $446.8 billion a year, 10.6 million people are employed in aviation-related fields.

ATO relies on numerous programs to maintain the safety and efficiency of the current system and ensure its viability well into the future.

The Flight Program Operations is responsible for all aspects of flight program safety, administration, operations, training, and maintenance. The FAA operates and maintains 46 owned/exclusive-use leased aircraft performing four primary missions: aviation safety training (currency and proficiency for AVS pilots); flight inspection of airspace infrastructure; and research, development, test and evaluation (RDT&E); and transportation (disaster/emergency and National Transportation Safety Board (NTSB) Go Team response). Flight program consolidation will realign employees, aircraft, and resources from the following legacy flight programs: Flight Inspection Flight Program (AJW-3), Washington Flight Program (AJW-36), William J. Hughes Technical Center (WJHTC) Flight Program (ANG-E17), and AFS Flight Program (AFS-60) into the new Flight Program Operations organization, resulting in a single FAA Flight Program. Flight Program Operations is also the sole provider of flight program services for ATO and Office of Aviation Safety (AVS) participants, as well as internal and external customers (including the NextGen Office (ANG)).

The Flight Program Operations organization is structured around **five** functional areas:

Flight Program Business Management, which develops and implements policies, programs, processes, and procedures governing administrative, fiscal, and human resource management and acquisition support including but not limited to: capital investments, training requirements, staffing, travel, budget, program planning and internal/external reporting requirements for the FAA Flight Program. Flight program project management personnel also coordinate requirements with internal and external customers.

Aviation Safety Training, which provides currency/proficiency and training services to Office of Aviation Safety (AVS) participants in the FAA Flight Program. Aviation Safety Training is also responsible for administering the aircraft rental program and maintaining crewmember records for AVS participants in the FAA Flight Program.

Aircraft Operations, which supports flight operations in FAA-owned and exclusive-use leased aircraft in accordance with Title 14 of the Code of Federal Regulations (14 CFR), federal directives, and the Flight Program Operations Air Operator/Air Carrier Certificate(s). Flight Program Operations missions include: flight inspection; proficiency, qualification, and standardization (PQ&S); recent flight experience (currency); research, development, test and evaluation (RDT&E); support/logistics; training; and transportation.

Aircraft Maintenance and Engineering, which provides maintenance services in accordance with 14 CFR, federal directives, and operating and repair station certificate(s) held by the Flight Program Operations organization.

Flight Program Safety, which administers and executes the Flight Program Operations safety management system to include all flight and ground safety programs (e.g., aviation safety action program (ASAP), environmental management system, flight operational quality assurance (FOQA), occupational safety and health (OSH) program).

The Flight Program Operations organization centralizes the authority and responsibility for operating the Agency's aircraft - owned and leased [/rented] - to enhance the safety and oversight of the operation. By consolidating flight program missions into a single operations organization, the ATO is responsible for all aspects of flight program safety, administration, operations, training, and maintenance. In addition, all FAA flight program regulatory oversight functions (including oversight of 41 CFR 102-33) are consolidated in a single oversight office within the AVS LOB.

The FAA performs four primary missions supported by a centralized Flight Control Team:

Aviation Safety Training is responsible for providing formal training and currency/proficiency services to Flight Standards Service (AFS) participants, Aircraft Certification Service (AIR) participants, and FAA Academy participants in the FAA Flight Program. These Office of Aviation Safety (AVS) participants require Flight Program Operations services in order to become or remain qualified and/or current to operate FAA aircraft in accordance with AFS or AIR requirements to perform their primary job duties in a proponent/applicant aircraft. Flight Program Operations personnel, including contract flight instructors, assigned to the Aviation Safety Training missions are based at Fort Worth Alliance Airport (AFW). In addition to operations conducted at the AFW Service Center in FAA-owned King Air C90GTi aircraft and a fleet of leased aircraft, aircraft are rented across the country for AFS and AIR participants.

Flight Inspection ensures the integrity of instrument approaches and airway procedures that constitute our National Airspace System (NAS) infrastructure and the agency's international commitments. Flight Program Operations accomplishes this mission through the airborne inspection of all space and ground-based instrument flight procedures and the validation of electronic signals in space transmitted from ground navigation systems. Flight Program Operations also performs inspections at Department of Defense (DoD) navigational facilities designated as essential to the defense of the United States both foreign and domestic. Crewmembers at 5 flight inspection field offices (Anchorage, AK; Atlanta, GA; Atlantic City, NJ; Battle Creek, MI; Oklahoma City, OK; and Sacramento, CA) support the Flight Inspection mission.

Research, Development, Test & Evaluation (RDT&E) conducts flights directly related to research, development, test, and evaluation of new electronic aids, air traffic procedures, aircraft improvement, and aviation medical research.. Crewmembers assigned to the RDT&E mission are based at the William J. Hughes Technical Center at Atlantic City International Airport (ACY). The NextGen Office (ANG), through the Laboratory Services Division, is the primary external customer that uses RDT&E services.

Transportation is performed to accomplish required official FAA responsibilities in times of emergency or disaster, as well as support the National Transportation Safety Board (NTSB) in carrying out its duties. Flight Program Operations also serves the transportation needs of Department of Transportation (DOT) and FAA senior executives. In addition, Flight Program Operations supports other federal agencies under reimbursable agreements, including the Department of Energy (DOE), Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA) and Transportation Security Administration (TSA). Crewmembers assigned to the Transportation mission are based at Ronald Reagan Washington National Airport (DCA), Hangar 6.

The Flight Control Team supports all FAA Flight Program participants from two locations:

> The OKC Service Center is located at the Mike Monroney Aeronautical Center (MMAC). It is a 24/7 operation. The OKC Service Center primarily supports Aircraft Operations flights, but provides back-up support for Aviation Safety Training flights when the AFW Service Center is not staffed.
>
> The AFW Service Center is staffed during normal business hours on weekdays, except federal holidays. The AFW Service Center primarily supports Aviation Safety Training flights, but may provide back-up support for the OKC Service Center.

What Does This Funding Level Support?

Funding will provide Flight Inspection of NAS facilities and DOD facilities, initial and recurring aviation safety training to FAA Aviation Safety Inspectors in order to perform their primary job duties, and support for the FAA's research and NextGen initiatives.

In FY 2015, a total of 12,926 flight inspections were conducted of existing ground-based navigational aids and existing IFPs; 1,107 had reportable discrepancies. This equates to 8.6% of published IFPs and associated ground-based navigational aids requiring further attention. A total of 2,496 IFPs required flight inspection in order to publish a new or amended flight procedure. The results of those flight inspections required 431 IFPs to be adjusted or were found to be unsatisfactory. Of the new or amended IFPs, 17.3% required correction and thereby avoided potentially unsafe IFPs from being published.

Flight inspection is a key component of FAA's safety and 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. NextGen initiatives will be achieved through Performance-Based Navigation (e.g., RNP/RNAV), Augmentation System Navigation (e.g., SBAS/WAAS and GBAS/LAAS), and Surveillance Systems (e.g., ADS-B, WAM, ASDE-X).

The **training** mission ensures that formal training and currency/proficiency services are provided to Flight Standards Service (AFS) participants, Aircraft Certification Service (AIR) participants, and FAA Academy participants. Participants are required to become or remain qualified and/or current to operate FAA aircraft in accordance with AFS or AIR requirements and to perform their primary safety job duties.

The FAA's **transportation** mission supports disaster/emergency response for the FAA and National Transportation Safety Board (NTSB), as well as transportation for DOT and agency officials, and reimbursable transportation to other Federal agencies on official business. Flight inspection is required for NAS maintenance and restorals to ensure FAA navigational systems, facilities, and tools are sound and operating according to specifications. The Agency must meet its responsibilities to Department of Defense (DOD) worldwide flight inspection requirements and transportation requirements of the Secretary of Transportation and NTSB.

The **RDT&E** mission serves many customers throughout the FAA with airborne evaluations. The ability to conduct airborne evaluations enables the FAA to evaluate new concepts and programs while operating in the NAS using an accurately replicated operational environment. This increases the accuracy and reliability of the data used to develop new programs and helps critical acquisition programs maintain cost and schedule targets, and improves the overall operational efficiency of the agency.

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

The Flight Program consolidation will leverage resources, address fleet composition, create standardization and provide synergy and efficiencies across the flight operations missions. Consolidation activities require safety improvements consistent with safety management system (SMS) principles; a clear line of delegation for operational control starting with Flight Program Executive; a single flight control system consistent with FAA expectation of industry operators; and standardization for all FAA aircraft at (or equivalent to) the highest regulatory requirements under 14 CFR for industry operators with similar size, scope, and complexity of operations.

The Flight Program Operations (AJW) organization supports various programs and projects and contributes to the user benefits of safety and flight efficiency. Without the flight inspection mission, FAA could not validate the NAS and find potential safety issues prior to the publication of new Instrument Flight Procedures (IFPs) or ensure the existing NAS infrastructure remains within established specifications.

ATO Explanation of Funding Changes

	Dollars ($000)	FTE
Air Traffic Organization	**$912**	**-87**
Overview: For FY 2018, the Air Traffic Organization (ATO) requests $7,491,938,000 and 29,519 FTEs to meet its mission. The FY 2018 request level reflects adjustments to base, other changes, discretionary adjustments and base transfers. This represents an increase of $912,000 over the FY 2017 level.		
Adjustments to Base	**$132,766**	**-**
FY 2018 Pay Raises: 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 1.9 percent.	77,760	
Annualization of FY 2017 Pay Raises: This increase is required to provide for the remaining quarter of the FY 2016 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 1.0 percent.	28,386	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **System Wide Information Management (SWIM)** – SWIM is an information management and data sharing system for NEXGEN. In FY 2015, SWIM NAS Enterprise Messaging Services (NEMS) nodes were deployed in Anchorage (ZAN), Oakland (ZOA), Jacksonville (ZJX), and New York (ZNY) Centers and NEMS SWIM Flight data Publication Service (SFDPS) facilities in Salt Lake City (SLC) and Atlanta (ATL). The program also implemented enterprise messaging via the NEMS for new service providers and facilitated the transition by Segment 1 SIPs to using the NEMS. Funds will provide Segment 1 and 2a, with first and second level engineering support, and physical infrastructure support.	10,929	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Terminal Automation Modernization/Replacement (TAMR) Phase 1 G4 Technology Refresh (G4TR)** – The current scope of the TAMR Phase 1 program is to technologically refresh and enhance systems already deployed. In FY 2015, eight sites were upgraded: Seattle (S46), New Orleans (MSY), Tampa (TPA), Salt Lake (S56), Fort Lauderdale (FXE), Miami (MIA), Philadelphia (PHL), and Cleveland (CLE). The funding request provides for increased telecommunication costs because of a separate wiring requirement (G-4 backup for redundancy).	946	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Integrated Display System Replacement (IDS-R)** – The IDS-R program provides for the replacement of the legacy integrated Display systems-4 (IDS-4) with current technology. In FY 2015, 20 individual sites were installed. Funding provides for first and second level engineering, telecommunication, logistics and physical infrastructure support.	4,271	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Surveillance and Broadcast Services (SBS)** – ADS-B is an advanced surveillance technology that provides highly accurate and comprehensive surveillance information. In FY 2015, the following components were installed: Surveillance and Broadcast Services Monitor (SBSM), Service Availability Prediction Tool (SAPT), Wide-Area Multilateration (WAM), and Compliance Monitor (SBS). The funding request provides first and second level engineering and logistics support.	3,936	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Time Based Flow Management (TBFM) Work Package (WP) 2/3** – TBFM WP3 will implement additional NextGen concepts, such as, Terminal Spacing and Sequencing (TSS), which provides efficient sequencing and runway assignment by extending time based	1,951	

	Dollars ($000)	FTE
metering to the runway and expansion of the Integrated Departure/Arrival Capability (IDAC). In FY 2015, IDAC was installed at 5 ARTCCs: Los Angeles (LAX), Indianapolis (ZID), Cleveland (ZOB), Washington (ZDC), and Boston (ZBW). The funding request provides for second level engineering and telecommunications support.		
Transition from Facilities & Equipment (F&E) to Operations (Ops): **ERAM FUSE – NextGen ABRR/PDRR/ERAM SWIM Interface** The ERAM SWIM interface was developed to disseminate pre departure and airborne reroute (ABRR) information from the traffic flow management system (TFMS) to ARTCCs. The interface was placed in service at 20 ARTCC sites in FY 2015. The funding request will provides for second level engineering and maintenance support, training, licenses, version upgrades, physical infrastructure and logistics support.	2,423	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Mobile Assets Management Program (MAMP)** – The Mobile Assets Management Program (MAMP) provides for the continuity, restoration, and/or augmentation of NAS operations at FAA operational facilities. One Deployable Air Traffic Control Facility (DATCF) was deployed and made available for service in FY 2015. The funding request provides for first and second level engineering, training, logistics and physical infrastructure support.	817	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Runway Status Lights (RWSL)** — Runway Status Lights 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. Six locations: Las Vegas (LAS), Minneapolis (MSP), Cleveland (CLT), Ft. Lauderdale (FLL), Detroit (DTW), and New York were installed and achieved operational readiness in FY 2015. Funding provides for second level engineering, logistics support, and physical infrastructure.	1,418	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Facility Security Risk Management (FSRM)**— The Facility Security Risk Management (FSRM) 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 funding requested will provide for the ongoing operation and maintenance of the physical infrastructure that supports the 87 FSRM Access Control Security Systems installed in FY 2015.	718	
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.	-789	
Other Changes	**-$146,537**	**-152**
Workforce Reduction Through Attrition: Restricted hiring to achieve savings through attrition.	- 22,874	-152
CONUS Flight Service Stations: Is a plan to modify the scope/scale of this program by encouraging users to utilize more automated, internet provided services, which will not impact current levels of safety. The reduced dependency on direct person to person interaction would result in significant cost efficiencies. We will discontinue some of the services provided by the Flight Service Stations (FSS), reducing the need for pilot-to-specialist interaction from five fixed locations	- 25,000	

	Dollars ($000)	FTE
(Prescott, AZ; Fort Worth, TX; Ashburn, VA; Raleigh, NC; and Miami, FL).		
Contract Weather Savings: Contract Weather Observer (CWO) savings is an effort to streamline the CWO program to achieve operational cost efficiencies. Airports currently serviced by CWO-provided weather will transition to Limited Aviation Weather Reporting Station (LAWRS) controller provided weather observations.	- 50,000	
Academy Savings: Savings will be realized through a reduction in academy travel costs at the Mike Monroney Aeronautical Center, based on the lower staffing levels expected from hiring restrictions in the non-exempt workforce.	- 4,358	
Program Service Reduction: Air Traffic Organization (ATO) will achieve efficiencies through reductions in various programmatic areas (contracts, travel, equipment, supplies, etc.)	- 38,805	
SWIM: Is an advanced technology data sharing program that turns NAS data into useful information for aviation stakeholders. The FAA will achieve cost reductions by adding fewer new users (on-ramping) to the SWIM infrastructure.	- 2,000	
PERTI: Plan, Execute, Review, Train Improve (PERTI) will be conducted to provide the ATO with multi-disciplinary support, processes, and analytics to improve NAS Performance. The processes and procedures driven by data analysis and operational engagement will be implemented in FY 2018 in an effort to achieve cost reductions.	- 3,500	
Base Transfers	**$14,683**	**65**
FY 2017 Flight Standard Services Staffing (ATO to AVS): This request transfers -$189K and 1FTP/1FTE from the Air Traffic Organization, Mission Support Services (ATO/AJV) to Aviation Safety, Flight Standard Services (AVS/AFS).	-189	-1
FY 2017 Security and Hazardous Materials Safety Staffing (ATO to ASH): This request transfers -$92K and 1FTP/1FTE from the Air Traffic Organization, Technical Operations Services (ATO/AJW) to the Office of Security and Hazardous Materials Safety (ASH).	-92	-1
FY 2017 Civil Rights Staffing (ATO to ACR): This request transfers -$257K and 1FTP/1FTE from the Air Traffic Organization, Technical Operations Services (ATO/AJW) to the Office of Civil Rights (ACR).	-257	-1
Flight Program Operations (AVS, ANG to ATO): This request transfers $15.2 million and 34FTP/34FTE from the Aviation Safety Organization, AVS (30 FTP/FTE) & NextGen and Operations, ANG (4 FTE/FTP) to the Air Traffic Organization, ATO. In addition 34FTP/34FTE transfers from the ATO Franchise Fund account into the ATO Operations account.	15,221	68

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 2016

FY 1992	15,147	FY 2001	15,223	FY 2010	15,696	FY 2019 Req.	14,364
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	14,143		
FY 1998	14,966	FY 2007	14,874	FY 2016	14,156		
FY 1999	15,153	FY 2008	15,381	FY 2017 Req.	14,271		
FY 2000	15,153	FY 2009	15,770	FY 2018 Req.	14,462		

System Maintenance Overtime

	FY 2016 Actual	FY 2017 Estimated	FY 2018 Request
Field Maintenance			
Hours	271	245	252
Amount	18,102	16,358	16,781
Program and Technical Support			
Hours	38	30	30
Amount	3,164	2,370	2,432
Total			
Hours	309	277	284
Amount	21,266	18,728	19,213

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AVIATION SAFETY (AVS)

Aviation Safety Organization (AVS)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$1,256,019**	**7,406**	**125**	**7,329**
Adjustments to Base	**$31,271**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	15,510			
Annualization of FY 2017 Pay Raise 2.1%	5,472			
FY 2017 Transition from F&E to OPS	9,915			
Working Capital Fund	374			
Other Changes	**-$21,789**	**-111**	**-75**	**-56**
Workforce Reduction Through Attrition	-8,326	-111		-56
AVS Savings Target	-13,463			
Staffing Adjustment to Right Size			-75	
Discretionary Adjustments	**$7,000**	**0**	**0**	**0**
UAS Requirements	7,000			
Base Transfers	**-$14,520**	**-29**	**0**	**-29**
FY 2017 Flight Standard Services Staffing	189	1		1
Flight Program Operations	-14,709	-30		-30
FY 2018 Request	**$1,257,981**	**7,266**	**50**	**7,244**

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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 $1,257,981,000 and 7,244 full-time equivalents (FTEs) allows for Aviation Safety (AVS) to provide core services of certification, production approval, and continued airworthiness of aircraft as well as the certification of pilots, mechanics, and others in safety-related positions; expand Unmanned Aircraft System (UAS) integration into the National Airspace System (NAS); and enhance safety data reporting capabilities through increased data sources. The request provides an adjustment to base of $15,510,000 for the annualized cost of the FY 2017 pay increase, $5,472,000 for the 2018 pay raise, $9,915,000 for the FY 2017 Transition to Operations and Maintenance (TOM) costs, and $374,000 for Working Capital Fund. Other changes include -$8,326,000 for Workforce Reduction through Attrition, -$13,463,000 for implementation of staffing and funding efficiencies, and $7,000,000 for Unmanned Aircraft System (UAS) requirements. The funding request includes base transfers of one position and $189,000 from Air Traffic Organization (ATO) into AVS and the AVS Flight Program into the ATO ($14,709,000 and 30 positions). Hiring will be restricted for the non-exempt employees identified under the initial hiring policies developed in FY 2017. This exempts safety personnel, which includes safety inspectors within the Aviation Safety organization.

What is this program and why is it necessary?

AVS is responsible for setting the safety standards for every product, person, and organization that produces and operates aircraft in the NAS.

AVS provides the following services:

- Surveillance and oversight of existing certificate holders.
- Development and establishment of safety and certification standards for the civil aviation industry.
- Surveillance and oversight of air carriers, general aviation (GA) operators, repair stations, manufacturers and airman.
- Issuance or denial of certifications.
- Ongoing and wide-ranging transformation of the NAS encompassed by NextGen.

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

AVS has eight services and offices:

Flight Standards (AFS): Flight Standards Service promotes safety in air transportation by setting the standards for certification and oversight of airmen, air operators, air agencies, and designees as well as safety of flight of civil aircraft in air commerce; sets regulations and standards that consider the air carrier's duty to operate in the public interest at the highest possible degree of safety; sets regulations and standards for other air commerce, air agencies, and airmen at the appropriate level of safety in the public interest; accomplishes certification, inspections, surveillance, investigation, and enforcement activities; and manages the system for registry of civil aircraft and all official airmen records.

Aircraft Certification (AIR): Aircraft Certification Service develops and administers safety standards governing the design, production and airworthiness of civil aeronautical products; oversees design, production, and airworthiness certification programs to ensure compliance with prescribed safety standards; establishes and maintains a Safety Performance Management (SPM) system for continued operational safety of aircraft; provides oversight of approval holders, designees, and delegated organizations; and works with aviation authorities, manufacturers, and other stakeholders to help them improve safety in the international air transportation system.

Aerospace Medicine (AAM): Office of Aerospace Medicine oversees a broad range of medical programs and services for both the domestic and international aviation communities; performs medical certification of airmen; inspects and oversees aviation industry drug and alcohol testing programs; performs medical clearance of air traffic control specialists (ATCSs); oversees drug and alcohol testing of FAA employees with safety-sensitive jobs and jobs requiring security clearances; performs aerospace medicine and human factors research; manages employee occupational health and health awareness programs; develops and provides airman training in physiological and survival training to GA and commercial aviation airmen through on-site and sponsoring training events at aviation-related events and performs designee oversight of aviation medical examiners (AMEs).

Rulemaking (ARM): Office of Rulemaking manages FAA's rulemaking program, processes, and timelines; develops proposed and final rules; manages responses to petitions for rulemaking and for exemption from regulatory requirements; and oversees rulemaking advisory committees that provide advice and recommendations on aviation-related issues.

Accident Investigation & Prevention (AVP): Office of Accident Investigation and Prevention investigates aviation accidents and incidents to detect unsafe conditions and trends and to coordinate the corrective action process; investigates major or significant accidents and incidents to identify safety deficiencies and unsafe conditions and recommend policy; coordinates with the responsible FAA office for evaluation and corrective action; analyzes accident and incident data and other safety data to identify safety issues and trends; addresses National Transportation Safety Board (NTSB) and internal FAA Safety Recommendations; and leads Safety Management System (SMS) implementation efforts for FAA and AVS.

Air Traffic Safety Oversight (AOV): Air Traffic Safety Oversight Service conducts independent safety oversight of the Air Traffic Organization's (ATO) provisioning of air traffic services, using risk-based, data-supported surveillance methods. Surveillance approaches include audits, inspections, investigations, compliance, and approvals, acceptances, and concurrences. AOV staff monitors local air traffic services, processes, and procedures using safety risk standards, SMS principles, and certification/credentialing programs. AOV approves the ATO's SMS, monitors the ATO for compliance with its approved SMS, and reviews and approves the ATO's safety implementation actions and risk management strategies.

Unmanned Aircraft Systems Integration (AUS): Office of Unmanned Aircraft Systems Integration is responsible for facilitating the safe, efficient, and timely integration of UAS into the NAS; managing and coordinating international activities for UAS within FAA, aligning UAS international activities with foreign civil aviation authorities; supporting standards and policy development related to UAS projects, providing strategic planning and support for continued UAS Research and Development (RE&D).

Quality, Integration, and Executive Services (AQS): Office of Quality, Integration, and Executive Services provides executive oversight and direction of consolidated management support services for all of AVS; manages all phases of planning, financial management, IT liaison services, and administrative activities for the immediate office of the associate administrator; approves, oversees, and facilitates integration initiatives among the AVS services and offices; oversees the AVS Quality Management System (QMS); provides budget and labor distribution reporting management; and provides AVS training, planning, and human resource management.

What does this funding level support?

Public expectation is that the FAA will continuously reduce the risk of aviation incidents and accidents while enabling new technologies. This requested resource level will enable AVS to provide funding and staffing for continued operational safety, while reducing positions through attrition. AVS projects the need for additional safety staffing to meet growing demands for UAS operations, while continuing to expand delegation responsibilities to designees for future NAS growth. FAA/AVS forecast changes in the demand for non-UAS type certification design approvals required by applicants, production certificates provided to manufacturers, and supplier control audits conducted at manufacturers to remain relatively flat from FY 2016 to FY 2017. Analysis of Labor Distribution Reporting hours using the AVS Staffing Tool and Reporting System (ASTARS) shows forecasted safety work activities remaining relatively unchanged with the exception of UAS within the NAS. The most recent data also indicates that the time to complete certifications for the design of new aviation products and airworthiness directives issued to correct aircraft safety deficiencies remained relatively constant. The number of UAS aviation products requiring certification and approvals services is anticipated to expand within the systems, and complexity is anticipated to increase as new technologies are introduced. These factors are driving the need for additional resources for UAS integration into the NAS.

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

AVS will provide the American public safety and economic benefits by maintaining oversight of the NAS through data analysis techniques used for audits, surveillance, and certification of aircraft operators and production manufacturers, pilots, mechanics, and other safety related positions.

AVS will provide certification and integration services for newly designed and manufactured aviation products associated with UAS. The engineer and inspector resources will provide manufacturing and operational approvals of UAS technologies while maintaining safety oversight services within the NAS.

AVS will manage Risk-Based Decision Making (RBDM) through data analysis capabilities within the Hazard Tracking System and AVS Information, Analysis and Sharing (ASIAS) application based on evolution of SMS principles. Revised business processes and increased database information will enable the FAA to be proactive about safety and use SMS principles to make smarter, risk-based decisions throughout the agency, with industry and global stakeholders. The request will support RBDM policies and processes within the FAA, as well as support the use of SMS throughout the agency.

The AVS organizational structure is depicted in Figure 1 below:

Note: The AUS Office was established in Fiscal Year 2017.

Aviation Safety Organization (AVS) Budget Summary
($000)

What is the request and what funds are currently spent on the program?

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	1,042,424	1,088,493	1,096,826	8,333
Program Costs	215,987	167,526	161,155	-6,371
Total	**$1,258,411**	**$1,256,019**	**$1,257,981**	**$1,962**
FTE	**7,173**	**7,329**	**7,244**	**-85**

The request of $1,257,981,000 and 7,244 FTEs allows for AVS to provide core services of certification, production approval, and continued airworthiness of aircraft as well as the certification of pilots, mechanics, and others in safety-related positions; continue UAS integration into the NAS; and support safety data reporting capabilities. The request provides an adjustment to base of $15,510,000 for the annualized cost of the FY 2017 pay increase, $5,472,000 for the 2018 pay raise, $9,915,000 for the FY 2017 Transition to Operations and Maintenance (TOM) costs, and $374,000 for Working Capital Fund. Other changes include -$8,326,000 for Workforce Reduction through Attrition, -$13,463,000 for implementation of staffing and funding efficiencies, and $7,000,000 for Unmanned Aircraft System (UAS) requirements. The funding request realigns one position and $189,000 from Air Traffic Organization (ATO) into AVS and the AVS Flight Program into the ATO ($14,709,000 and 30 positions). Hiring will be restricted for the non-exempt employees identified under the initial hiring policies developed in FY 2017. This exempts safety personnel, which includes safety inspectors within the Aviation Safety organization.

Funding details for AVS's eight services and offices:

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Flight Standards Service	874,549	862,527	857,984	-4,543
Aircraft Certification Service	222,336	226,606	226,530	-76
Office of Aerospace Medicine	60,114	58,299	57,520	-779
Office of Rulemaking	6,368	6,275	6,205	-70
Air Traffic Safety Oversight Service	23,967	24,120	24,096	-24
Office of Accident Investigation & Prevention	25,713	24,673	23,383	-1,290
Office of Unmanned Aircraft Systems Integration	-	12,723	15,670	2,947
Office of Quality, Integration and Executive Services	45,364	40,796	46,593	5,797
Total	**$1,258,411**	**$1,256,019**	**$1,257,981**	**$1,962**

Discretionary Adjustments:

Program	Service Unit	Amount
Unmanned Aircraft System (UAS) Requirements	AUS, AFS, AIR, ARM	7,000
Total Discretionary Adjustments		**$7,000**

Transition to Operations and Maintenance in FY 2017:

Program	Service Unit	Amount
A25.02-01/02, Safety Approach for Safety Oversight (SASO)	AQS, AFS	7,663
A26.01-00, Aviation Safety Knowledge Management Environment (ASKME)	AQS, AIR	444
A17.01-02, Regulation and Certification Infrastructure for Safety System (RCISS)	AQS, AVS	1,808
Transition to Operations and Maintenance in FY 2017		**$9,915**

FY 2018 – Flight Standards Service (AFS)
($000)

What is the request and what funds are currently spent on the program?

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	737,585	767,276	773,210	5,934
Program Costs	136,964	95,251	84,774	-10,477
Total	**$874,549**	**$862,527**	**$857,984**	**-$4,543**
FTE	**5,174**	**5,273**	**5,206**	**-67**

The FY 2018 request of $857,984,000 and 5,206 FTEs allows AFS to provide 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. The request includes a base transfer increase in the amount of $189,000 for Flight Standard Services (1 FTE from Air Traffic Organization) and $1,325,000 funding for Unmanned Aircraft System (UAS) requirements. Current funds cover 8 regional offices, 79 flight standards district offices, 18 certificate management offices, 4 international field offices, and 5 aircraft evaluation group offices.

What is this program and why is it necessary?

AFS provides core services of certification, production approval, and continued airworthiness of aircraft as well as the certification of pilots, mechanics, and others in safety-related positions; expands UAS integration into the NAS; and enhances safety data reporting capabilities through increased data sources.

In FY 2018, AFS will develop policies, procedures, and approval processes to enable UAS operations; conduct and participate in Pilot Seminars and Flight Instructor Refresher Courses and Commercial Flight Instructor/Designated Pilot Examiner refresher courses at towered and non-towered airports; develop appropriate policy, procedural guidance, and certificate management programs for the emerging technologies needed to transition and operate in the NextGen environment; validate 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; establish the infrastructure necessary to oversee the implementation of SMS by 14 CFR Part 121 Air Carriers; integrate Safety Assurance System in all the field offices; formalize an AFS Internal Safety Assurance Program; and implement a secure FAA airman test delivery system that incorporates new technology and is supported by training and testing documents, which embraces NextGen concepts.

AFS FY 2017-2018 programs include: UAS, SAS, Air Carrier Training Aviation Rulemaking Committee, Airman Certification System Improvement, Activities from FAA Modernization and Reform Act, and Certification and Oversight of New Entrants.

Anticipated FY 2017 Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Flight Standards Service	• Developing policies, procedures, and approval processes to enable UAS operations • Delivering Pilot Seminars and Flight Instructor Refresher Courses and Commercial Flight Instructor/Designated Pilot Examiner refresher courses at towered and non-towered airports • Continuing to develop policy, procedural guidance, and certificate management programs for the emerging technologies needed to transition and operate in the NextGen environment • Evaluating effectiveness of initiatives, interventions, and recommendations implemented by the GA Loss of Control workgroup and the amateur-built flight standardization board to mitigate loss of control causes in GA • Continuing to develop the infrastructure necessary to oversee the implementation of SMS by 14 CFR Part 121 Air Carriers • Integrating SAS in all the field offices • Formalizing an AFS Internal Safety Assurance Program • Implementing a secure FAA airman test delivery system that incorporates new technology and is supported by training and testing documents, which embraces NextGen concepts

What does this funding level support?

AFS plays a vital role in 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.

In FY 2018 AFS plans to increase support for UAS integration into the NAS through oversight and surveillance services for approved aviation products.

Anticipated FY 2018 Accomplishments:

Function/Office	FY 2018 Anticipated Accomplishments
Flight Standards Service	• Conduct and participate in Pilot Seminars and Flight Instructor Refresher Courses and Commercial Flight Instructor/Designated Pilot Examiner refresher courses at towered/non-towered airports. • Validate 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. • Continue developing and implementing the infrastructure necessary to oversee the implementation of SMS by 14 CFR Part 121 Air Carriers while at the same time supporting the voluntary implementation of SMS by other CFR certificate holders. • Continue the integration Safety Assurance System (SAS) in all the field offices to include the SAS phase IIB project. • Develop a Flight Standards process for identifying national-level hazards and risk analysis to prioritize the use of resources and support risk mitigation and targeted surveillance plans • Acquire a secure FAA airman test delivery system that incorporates new technology and is supported by training and testing documents, which embraces NextGen concepts.

Total requested Discretionary Increase Requests:

Programs	Amount	FTP	FTE
Unmanned Aircraft System (UAS) Requirements	1,325,000		
Total	**$1,325,000**		

Unmanned Aircraft System (UAS) Requirements: Flight Standards is requesting $1,325,000 to support UAS access to the NAS through the implementation of three focus areas that expand the current exemption and Certificates of Authorization (COAs) processes into new areas. This increase supports the NAS Initiative to safely and efficiently incorporate new aviation products and users such as UAS. AVS will support the aviation industry's demand for aircraft, operator, and airmen certification services as well as grow for UAS products. New designs and products have been developed, and must be safely integrated into the NAS.

This program will allow for:

- More timely UAS registrations and operator certificates
- Greater access to data relating to UAS aircraft and operators entering the world of aviation

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

The programmatic approach outlined in the NAS Initiative includes adapting services and regulatory approaches in order to integrate these new operations into the NAS in a timely fashion and with the same level of safety and efficiency as other legacy operations. This request will support the planning for and subsequent processing of exemptions and COAs associated with the expanded UAS access to the NAS. The Registry is forecasted to process registration and recordation documents for approximately 10,000 aircraft in the UAS category and issue approximately 37,500 operator certificates over the next five years. There are also maintenance and renewal activities associated with the issuance of certificates for the airmen/operator.

FY 2018 – Aircraft Certification Service (AIR)
($000)

What is the request and what funds are currently spent on the program?

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	202,321	212,505	213,980	1,475
Program Costs	20,015	14,101	12,550	-1,551
Total	**$222,336**	**$226,606**	**$226,530**	**-$76**
FTE	**1,336**	**1,343**	**1,334**	**-9**

The FY 2018 request of $226,529,000 and 1,334 FTEs allows AIR to provide regulatory oversight for type, production, and airworthiness certification of civil aeronautical products and parts. The request includes a $725,000 increase for Unmanned Aircraft System (UAS) requirements. Current funds cover 14 Aircraft Certification Offices, 19 Manufacturing Inspection District Offices, 3 Manufacturing Inspection Satellite Offices, 1 Certificate Management Office, 2 Certificate Management Units, and 2 International Offices (Brussels, Shanghai).

What is this program and why is it necessary?

AIR's functions, which are essential to ensure the safety of the NAS, are 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; and investigating possible violations and initiating compliance and enforcement actions.

In FY 2018, AIR will support agency emerging technology initiatives by developing standards, policy, and guidance needed to transition and operate in the NextGen environment, conducting inspections, audits, surveillance, investigations, enforcement and certification activities related to aircraft manufacturers and suppliers.

AIR FY 2017-2018 programs include: FAA Modernization and Reform Activities under the Small Airplane Revitalization Act: Part 23 Rule and Part 21/SMS Rule; Organization Delegation Authorization (ODA) Improvements; Advancing our SMS; Globalization of the Aviation Manufacturing Industry; and Developing Advisory Guidance for Certification of UAS.

Anticipated FY 2017 Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Aircraft Certification Service	• Advancing rulemaking efforts to update regulations to incorporate safety management principles into the design and manufacturing environments • Updating 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 UAS • Encouraging 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 • Transitioning the existing fleet of piston-engine aircraft to unleaded fuel and enabling newly manufactured aircraft to be certificated with unleaded fuel • Evolving and optimizing our delegation system to reinforce a systems approach to safety

What does this funding level support?

AIR operations vital to aviation safety include promoting FAA Modernization and Reform activities under the Small Airplane Revitalization Act, developing the Part 23 and Part 21/SMS Rule, organizing ODA Improvements, implementing the Safety Continuum for other product types, advancing our SMS, globalizing the aviation manufacturing industry, and developing advisory guidance for certification of UAS.

Anticipated FY 2018 Accomplishments:

Function/Office	FY 2018 Anticipated Accomplishments
Aircraft Certification Service	• Establish a formal capability for planning and executing transformation of aircraft certification and oversight processes to achieve improvements in efficiency and effectiveness • Implement updated Part 23 rules leveraging industry standards to improve the certification, safety and cost of small airplanes • Continue to advance rulemaking efforts to update regulations to incorporate safety management principles into the design and manufacturing environments • Continue to update airworthiness standards, policies, and processes to reflect the safety continuum and enabling the proper introduction and oversight of safety enhancing technologies • Continue to develop standards, policy and guidance associated with UAS • Transition existing fleet of piston-engine aircraft to unleaded fuel and enable newly manufactured aircraft to be certificated with unleaded fuel • Continue to evolve and optimize our delegation system to reinforce a systems approach to safety, and to effectively leverage all available certification

	resources to reduce safety risks

Total Requested Discretionary Increase Requests:

Programs	Amount	FTP	FTE
Unmanned Aircraft System (UAS) Requirements	725,000		
Total	**$725,000**		

Unmanned Aircraft System (UAS) Requirements: Aircraft Certification Service is requesting $725,000 to guide development of standards and issuing policy and guidance associated with UAS. This request will support the planning for and subsequent processing of residual and incoming Section 333 exemptions, COA, type certifications, and experimental certificates associated with the expanded UAS access to the NAS. In addition, this request supports development and coordination of design, production, and airworthiness requirements, certification procedures, and international harmonization of FAA UAS certification activities. This program will allow for

- Visual Line of Sight operations in urban areas, planned Beyond Visual Line of Sight (BVLOS) operations in rural areas, and dynamic BVLOS operations in rural areas
- Continued development of UAS design approval process under the existing 21.17(b) special class type design regulations with its pathfinder project

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

The request provides for continued services for type, production and airworthiness certification of civil aeronautical products and parts. AIR is responsible for the establishment of safety standards and procedures governing the design, production and continued airworthiness of aircraft and aircraft parts. AIR provides the American public the engineering and manufacturing expertise to determine if an aircraft meets applicable standards and is safe to fly.

FY 2018 – Office of Aerospace Medicine (AAM)
($000)

What is the request and what funds are currently spent on the program?

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	47,194	47,551	47,955	404
Program Costs	12,920	10,748	9,565	-1,183
Total	**$60,114**	**$58,299**	**$57,520**	**-$779**
FTE	**370**	**383**	**377**	**-6**

The FY 2018 request of $57,520,000 and 377 FTEs allows AAM to provide a broad range of external and internal aviation safety programs related to aerospace medicine. Current funds cover the AAM headquarters staff, medical specialties personnel, drug abatement division, 9 regional offices, 4 medical field offices, and the Civil Aerospace Medical Institute (CAMI).

What is this Program and Why is it Necessary?

AAM provides advice and technical support for medical policies and standards, medical rulemaking, airman medical certification appeals, psychiatry; agency employee medical clearance appeals; manages the development, implementation, administration, and compliance monitoring of the aviation industry drug and alcohol testing programs; and supports a wide range of national programs and administrative activities within their geographical areas. At CAMI, AAM develops and manages a system for the medical examination and certification of U.S. civil airmen; conducts medical and related human factors research projects applicable to the FAA's mission; develops and administers aerospace medicine education programs; operates a medical clinic; provides occupational health programs for the Mike Monroney Aeronautical Center; and plans, develops, and administers basic and refresher designee AME training.

AAM FY 2017-2018 programs include: AME Assisted Special Issuance and Conditions AMEs Can Issue Program (CACI), Aerospace Medicine Safety Information System (AMSIS), AAM SMS, Medical Guidance for Effective Screening for Disqualifying Medical Conditions, and International Leadership in Aerospace Medicine.

Anticipated FY 2017 Accomplishments:

Function / Office	FY 2017 Anticipated Accomplishments
Office of Aerospace Medicine	• Leading the world and collaborating in the development of medical standards for pilots and Air Traffic Control Specialists (ATCS) • Expanding risk based approaches to determine the eligibility of airmen for medical certification and ATCSs for medical clearances • Developing appropriate medical protocols and reviewing complex medical cases to medically certify all applicants who can be safely qualified to fly • Managing and supporting nearly 3,000 designees that perform critical aviation medical examiner duties for the FAA • Issuing medical clearances to Air Traffic Controllers • Improving 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 • Managing the FAA internal substance abuse testing program • Overseeing the AME Training and Oversight program for designees • Providing critical physiological and survival training to thousands of GA and commercial pilots

What does this funding level support?

AAM is responsible for a broad range of external and internal aviation safety critical programs related to medicine. AAM leads the world in developing medical standards for pilots and ATCS; implements and manages systems to medically certify commercial and GA pilots; processes pilot medical certification and appeal cases, including special issuances for increasingly complex medical issues; manages medical clearance of ATCS; designates and overseeing AMEs; conducts compliance and enforcement inspections of aviation industry drug and alcohol testing programs; implements and overseeing drug and alcohol testing of FAA employees in safety critical and security jobs; and provides critical physiological and survival training to thousands of GA and commercial airmen.

Anticipated FY 2018 Accomplishments:

Function / Office	FY 2018 Anticipated Accomplishments
Office of Aerospace Medicine	AAM plans to fulfill the following endeavors based on the resources provided in FY 2018: • Lead the world and collaborating in the development of medical standards for pilots and Air Traffic Control Specialists (ATCS) • Continue to expand risk based approaches to determine the eligibility of airmen for medical certification and ATCSs for medical clearances • Continue to develop appropriate medical protocols and reviewing complex medical cases to medically certify all applicants who can be safely qualified to fly • Manage, train and support nearly 3,000 aviation medical examiner (AME) designees that perform critical duties for the FAA conducting medical examinations of professional and private aviators • Oversee the AME Training and Oversight program for designees in AVS DMS; training and managing International Region designee AMEs in 90 countries; training DOD US Military residents in aerospace medicine in civil aviation medicine • Conduct compliance and enforcement surveillance inspections of aviation industry employers that have DOT required employee drug and alcohol testing programs • Manage the FAA internal substance abuse testing program • Provide critical physiological and survival training to thousands of GA and commercial pilots

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

This request will support on-going safety requirements for airman and air traffic controller medical certification, surveillance of industry drug and alcohol programs, surveillance of Aerospace Medical Examiners (AMEs), delivery of aerospace medical education courses for airman and occupational safety and health management services for agency employees.

FY 2018 – Office of Rulemaking (ARM)
($000)

What is the request and what funds are currently spent on the program?

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	5,090	5,227	5,272	44
Program Costs	1,278	1,048	933	-115
Total	**$6,368**	**$6,275**	**$6,205**	**-71**
FTE	**39**	**35**	**35**	**-**

The FY 2018 request of $6,205,000 and 35 FTEs allows ARM to ensure FAA regulations are developed to improve safety levels according to approved processes and are completed within mandated timelines. Current ARM funds cover two divisions and a program analysis staff. The request also includes a $150,000 increase in funding for Unmanned Aircraft System (UAS) requirements.

What is this Program and Why is it Necessary?

ARM performs necessary rulemaking functions of developing, with the assistance of other internal stakeholders, FAA's rulemaking priorities for the current year and out-years; coordinates the development of rules with all internal and external stakeholders; processes petitions for rulemaking and petitions for exemption received from the aviation community; develops and implements improvements to critical FAA rulemaking and exemption processes and systems; and facilitates the ability of internal stakeholders to support such processes and systems.

ARM FY 2017-2018 programs include: Private Pilot Privileges Rule, UAS Rulemaking Initiatives, Part 23 Rule, Communication, Navigation and Surveillance Rule, International Regulatory Cooperation, and the Rulemaking Prioritization Program.

Anticipated FY 2017 Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Office of Rulemaking	• Improving the FAA's rulemaking program through emphasis on early stakeholder input and robust prioritization of potential rulemaking projects • Sending critical safety rules to the OST within 90 days of planned date • Processing 75 percent of exemption requests within 120 days and with an average processing time of under 90 days

What does this funding level support?

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, and 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 2018 Accomplishments:

Function/Office	FY 2018 Anticipated Accomplishments
Rulemaking	• Defining and prototyping improved rulemaking processes for early stakeholder involvement • Revising and aligning the FAA regulatory agenda with executive orders related to rulemaking

Total Requested Discretionary Increase Requests:

Programs	Amount	FTP	FTE
Unmanned Aircraft System (UAS) Requirements	150,000	-	-
Total	**$150,000**	**-**	**-**

Unmanned Aircraft System (UAS) Requirements: Office of Rulemaking is requesting $150,000 to support UAS access into the NAS through UAS Rulemaking Initiatives. This increase supports the safe and efficient incorporation of new users such as UAS and is one of the AOA Priorities. Processing petitions for rulemaking and petitions for exemption received from the aviation community. This program will allow ARM to:

- Further develop and implement improvements to critical FAA rulemaking and exemption processes and systems
- Address more timely UAS registrations and operator certificates
- Allow for greater access to data relating to UAS aircraft and operators entering the world of aviation

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

ARM maintains an extensive base of knowledge from processing UAS 333 exemptions which provide authorization for companies to operate UAS. With RBDM petition analyses, ARM discerns patterns in the requested operations, the aircraft, and the models of UAS on the market and uses a standardized process along with the conditions and limitations for each UAS exemption. With this process evolution ARM has taken the lead in UAS exemption processing for most new exemptions requests, which now require only a summary grant document, and, as a result, some 90 percent of UAS 333 petitions have been granted successfully.

FY 2018 – Office of Accident Investigation and Prevention (AVP)
($000)

What is the request and what funds are currently spent on the program?

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	11,709	12,014	12,116	102
Program Costs	14,004	12,659	11,267	-1,392
Total	**$25,713**	**$24,673**	**$23,383**	**-$1,290**
FTE	**69**	**67**	**66**	**-1**

The FY 2018 request of $23,383,000 and 66 FTEs provides analytical capabilities to identify risk affecting the entire air transportation system and industry. Current funding supports headquarters staff and 4 divisions.

What is this Program and Why is it Necessary?

AVP is the principal organization within the FAA with respect to aircraft accident investigation and all activities related to the NTSB. Its mission is to make air travel safer through investigation, data collection, risk analysis, and information sharing. AVP identifies corrective measures based on accident data and FAA/NTSB safety recommendations, coordinates FAA-wide participation in accidents and incident investigations, collects aviation safety data, identifies trends, and measures effectiveness of interventions, and leads agency efforts on RBDM and SMS.

AVP FY 2017-2018 programs include: Commercial Aviation Safety Team, GA Joint Steering Committee, Aviation Safety Information Analysis and Sharing (ASIAS), Risk Based Decision Making (RBDM), Safety Management Implementation for FAA and for AVS, and the Aviation Safety Research and Development Program.

Anticipated FY 2017 Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Office of Accident Investigation and Prevention	• 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 Aviation Safety Information and Sharing (ASIAS) Program. • Leading and managing RBDM and aligning the activities with the FAA Safety Management Systems (SMS), AVS SMS, and the U.S. State Safety Program (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 SRM and safety assurance processes including the deployment of an initial FAA level hazard tracking system • Promoting safety management implementation across the aviation system and working with ICAO and other CAA to ensure consistency internationally • Advancing accident investigation by using root cause analysis techniques in analyzing data in conjunction with activity surrounding major accident

What does this funding level support?

AVP leads agency efforts on RBDM, SMS and many other agency initiatives. AVP is responsible for analytical capabilities to identify risk affecting the entire air transportation system and industry and manages corrective measures based on accident data and FAA/NTSB safety recommendations. AVP also coordinates FAA-wide participation in accidents and incident investigations; and collects aviation safety data, to identify trends, and measure effectiveness of interventions. In addition, AVP promotes and facilitates government/industry safety teams to identify emerging risks and implementation of safety mitigation strategies. Many of these programs are reported and monitored by OMB and are required per agency policies, the proposed budget will be reduced and/or some eliminate capabilities.

Anticipated FY 2018 Accomplishments:

Function/Office	FY 2018 Anticipated Accomplishments
Office of Accident Investigation and Prevention	• Lead agency efforts to effectively address NTSB recommendations issued to the FAA • Lead agency efforts to effectively address FAA Safety recommendations • Continue to perform accident investigations at a reduced number, such as reducing most non-fatal air carrier investigations and eliminating some foreign investigations. Limiting the number of investigations impacts FAA's ability to quickly understand root causes of accidents and precursors and hinders our ability to discover potential critical safety issues that are exposed by foreign accident investigation authorities.

	• Collect and analyze aviation safety data while delaying migration of some elements of ASIAS from development to operations. There will also be the delay of critical upgrades to the architecture, reduced production of CAST and GAJSC safety metrics and the postponement of incorporating UAS and rotorcraft. • Facilitate government/industry safety teams to identify emerging system risk and implement risk mitigation strategies • Facilitate the continued maturation and evolution of the FAA's implementation of SMS and the U.S.SSP focusing on the effective use of SRM and safety assurance processes.

AVP leads agency efforts to effectively address NTSB recommendations issued to the FAA and FAA Safety recommendations, collects and analyzes aviation safety data at a national level and consolidate the data under ASIAS; leads and manages the initiative on RBDM and aligns the activities with the FAA SMS, AVS SMS, and the U.S. SSP; facilitates the continued maturation and evolution of the FAA's implementation of SMS and the U.S. SSP; focuses on the effective use of SRM and safety assurance processes; continues to promote SMS implementation across the aviation system and works with ICAO and other CAA to ensure consistency internationally; advances accident investigation by using root cause analysis techniques in analyzing data from major accident investigations; and leads government/industry efforts for the Commercial Aviation Safety Team and the GA Joint Steering Committee.

What benefits will be provided to the American public through this request?

This request supports the FAA's RBDM to make aviation safer and smarter by delivering advanced methods for historical risk analysis and future risk forecasting and by developing and operating safety management functions. As a result, newly identified hazards and ineffective controls for the most significant system-wide safety issues are identified, analyzed, and mitigated and safety performance is measured and managed. The request also supports the agency's strategic objectives by enhancing hazard tracking tools to ensure data consistency and reduce manual processes. The requirements for these programs have congressional mandate and support initiatives such as the Commercial Air Carrier Fatality Rate, the GA Joint Steering Committee and NextGen Safety Analysis.

FY 2018 – Air Traffic Safety Oversight Service (AOV)
($000)

What is the request and what funds are currently spent on the program?

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	21,837	22,188	22,377	189
Program Costs	2,130	1,932	1,719	-213
Total	**$23,967**	**$24,120**	**$24,096**	**-$24**
FTE	**126**	**127**	**126**	**-1**

The FY 2018 request of $24,096,000 and 126 FTEs allows AOV to conduct independent safety oversight of the ATO – the air navigation services provider (ANSP) in the United States. Current funds cover AOV's operational presence in four separate geographic locations.

What is this Program and Why is it Necessary?

The Air Traffic Safety Oversight Service (AOV) is responsible for ensuring the ATO's compliance with its safety standards through the performance of risk-based, data-supported safety audits and assessments of ATO operations and system processes. AOV's oversight of the ATO follows a systems safety approach for continued operational safety, SMS standards, and credentialing for ATO operational personnel. It also reviews and approves the ATO's safety implementation actions and risk management strategies and the ATO's SMS. In addition, AOV participates in the development and harmonization of air traffic control international standards.

AOV FY 2017-2018 programs, include: ATO Surveillance through Audits and Assessments along with International Outreach for ANSP Oversight Development.

Anticipated FY 2017 Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Air Traffic Safety Oversight Service	• Conducting risk-based audits and assessments of Air Traffic Control facilities and Technical Operations locations, services, and program areas, ensuring the ongoing safety of the NAS • Overseeing ATO's adherence to its safety standards, utilizing multiple AOV automated surveillance tools and processes • Issuing FAA credentials to US Air Force, Navy, and Marine Corps Air Traffic Controllers as part of a joint initiative with Department of Defense • Monitoring changes to ATO's overarching and facility-specific standards • Engaging aviation professionals around the world by sharing strategies and best practices for conducting effective safety oversight of air traffic services • Participating in the ATO's Voluntary Safety Reporting Program (VSRP) for air traffic (ATSAP) and Technical Operations (TSAP)

What does this funding level support?

AOV provides independent safety oversight of the ATO's provisioning of air traffic services, using risk-based, data-supported surveillance methods to monitor the safety of the NAS. The authority delineating the responsibilities of the ATO and AOV remains separate and distinct. The ATO has the legal and primary functional obligation for providing safe and efficient air traffic services and risk assessments for changes to the NAS. AOV's role as a regulator is to assess the capability of the ATO to ensure safe air traffic policies and operations.

AOV accomplishes this independent safety oversight function by utilizing a systems safety approach for continued operational safety. For example, AOV conducts scheduled and unscheduled audits of air traffic and Technical Operations facilities, services, and/or program areas throughout any fiscal year. AOV manages the credentialing system for all Air Traffic Controllers and Airway Transportation Systems Specialists. Also, AOV has a critical role in the ATO Voluntary Safety Reporting Program (VSRP) by participating on ATSAP and TSAP Event Review Committees to examine, investigate, and respond to safety-related reports. AOV maintains an operational presence in four separate geographic locations, employing 133 personnel. This forward presence across the United States allows AOV timely access to major facilities. AOV employees are a mixture of former FAA Air Traffic Controllers, military Air Traffic Controllers, and Airway Transportation Systems Specialists, among other skill sets.

AOV continues to evolve its approach to conducting independent safety oversight of the ATO. In FY 2018, AOV anticipates it will achieve the following major accomplishments.

Anticipated FY 2018 Accomplishments:

Function/Office	FY 2018 Anticipated Accomplishments
Air Traffic Safety Oversight Service	• Advance the tools and processes used to conduct safety oversight of the ATO by focusing on risk indicators and facility-specific assessments • Continue to conduct risk-based audits and assessments of Air Traffic Control facilities and Technical Operations locations, services, and program areas, ensuring the ongoing safety of the NAS • Oversee ATO's adherence to its safety standards, utilizing enhanced AOV automated surveillance tools and processes • Expand the issuance of FAA credentials to the US Army Air Traffic Controllers • Continue to monitor changes to ATO's overarching and facility-specific safety standards, creating synergy between numerous data sources and years of air traffic experience and expertise • Share AOV's safety oversight perspectives and experience in the international arena

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

This request will support on-going AOV independent safety oversight of the ATO's safety standards through various types of surveillance, including audits, assessments, compliance, investigations, inspections, and approvals, acceptances, and concurrences. The program initiatives conducted by AOV support on-going implementation of SMS principles within the NAS. AOV's continuing surveillance efforts utilize multiple AOV technical tools to capture and analyze relevant data on potentially hazardous safety trends of air traffic services. AOV evaluates the ATO's proposed safety risk mitigations and supports the FAA NextGen safety implementation goals. These critical AOV responsibilities ensure the safety of the NAS and ultimately that of the American public.

FY 2018 – Office of Unmanned Aircraft Systems Integration (AUS)
($000)

What is the request and what funds are currently spent on the program?

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	-	6,728	6,785	57
Program Costs	-	5,995	8,885	2,890
Total	**-**	**$12,723**	**$15,670**	**$2,947**
FTE	**-**	**39**	**39**	**-**

The FY 2018 request of $15,670,000 and 39 FTEs allows AUS to facilitate the safe, efficient, and timely integration of UAS in to the National Airspace System (NAS). Current funding covers headquarters staff for 4 divisions. The request also includes a $4,800,000 funding increase for Unmanned Aircraft System (UAS) requirements.

What is this Program and Why is it Necessary?

AUS manages and coordinates international activities for UAS within AVS and with other FAA lines-of-business, ensures alignment of UAS international activities with U.S. and FAA strategy and collaborates with foreign civil aviation organizations to improve global aviation safety, manages projects and data for all UAS programs and activities, supports standards and policy development related to UAS and provides engineering resources to support UAS projects, and coordinates operational aspects of safe and timely integration of UAS within the National Airspace System (NAS).

AUS FY 2017-2018 programs, include: UAS Standards and Policy Development (Counter UAS, RTCA, Internal FAA UAS Rulemaking, Part 107 support), Stakeholder Engagement (DAC, UAST, UAS Symposium), Government and Industry Partnerships (Test Sites, Pathfinder Programs, Centers of Excellence), International Outreach (Global standards, Bilateral Agreements), UAS Data and Enterprise Architecture (B4UFLY, MITRE, sUAS Integrated Gateway).

Anticipated FY 2017 Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Office of Unmanned Aircraft System Integration	• Leading agency UAS efforts, working with National Security Agencies to effectively address security concerns • Publishing the UAS Research Management Plan • Publishing the UAS Roadmap • Identifying DAC priorities and coordinate activities with stakeholders • Processing waivers and exemptions to enable UAS Operations

What does this funding level support?

AUS facilitates activities for UAS within AVS and with other FAA lines-of-business to provide a clear path to UAS operations in the NAS that will be available to every UAS operator and every FAA employee. The request supports the growing demands for UAS operations, while continuing to support expanded rulemaking and the automation of FAA processes to enable future NAS growth. AUS will provide policy and technical assistance for UAS waivers and exemptions, to further the integration of UAS into the NAS. AUS will also provide FAA-wide coordination for UAS policy and rulemaking direction, as well as coordination with industry.

Anticipated FY 2018 Accomplishments:

Function/Office	FY 2018 Anticipated Accomplishments
Office of Unmanned Aircraft System Integration	• Complete rulemaking activities to address UAS security concerns, including the Markings and Part 48 Final Rules • Develop the Part 107 Ops NPRM • Process waivers and exemptions to enable UAS Operations

Total Requested Discretionary Increase Requests:

Programs	Amount	FTP	FTE
Unmanned Aircraft System (UAS) Requirements	4,800,000		
Total	**$4,800,000**		

Unmanned Aircraft System (UAS) Requirements: AUS is requesting $4,800,000 to assist in the implementation of the UAS Global Engagement Strategy and work with standard-setting bodies to develop international standards that are consistent with U.S. priorities. The resource request will expand internal and external stakeholder outreach, education and communication services. The funds will also support the development of minimum performance standards, UAS detect and avoid strategies, and command and control implementation strategies.

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

Public expectation is that the FAA will continuously reduce the risk of flying while enabling new technologies to enter into the aviation system. The request will support the growing demands for UAS operations, while continuing to support expanded rulemaking and the automation of FAA processes for future NAS growth.

FY 2018 – Office of Quality, Integration, and Executive Services (AQS)
($000)

What is the request and what funds are currently spent on the program?

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	16,688	15,004	15,131	127
Program Costs	28,676	25,792	31,462	5,670
Total	**$45,364**	**$40,796**	**$46,593**	**$5,797**
FTE	**59**	**62**	**61**	**-1**

The FY 2018 request of $46,593,000 and 61 FTEs allows AQS to provide executive oversight and direction of consolidated management support services for AVS. Current funds cover the AVS Executive Office, AQS Executive Management, and 4 divisions. The request also includes $9,915,000 for the FY 2017 Transition to Operations and Maintenance (TOM) costs.

What is this Program and Why is it Necessary?

AQS coordinates the integration of business and operational processes across AVS. Its four divisions produce the following products and services: managing AVS QMS processes; oversight of special programs; leadership of strategic and business planning activities; development of employee training; development of the AVS budget; development and implementation of AVS wide human resource programs, coordination and oversight of all AVS administrative and management activities; and AVS internal communications program.

AQS FY 2017-2018 programs include: AVS QMS, AVS Occupational Safety and Health (OSH), Program and AVS-wide integrated Environmental Management System (EMS), AVS Telework Program, AVS Internal Communications Program, AVS Staffing Tool and Reporting System (ASTARS), AVS Diversity and Inclusion initiatives, Hiring Persons with Targeted Disabilities, Hiring Outreach and Recruitment Initiatives, and Reasonable Accommodations.

Anticipated FY 2017 Accomplishments

Function/Office	FY 2017 Anticipated Accomplishments
Office of Quality, Integration, and Executive Services	• Maintaining the AVS ISO Certification • Meeting the NARA annual requirements for Records Management • Supporting teleworking • Implementing the Office of Aerospace Medicine, Medical Certification component within the ASTARS • Developing and implementing AVS-wide Human Resource and Leadership Development Programs in support of agency programs • Implementing communications and employee engagement strategies to keep AVS employees informed of latest safety news pertinent to their mission • Collaborating with the FAA Office of Communications and other lines of business (LOBs) to assist with agency-wide social engagement platforms such as IdeaHub • Establishing an approach for improved management of AVS Information Technology Systems • Continue collaboration efforts to close OIG/GAO recommendations • Develop dashboard for tracking AVS planning and programmatic milestones

What does this funding level support?

AQS is responsible for establishing integrated policy and processes for systems that support aviation safety. AQS manages the AVS-wide QMS and is the lead for maintaining the AVS ISO 9001:2008 certification. AQS manages and provides AVS-wide guidance for strategic and business planning, internal communications, OIG/GAO audits and reports to Congress, financial management, human resource management; integrates training and development services; oversees the AVS Environmental Protection Policy; and oversees the AVS OSH.

Anticipated FY 2018 Accomplishments

Function/Office	FY 2018 Anticipated Accomplishments
Office of Quality, Integration, and Executive Services	• Maintain the AVS ISO Certification • Meet the NARA annual requirements for Records Management • Support teleworking • Manage and maintain the ASTARS models for AFS, AIR and AAM (Medical and Airmen Certification Programs) for input into the AVS Workforce Plan • Identify work activity measures for the Office of Unmanned Aircraft Systems Integration to support development of draft ASTARS model • Develop dashboard for tracking AVS planning and programmatic milestones

Transition to Operations and Maintenance in FY 2017:

Program	Service Unit	Amount
A25.02-01/02, Safety Approach for Safety Oversight (SASO)	AQS, AFS	7,663
A26.01-00, Aviation Safety Knowledge Management Environment (ASKME)	AQS, AIR	444
A17.01-02, Regulation and Certification Infrastructure for Safety System (RCISS)	AQS, AVS	1,808
Transition to Operations and Maintenance in FY 2017		**$9,915**

Safety Approach for Safety Oversight (SASO) Phase II Beta: The SASO Program will transform AFS and the aviation industry to a national standard of system safety based upon International Civil Aviation ICAO SMS principles. SASO Phase 2a developed the AFS SAS, supporting the Safety Assurance component of the AVS SMS, for Title 14, Code of Federal Regulations (CFR) Parts 121 (major air carriers), 135 (on-demand or schedule operations) and 145 (repair stations). Phase 2a is currently in the Solution Implementation Phase of the Acquisition Management System (AMS) process.

SASO Phase 2b is a continuation of the efforts begun in Phase 2a and has been segmented into two parts. SASO Phase 2b, Segment 1 includes additional SAS development for the remaining Title 14 CFR Parts for which AFS has oversight responsibility along with the development and implementation of the four SMS components; Safety Assurance, Safety Policy, SRM and Safety Promotion. Development and implementation of the Safety Assurance component began in Phase 2a, with the development and deployment of the SAS, but it will be further defined, developed and deployed in Phase 2b, Segment 1.

Aviation Safety Knowledge Management Environment (ASKME) Program, Segment 2. This is a one-time request to support the transition deployment of the Segment 2 Integrated Systems into operations, and required operations and preventative maintenance. The request provides for enhancements to previously deployed Segment 1 systems. The enhancements will improve the usefulness and productivity for the end-users, namely Aviation Safety Engineers and Aviation Safety Inspectors, and related AIR personnel; transition new functionality into operations; and integrate those systems into the Segment 2 environment/portal. The underlying goal is to stay compliant with current AIR policies, requirements, and business process to integrate the previously deployed systems into the integrated portal.

ASKME systems support AIR business processes. The Aircraft Certification process software is being developed as part of the ASKME Segment 2 Integrated System, with the goal of streamlining the overall certification process. This supports Sec. 312 of P.L. 112-95, FAA SMS, and RBDM Strategic Initiative.

Regulation and Certification Infrastructure for System Safety (RCISS): Contractor support for the RCISS Enterprise Architecture Framework (EAF) project - This support will implement and maintain a new COTS data intelligence software tool that will play an integral part in agency adoption of Enterprise Information Management (EIM) as a strategic approach to optimizing information. This directly supports the RBDM initiative. EAF support is responsible for vital data architecture services including the following: Enterprise Data Architecture reviews, AMS artifacts, EIM architecture development, Federal Enterprise Architecture Data Reference Model mapping and data modeling, OMB Open Data Policy Support, FAA Data Registry metadata, Data Standards support, Data Sources for Service Oriented Architecture (SOA), and Master Data Management support.

Contract support for the RCISS SOA project - SOA contract support is responsible for the overall support implementation and maintenance for the RCISS SOA capability. This includes defining the SOA strategy and roadmap to managing all provider and consumer access to enterprise web services, messaging, business process management and business rule products. They assist application teams in developing their solutions to leverage the SOA infrastructure and develop standards for the use, performance, management and security of services or solutions available for reuse. They are also responsible for all SOA infrastructure upgrades, patches, infrastructure designs and security reviews. A growing number of major application development programs are relying on the infrastructure they support. RCISS SOA capabilities result in overall better functionality and lifecycle cost savings for its customers who leverage its available reusable services.

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

This request will support AVS executive oversight and AQS management support of the organizational components that provide safety services. AQS cross-functional programs provide oversight and direction for QMS processes, strategic planning, employee development, finance and communication services that support the surveillance, certification, and rulemaking actions conducted by the organization's safety workforce.

Explanation of Funding Changes

	Dollars ($000)	FTE
Aviation Safety	**$1,962**	**-85**
Overview: For FY 2018, the Associate Administrator for Aviation Safety requests $1,257,981,000 and 7,244 FTEs to meet its safety mission. The FY 2018 request level reflects adjustments to base, other changes, discretionary adjustments, and a base transfer. This represents an increase of $1,962,000 over the FY 2017 level.		
Adjustments to Base	**$31,271**	**-**
FY 2018 Pay Raises: 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 1.9 percent.	15,510	
Annualization of FY 2017 Pay Raises: This increase is required to provide for the remaining quarter of the FY 2016 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 1.0 percent.	5,472	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Safety Approach for Safety Oversight (SASO) -** The SASO Program will transform the FAA's Flight Standards Service (AFS) and the aviation industry to a national standard of system safety based upon International Civil Aviation Organization (ICAO) Safety Management System (SMS) principles. SASO Phase 2a requirements include security, training and automation requirements. In FY 2015, a total of 100 sites achieved Initial Operational Capability (IOC). The funding request provides for second level engineering and recurring travel and training.	7,663	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Aviation Safety Knowledge Management Environment (ASKME) -** This request will provide $444,000 to transition Segment 2 Integrated Systems into operations, and required operations and preventative maintenance. ASKME supports AIR business processes. The aircraft certification process software is being developed as part of the ASKME Segment 2 Integrated System, with the goal of streamlining the overall certification process.	444	
Transition from Facilities & Equipment (F&E) to Operations (Ops): **Regulation and Certification Infrastructure for System Safety (RCISS) -** This request seeks to secure Operations & Maintenance (O&M) funding commensurate with supporting the capabilities fielded in support of the Aviation Safety (AVS) Information Technology (IT) infrastructure through investment of Facilities & Equipment (F&E) funding. The items transitioning from F&E to O&M include contractor support, maintenance of new IT software and data maintenance capabilities, and maintenance of critical telecommunications infrastructure components.	1,808	
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.	374	
Other Changes	**-$21,789**	**-56**
Workforce Reduction Through Attrition: Restricted hiring to achieve savings through attrition.	- 8,326	-56
AVS Savings: Aviation Safety (AVS) will achieve efficiencies through reductions in various programmatic areas (contracts, travel, equipment, supplies, lease properties, etc.)	- 13,463	
Discretionary Adjustments	**$7,000**	**-**

Unmanned Aircraft System (UAS) Requirements: This increase supports the NAS Initiative to expand the safe and efficient incorporation of UAS. This resource request will enable AVS to support increased demand for new UAS aircraft, operators and airmen services as manufacturing and operations requirements expand. To continue to meet challenges of safe integration into the NAS, AVS has requested additional resources. The program approach outlined in this 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.	7,000	-
Base Transfers	**-$14,520**	**-29**
FY 2017 Flight Standard Services Staffing (ATO to AVS): This request transfers $189K and 1FTP/1FTE from the Air Traffic Organization, Mission Support Services (ATO/AJV) to Aviation Safety, Flight Standard Services (AVS/AFS).	189	1
Flight Program Operations (AVS, ANG to ATO): This request transfers $15.2K and 34FTP/34FTE from the Aviation Safety Organization, AVS (30 FTP/FTE) & NextGen and Operations, ANG (4 FTE/FTP) to the Air Traffic Organization, ATO. In addition, 34FTP/34FTE transfers from the ATO Franchise Fund account into the ATO Operations account.	-14,709	-30

Staffing Information

	FY 2016 Actual	FY 2017 Estimate	Proposed Change	FY 2018 Request
Direct Full Time Equivalents (FTEs)	**7,173**	**7,330**	**(86)**	**7,244**
Flight Standards Service	5,174	5,274	(68)	5,206
Aircraft Certification Service	1,336	1,343	(9)	1,334
Office of Aerospace Medicine	370	383	(6)	377
Office of Rulemaking	39	35	0	35
Air Traffic Safety Oversight Service	126	127	(1)	126
Office of Accident Investigation and Prevention	69	67	(1)	66
Office of Unmanned Aircraft Systems Integration	0	39	0	39
Office of Quality, Integration and Executive Services	59	62	(1)	61
End of Year Employment (FTP)	**7,300**	**7,406**	**(140)**	**7,266**
Flight Standards Service	5,248	5,318	(99)	5,219
Aircraft Certification Service	1,369	1,353	(24)	1,329
Office of Aerospace Medicine	378	391	(10)	381
Office of Rulemaking	40	38	(1)	37
Air Traffic Safety Oversight Service	137	133	(3)	130
Office of Accident Investigation and Prevention	67	72	(2)	70
Office of Unmanned Aircraft Systems Integration		40	0	40
Office of Quality, Integration and Executive Services	61	61	(1)	60

As of April 2017

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

	FY 2016 Actual	FY 2017 Estimate	FY 2018 Request
Flight Standards Service	**5,248**	**5,318**	**5,219**
Engineers	22	4	4
Aviation Safety Inspectors	4,036	4,161	4,120
Safety Technical Specialists	432	448	428
Operational Support	758	705	667
Aircraft Certification Service	**1,369**	**1,353**	**1,329**
Manufacturing Safety Inspectors	246	270	267
Pilots, Engineers and CSTAs	773	752	745
Safety Technical Specialist	191	172	165
Operational Support	159	159	152
Office of Aerospace Medicine	**378**	**391**	**381**
Physicians, Physician Assistants, Nurses	52	57	56
Alcohol/Drug Abatement Inspectors	56	70	69
Safety Technical Specialist	226	220	213
Operational Support	44	44	43
Air Traffic Safety Oversight Service	**137**	**133**	**130**
Air Traffic Safety Inspectors	59	58	57
Safety Technical Specialist	74	68	66
Operational Support	4	7	7
Office of Rulemaking	**40**	**38**	**37**
Safety Technical Specialist	37	35	34
Operational Support	3	3	3
Office of Accident Investigation and Prevention	**67**	**72**	**70**
Air Safety Inspectors	8	9	9
Safety Technical Specialist	45	53	51
Operational Support	14	10	10
Office of Unmanned Aircraft Systems Integration	**0**	**40**	**68**
Air Safety Inspectors	0	21	21
Safety Technical Specialist	0	13	13
Operational Support	0	6	6
Office of Quality, Integration and Executive Service:	**61**	**61**	**60**
Safety Critical Staff	7	12	12
Operational Support	54	49	48
Total	**7,300**	**7,406**	**7,266**
Safety Critical Staff	6,264	6,423	6,330
Operational Support	1,036	983	936

Note: In FY 2017, the Unmanned Aircraft Systems Integration Office was established.

As of April 2017

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COMMERCIAL SPACE TRANSPORTATION (AST)

Commercial Space Transportation (AST)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$17,766**	**106**	**2**	**104**
Adjustments to Base	**$304**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	227			
Annualization of FY 2017 Pay Raise 2.1%	77			
Other Changes	**-$165**	**-2**	**0**	**-1**
Workforce Reduction Through Attrition	-165	-2		-1
FY 2018 Request	**$17,905**	**104**	**2**	**103**

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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 $17,905,000, 104 full-time permanent positions, and 103 full-time equivalents enables AST to maintain staff and facilities while meeting basic programmatic needs.

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; performing safety evaluations of proposed operations and launch sites; granting licenses, experimental permits, and safety approvals; conducting safety inspections; supporting range operations; and carrying activities in partnership with ATO to integrate commercial space operations into the National Airspace System.

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) 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.

What does this funding level support?

Independent 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. Many planned missions will include technical and operational dimensions new in the 60-year history of spaceflight, involving an unprecedented level of complexity. This includes flyback boosters, autonomous safety systems, high frequency operations at existing airports, and reentries to sites within the Continental United States (CONUS).

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

From AST's inception in 1989 through 2016, the Office has licensed or permitted 307 commercial space launches and reentries. Commercial space transportation operations enhance citizens' lives through such activities as the launch of supplies for the International Space Station, deployment of communications satellites to ensure reliable cell phone operations, and the development of new transportation concepts and enabling technologies. This request will allow AST to keep pace with the increasing tempo of operations anticipated in the next few years and effectively evaluate the increasingly complex operations.

Budget Summary

Commercial Space Transportation (AST)
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	14,605	15,928	16,068	139
Program Costs	3,195	1,837	1,837	-
Total	**$17,800**	**$17,766**	**$17,905**	**$139**
FTE	**84**	**104**	**103**	**-1**

The Office of Commercial Space Transportation's (AST) request of $17,905,000, 104 full-time permanent positions, and 103 FTE allows AST to keep pace with the continued growth of the commercial space transportation industry. The request includes $139,000 in net pay increases.

Detailed Summary - Commercial Space Transportation (AST)

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

FY 2018 – Commercial Space Transportation (AST)
$(000s)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	14,605	15,928	16,068	139
Program Costs	3,195	1,837	1,837	-
Total	**$17,800**	**$17,766**	**$17,905**	**$139**
FTE	**84**	**104**	**103**	**-1**

The Office of Commercial Space Transportation's (AST) request of $17,905,000, 104 full-time permanent positions, and 103 FTE allows AST to marginally keep pace with the continued growth of the commercial space transportation industry. The request includes $139,000 in net pay increases.

What is this Program and Why is it Necessary?

FAA's Office of Commercial Space Transportation (AST) was established 1984 by Executive Order and the subsequent Commercial Space Launch Act. 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. Recent years have witnessed dramatic growth in both the number of commercial space transportation companies and operations. In addition, 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. As a result, AST continues to see significant increases in the activities required to achieve its mission.

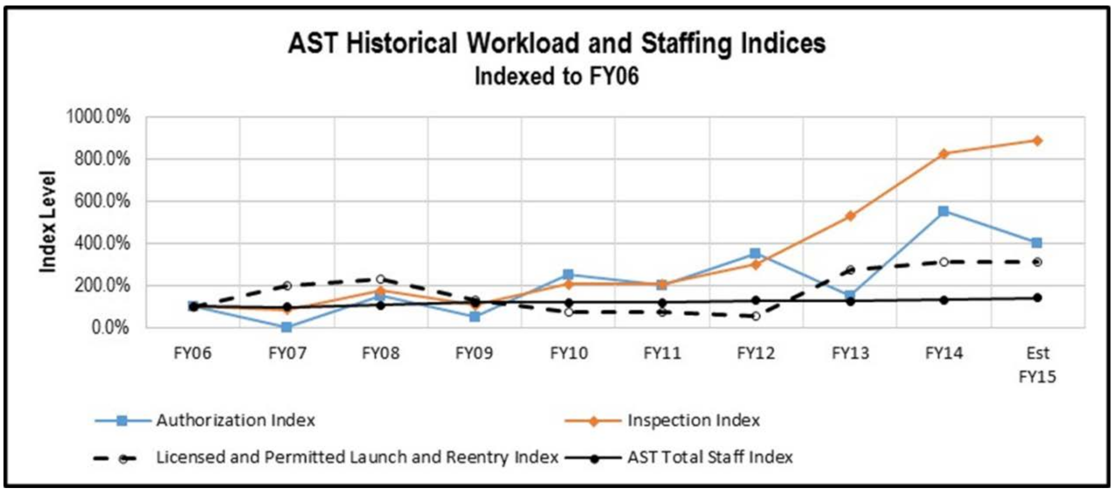
AST accomplishes its safety mission through the execution of its **licensing, permitting, and safety inspection** functions. The figure below highlights the trends in some of AST's workload indicators from 2006 –2015.

- Four indices are:
  - The **Authorization Index** relates the number of *new* licenses, permits, and safety approvals made by AST in the given year relative to FY 2006. New authorizations are shown to be a leading indicator of increased safety inspections and operations, which are illustrated by those respective indices which are also relative to their baseline FY 2006 level of activity. The Authorizations Index does not include license modifications or renewals at this point.
  - Safety oversight – primarily through **on-site inspections** – is a core AST 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 also encompasses sending safety inspectors to launch and reentry operations to ensure an operator's compliance with regulations and the representations made in its application. 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.

- 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:
  - And, most recently the Midland International Airport in Midland, Texas.

  There are currently ten launch sites in pre-application consultation with AST.

- The AST **Total Staff Index** compares AST's on-board year end staffing level to that at the end of 2006. The figure highlights that in FY 2014 AST's workload for authorizations were up approximately 550%; inspections were up over 825%; and launch and reentry operations were up over 300%, compared to FY2006. However, AST's staffing was increased only 42% over this same timeframe.



AST also 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 undertaking new and 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 to address orbital debris mitigation practices for U.S.-licensed commercial launches.

Function/Office	FY 2017 Anticipated Accomplishments
Commercial Space	• Completion of licensing and permitting evaluations 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

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, the FAA is developing and implementing a strategy to ensure the efficient integration of air and space traffic. This work will be performed in partnership with the ATO, NextGen, and other FAA organizations

What does this funding level support?

The funds in this request 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.

The AST office has supported licensed commercial launches, reentries, and permitted launches. As the number of launches increases, the number of reviews, analyses, 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.

Function/Office	FY 2018 Anticipated Accomplishments
Commercial Space	• Continued completion of licensing and permitting evaluations within statutory time limits • Continued environmental assessment completion for all launches/reentries within the statutory time limits • Continued completion of additional safety approval applications, which evaluate space-related components, processes or services • Applied improvement of the integrated planning and execution of commercial space operations in the National Airspace System • Continued enhancement of 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

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

Since AST's inception in 1989 through 2016, we have licensed and permitted 307 commercial space launches and reentries. AST also licenses the operations of nine launch sites in seven different states. These include the launch of supplies for the International Space Station, communications satellites and national security satellites, 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, 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. 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.

The commercial space transportation arena remains an outstanding opportunity for the United States. New concepts and business opportunities are continually emerging, currently limited only by the capacity for innovation. The funding requested by AST will help ensure that the regulatory environment keeps pace with this dynamically growing industry, and that AST can maintain the most important aspect of its mission: protecting the safety of the public and their property.

AST Explanation of Funding Changes

	Dollars ($000)	FTE
Commercial Space Transportation	**$139**	**-1**
Overview: For FY 2018, the Associate Administrator for Commercial Space Transportation requests $17,905,000 and 103 FTEs to meet its mission. The FY 2018 request level reflects adjustments to base, and other changes. This represents an increase of $139,000 over the FY 2017 annualized CR level.		
Adjustments to Base	**$304**	**-**
FY 2018 Pay Raises: 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 1.9 percent.	227	
Annualization of FY 2017 Pay Raises: This increase is required to provide for the remaining quarter of the FY 2016 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 1.0 percent.	77	
Other Changes	**-$165**	**-1**
Workforce Reduction Through Attrition: Restricted hiring to achieve savings through attrition.	- 165	-1

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FINANCE AND MANAGEMENT (AFN)

Office of Finance and Management (AFN)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$759,054**	**1,789**	**21**	**1,654**
Adjustments to Base	**$8,019**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	3,754			
Annualization of FY 2017 Pay Raise 2.1%	1,307			
GSA Rent	2,513			
Working Capital Fund	445			
Other Changes	**-$8,881**	**-118**	**0**	**-59**
Workforce Reduction Through Attrition	-8,881	-118		-59
FY 2018 Request	**$758,192**	**1,671**	**21**	**1,595**

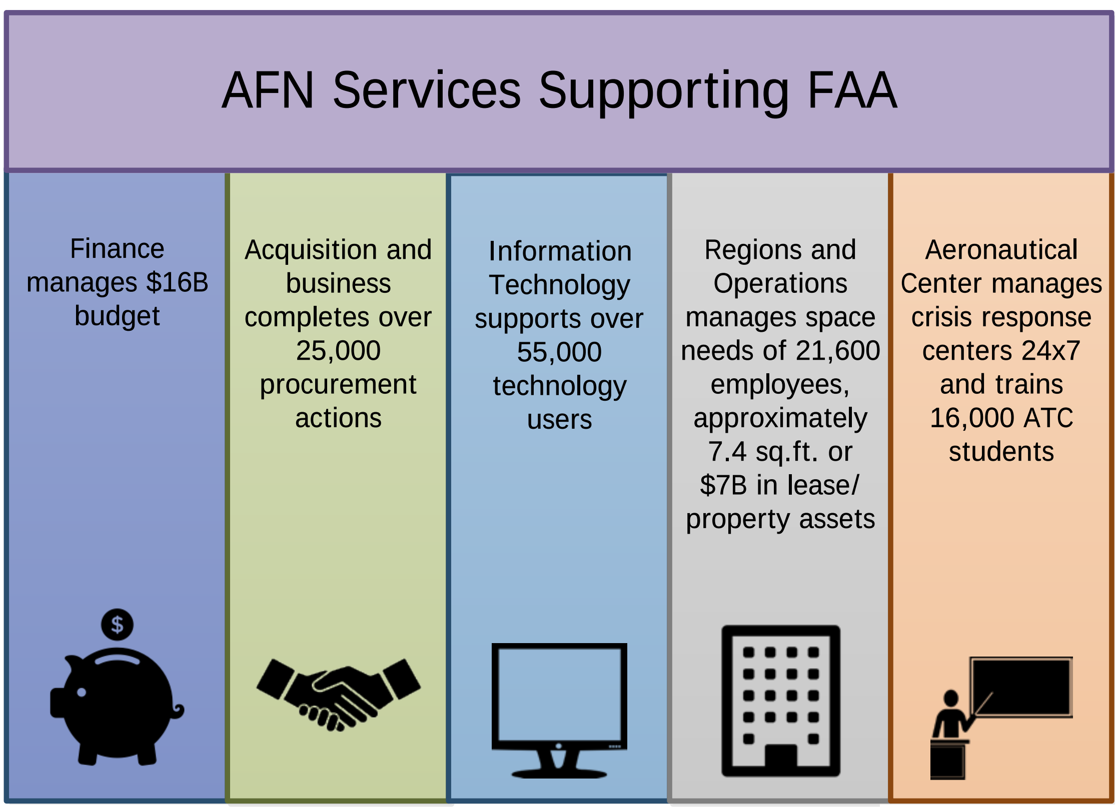
Executive Summary: Office of Finance and Management (AFN)

What is the request and what funds are currently spent on the program?

The FY 2018 request of $758,192,000, 1,671 full-time permanent, and 1,595 full-time equivalent personnel allows the Office of Finance and Management (AFN) to provide centralized management and delivery of core services to FAA's 14 lines of business (LOBs) and staff offices (SOs), enabling them to focus on maintaining the world's safest, most secure national airspace system (NAS). These core services include finance, acquisitions, non-National Airspace System (NAS) information technology, supply chain management, technical training, and regions and property operations support. The request includes increases of $5,061,000 for payroll adjustments for the FY 2017 annualized pay raise and the proposed FY 2018 government-wide pay raise; GSA rent increase in the amount of $2,513,000; an adjustment to the Working Capital Fund of $445,000; and -$8,881,000 in payroll savings as a result of the Workforce Reduction Through Attrition initiative.

What is the program and why is it necessary?

The Office of Finance and Management (AFN) is the FAA's shared services operating entity, responsible for providing and streamlining the agency's common business services through a consolidated, integrated approach. AFN oversees the delivery of finance, acquisitions, information technology, property, logistics, technical training, and regional emergency and integration services to customers across the agency and federal government. AFN leads the FAA's efforts to identify cost savings, leverage technology, and optimize resources throughout the agency in order to position the agency to achieve the aviation safety mission while maintaining the flexibility to accommodate ever-changing requirements. Each year, AFN manages the FAA's nearly $16 billion dollar budget, handles more than 25,000 contract actions, supports some 55,400 technology users, and detects and averts approximately 21 million cyber-alerts for NAS and non-NAS systems throughout FAA and DOT. AFN also manages and supports the FAA Academy which trains almost 16,000 resident students annually, including new Air Traffic Controllers (ATC). In addition, AFN manages leases and property assets that house 21,600 personnel (approximately 7.4M square feet), provides critical crisis response capability, immediate command and control for all incidents related to NAS continuity.



AFN's five service organizations include:

Financial Services (ABA): ABA enables the FAA to achieve its aviation safety mission by formulating, executing, and managing budgets for each of the agency's lines of business and staff offices, ensuring that funding is available to meet each organization's mission essential needs and that critical Aviation Safety, Air Traffic, and NextGen personnel, programs, and initiatives are prioritized to ensure the uninterrupted and improved efficiency and safety of the NAS. ABA leads the FAA in identifying cost savings, provides responsible financial management of budget appropriations, and manages the agency's workforce planning. ABA is responsible for preventing Anti-Deficiency Act violations, ensuring no duplicate payments are made to vendors, and saving taxpayer dollars. ABA strives to be responsible stewards, resulting in reduced cost and increased efficiency.

Acquisition and Business Services (ACQ): ACQ, led by the FAA's Federal Acquisition Executive (FAE), serves as the executive agent for FAA's Acquisition Management System (AMS). The FAE chairs the agency's organizational investment review board, known as the Joint Resources Council (JRC). The FAE also manages FAA's investment management process for capital investments including NextGen and other major systems acquisitions. As the agency's procurement and contracting experts, ACQ enables the FAA to achieve its aviation safety mission by securing the goods, services, resources, space, technologies, expertise, specialized skills, facilities, and tools that every line of business and staff office needs in order to accomplish their mission. ACQ contracted for more than $4.6 billion in goods and services in FY 2016. That total is expected to rise in FY 2018 to keep pace with demands on the agency.

Information and Technology Services (AIT): As the agency's information and technology backbone, AIT enables the FAA to achieve its aviation safety mission by providing and overseeing all aspects of the agency's IT enterprise, allowing all lines of business and staff offices, including AVS and ATO, to seamlessly connect, interact, and respond to customers, stakeholders, colleagues, and resources easier and more reliably. AIT is responsible for providing IT services to 45,000 employees, as well as 10,400 contractors across the FAA, for a total of 55,400 technology users. This includes the development and maintenance of over 650 systems and software applications and the streamlining of IT processes for a faster and more efficient user experience. AIT provides IT support for all mission support technology which includes IT training for FAA personnel. A key focus in FY 2018 will be to keep the FAA's network safe from cyber threats. Funding will ensure cyber security, maintain a comprehensive cyber threat intelligence analysis capability, and support innovative technology and tools to prevent attacks while continuing the agency on a path of increased efficiencies and innovation.

Regions and Property Operations (ARO); Formerly ARC: ARO enables the FAA to achieve its aviation safety mission by providing emergency readiness, property management, facilities management, corporate outreach, and infrastructure support. ARO manages facilities at FAA Headquarters, six Regional Offices, and three Service Center Regional Offices in addition to managing the FAA's portfolio of $7 billion in global agency assets throughout the National Airspace System. ARO oversees and manages the space needs of more than 21,600 personnel from every line of business and staff office across the FAA who are housed in over 7.4 million square feet of leased or directly owned FAA properties throughout the country. ARO also resources three Regional Operations Centers (ROCs), located within the Service Centers that operate around the clock and provide critical crisis support to the NAS.

Mike Monroney Aeronautical Center (AMC)
The AMC, located in Oklahoma City includes three key functions: the FAA Academy, the FAA Logistics Center and the Enterprise Services Center (ESC). AMC maintains and operates over 130 buildings at the Mike Monroney Aeronautical Center that include the physical plant. AMC conducts emergency planning, and provides architecture and engineering design, construction, and space management support for the approximately 6,500 personnel located at AMC. AMC also houses three unique services for the FAA: the **FAA Academy** is the primary provider of technical training for the agency and the largest training facility within the DOT; the **FAA Logistics Center (FAALC)** is the primary provider for parts and logistics services in support of the Air Traffic Organization (ATO) and the National Airspace System (NAS); and the **Enterprise Services Center (ESC)** is one of four OMB-designated Shared Service Providers for financial services within the federal sector.

What does this funding level support?

The requested funding for FY 2018 will support all of FAA's 14 lines of businesses and staff offices and key initiatives that include:

- Ensuring efficient operations of backup command, control, and communications centers for the NAS;
- Protecting and updating the agency's IT infrastructure;
- Competing, negotiating, awarding, and managing more than $4 billion in key contracts that support critical programs and projects including NextGen;
- Training more than 16,000 resident students in safety related occupations annually to keep the NAS operating at optimal capacity and efficiency at any given time;
- Maintaining 270,000 property and equipment assets.

Each AFN service area works to move the agency forward by streamlining processes previously handled at the line of business or staff office level. IT support for systems, efficient, adequate space to house staff, a procurement group that can acquire needed materials and services, and a strong financial engine all substantially contribute to both ATO and AVS and is critical to support the daily air traffic control work in ATO and safety inspections in AVS. As a whole, AFN continues to find new and innovative ways to lessen the administrative burden on the agency's employees, allowing them to more efficiently and effectively meet their individual responsibilities to support the safety of the NAS.

What benefits will be provided to the American public through this request?

AFN's shared services approach to delivering the agency's common finance, acquisitions, information technology, property, logistics, technical training, and regional integration services promotes financial integrity, IT infrastructure security, continuous improvement, and streamlined products and services to support the FAA's vital aviation safety mission. AFN's integrated delivery model also focuses on reducing costs across the agency, saving taxpayer dollars while providing added value to all customers and stakeholders. As an innovative, forward-thinking organization, AFN strives to empower FAA personnel across the country to focus on the mission, lessening the administrative support burden on front-line organizations critical to maintaining the safest airspace system in the world. Ultimately, AFN benefits the American public by ensuring a more efficient, reliable, transparent, and financially responsible FAA while providing additional support to other agencies and bureaus.

Office of Finance and Management (AFN)

($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Office of AFN				
Salaries and Expenses	248,930	263,555	259,735	-3,820
Program Costs	511,570	495,499	498,457	2,958
Total	**$760,500**	**$759,054**	**$758,192**	**-$862**
FTE	**1,665**	**1,654**	**1,595**	**-59**

The FY 2018 request of $758,192,000,1,671 full-time permanent, and 1,595 full-time equivalent personnel allows the Office of Finance and Management (AFN) to provide centralized management and delivery of core services to FAA's 14 lines of business and staff offices, enabling them to focus on maintaining the world's safest, most secure National Airspace System (NAS). These core services include finance, acquisitions, non-NAS information technology, regions and property operations, technical training, supply chain management, and enterprise system design and operation.

Funding details for AFN's five service units: ($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Financial Services (ABA)	118,836	120,955	120,739	-216
Acquisition and Business Services (ACQ)	52,665	54,218	53,357	-861
Information Services (AIT)	300,591	296,760	296,901	141
Regions and Property Operations (ARO)	288,408	244,306	244,727	421
Mike Monroney Aeronautical Center (AMC)	-	42,815	42,468	-347
Total	**$760,500**	**$759,054**	**$758,192**	**-$862**

Detailed Justification for-Financial Services (ABA)

What is the request and what funds are currently spent on the program?

FY 2018 – Financial Services (ABA)
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Office of ABA				
Salaries and Expenses	38,194	43,635	43,419	-216
Program Costs	80,642	77,320	77,320	-
Total	**$118,836**	**$120,955**	**$120,739**	**-$216**

The FY 2018 budget request of $120,739,000 is to support the Financial Services (ABA) Program. As part of the Office of Finance and Management (AFN), ABA provides agency-level financial, analytical and modeling expertise that promotes the achievement of FAA performance goals, promotes cost effective and efficient operations and continues the FAA's leadership in global aviation. AFN continues to streamline agency functions to limit administrative expenses while ensuring delivery of our agency goals through the responsible stewardship of FAA resources.

What is this program and why is it necessary?

ABA manages the FAA's annual and multi-year appropriations. Financial Services (ABA) is one of the five main functional areas under the Assistant Administrator for Finance and Management (AFN). Serving as the principal financial manager for the organization with appropriated resources totaling approximately $16 Billion and capital assets valued in excess of $13.2 Billion, ABA provides agency-level budgeting, accounting, financial control, cost control via analytical and modeling expertise, and financial programs and policies.

ABA enables the FAA's aviation safety mission by formulating, executing, and managing budgets for each of the agency's lines of business and staff offices. The organization ensures that funding is available to meet FAA mission essential needs and that all personnel, programs, and initiatives are prioritized so that the NAS is efficient, safe, and uninterrupted. ABA leads the FAA in identifying cost savings, provides financial management for all budget appropriations, and manages the workforce planning.

ABA performs four (4) financial functions:

- Budgeting and Programming
- Operations
- Reporting and Controls, and
- Analysis

Budgeting and Programming ensures the agency identifies and defines budgetary needs and uses funds and other resources effectively while incorporating performance and budget plans to meet agency goals. Budget and Programming develops and establishes agency budgetary policies, standards, systems, and procedures. It also forecasts and evaluates future Agency requirements and evaluates and coordinates Agency resource requests with Office of the Secretary (OST) and OMB. During the year of execution, Budget and Programming works directly with OMB to apportion and allocate appropriated funds throughout the Agency.

Operations maintain the financial management, cost accounting, and procurement systems as well as managing the accounting and recording of Agency property and equipment.

Reporting and Controls implements accounting and financial management policy for the agency and assures the adequacy of internal controls for compliance with laws, regulations and policies. Additionally, Reporting and Controls maintains general ledger data for quality and prepares agency financial reports.
Analysis facilitates the agency's cost reductions effort and implements cost control initiatives. ABA develops agency policy and oversees financial guidance and advisory services for agency contracts; ensures business decisions are sound by analyzing the financial impact of proposed agency investments and labor contracts; and, develops agency policy for spending and authorization controls to help ensure the agency's resources are used efficiently and effectively.

FY 2017 Anticipated Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Budget and Programming	▪ Maintain required funding needs for agency programs through effective resource oversight; ▪ 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 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 ▪ Implement and conduct a suite of formal financial training classes hosted within the FAA to enhance corporate budgetary knowledge, standardize operating procedures, internal controls, purchase card use, and fund certification.
Operations	▪ Conduct effective oversight of agency financial systems; ▪ Collaborate with the Enterprise Services Center and DOT to improve financial business processes through core accounting system enhancements 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; ▪ Perform effective oversight of agency financial systems.
Reporting and Accountability	▪ Ensure an unmodified audit opinion on Agency FY 2017 financial statements with no material weaknesses; ▪ Examine 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 November 2009.
Analysis	▪ Identify realized net savings through the review of acquisitions of $10 million or more to ensure the procurement represents a good investment of taxpayer resources and appropriate alternatives were considered; ▪ Implement business case discipline for investment categories (e.g., facilities and variable quantity investments) to support sound investment decisions; ▪ Produce the Controller Workforce Plan which is a projection of changes in air traffic forecasts, controller retirements, and staffing requirement ranges for air traffic control facilities to support FAA's safety mission to meet external stakeholder requirements; ▪ Analyze all Agency labor contracts and proposals to ensure understanding of the impact of change to labor contracts;

Function / Office	FY 2017 Anticipated Accomplishments
	▪ Implement the Operational Planning and Scheduling (OPAS) System in air traffic control facilities; ▪ Expand the role of the Labor Analysis group to include workforce planning and labor cost analysis for FAA business units; ▪ Analyze Agency investments and monitor acquisition program baselines; ▪ Promote the full range of FAA acquisition decisions for both NAS and non-NAS programs; ▪ Employ business case discipline to new investment categories (e.g., facilities and variable quantity investments); and ▪ Develop, update, and implement cost estimator, schedule development, and other investment analysis training in support of the larger acquisition community.

What does this funding level support?

Requested ABA funding will support related inflationary and proposed pay increases. Funding will allow ABA to provide centralized agency-level financial functions that help improve accountability and enhance operational efficiency in the usage of FAA resources. Funding will also allow ABA to oversee and maintain the Agency's financial systems, financial policies, financial reporting, and spearhead the Agency cost efficiency program and other agency-wide management reforms to ensure resources are managed in accordance with all laws, policies, and procedures. Funding will enable ABA to 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.

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 NextGen and operational programs. Funding below the requested level will reduce FAAs ability to perform the necessary analysis and evaluation of many FAA capital and operational business cases.

Labor costs are the FAA's single largest operating cost. The funding supports the development of benchmarking, plans, analyses, and models for labor related data, to support bargaining unit negotiations and cost efficiency in the FAA. The Labor Analysis office 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 Workforce Plans are key business tools that drive hiring, training, and staffing requirements across all FAA air traffic facilities.

FY 2018 Anticipated Accomplishments:

Function / Office	FY 2018 Anticipated Accomplishments
Budget and Programming	▪ Maintain required funding needs for agency programs through effective resource oversight; ▪ 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 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 ▪ Implement and conduct a suite of formal financial training classes hosted within the FAA to enhance corporate budgetary knowledge, standardize operating procedures, internal controls, purchase card use, and fund certification.

Operations	▪ Conduct effective oversight of agency financial systems; ▪ Collaborate with the Enterprise Services Center and DOT to improve financial business processes through core accounting system enhancements 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; ▪ Perform effective oversight of agency financial systems.
Reporting and Accountability	▪ Ensure an unmodified audit opinion on Agency FY 2018 financial statements with no material weaknesses; ▪ Examine 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 November 2009.
Analysis	▪ Identify realized net savings through the review of acquisitions of $10 million or more to ensure the procurement represents a good investment of taxpayer resources and appropriate alternatives were considered; ▪ Employ business case discipline to new investment categories (e.g., facilities and variable quantity investments) to attain cost savings; ▪ 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 air traffic control facilities to support FAA's safety mission to meet external stakeholder requirements. ▪ Analyze all Agency labor contracts and proposals to ensure understanding of the impact of change to labor contracts; ▪ Implement the Operational Planning and Scheduling (OPAS) System in air traffic control facilities; ▪ Expand the role of the Labor Analysis group to include workforce planning and labor cost analysis for FAA business units; ▪ Analyze Agency investments and monitor acquisition program baselines; ▪ Promote the full range of FAA acquisition decisions for both NAS and non-NAS programs; ▪ Employ business case discipline for new investment categories (e.g., facilities and variable quantity investments); and ▪ Develop, update, and implement cost estimator, schedule development, and other investment analysis training in support of the larger acquisition community.

What benefits will be provided to the American public through this request?

ABA is the financial services provider within a shared services framework for the FAA's 14 Lines of Businesses (LOBs) and Staff Offices (SOs). ABA provides financial services for the 4 appropriated funds (Operations; Facilities and Equipment; Research, Engineering, and Development; and Grants-in-Aid to Airports) totaling $16.3 billion in FY 2016 to the fourteen (14) LOBs and SOs. 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 goal of greater transparency in government. 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 enables the lines of business and staff offices to better focus their attention and resources on achieving their individual goals in supporting the FAA mission.

In recent years, there has been an increased recognition of the need for effective oversight of financial decision-making processes. In response, 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.

Detailed Justification for – Acquisition and Business Services (ACQ)

What is the request and what funds are currently spent on the program?

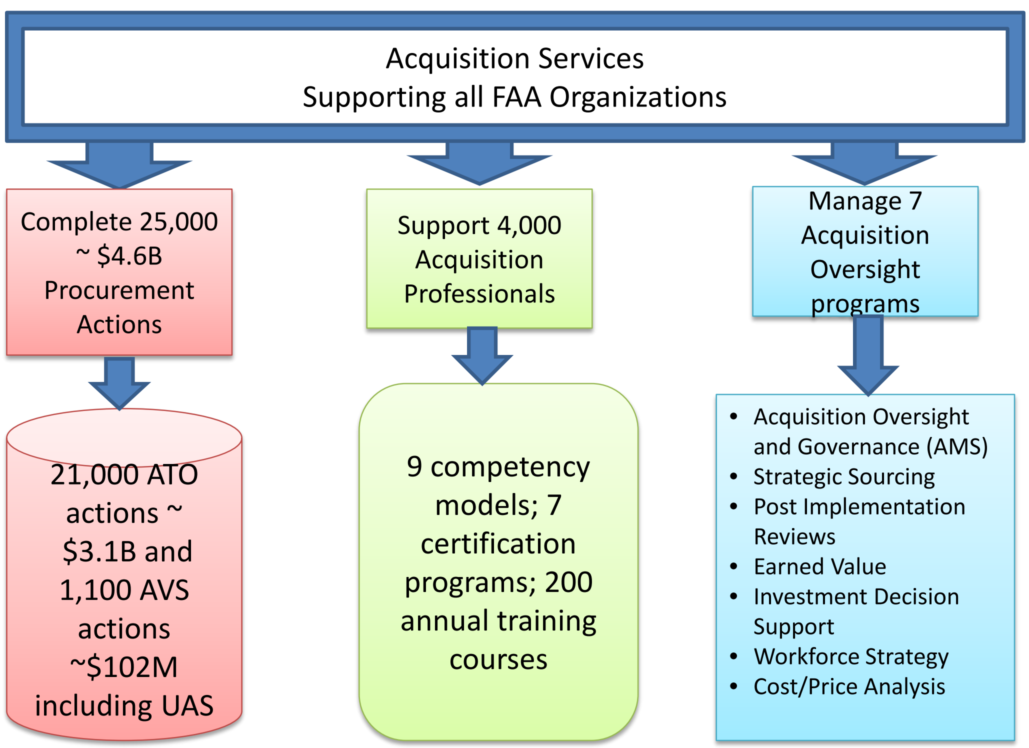
FY 2018 –Acquisition and Business Services (ACQ)
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Office of ACQ				
Salaries and Expenses	32,409	41,400	40,539	-861
Program Costs	20,256	12,818	12,818	-
Total	**$52,665**	**$54,218**	**$53,357**	**-$861**

The FY 2018 budget requests $53,357,000 for Acquisition and Business Services (ACQ). This request will provide for salaries, benefits, annualized pay, and contract services. It includes adjustments for annualization of the FY 2018 pay raise.

What is this program and why is it necessary?

ACQ procures the goods and services to ensure the safe and efficient operation and regulation of the National Airspace System (NAS), as well as to support infrastructure and services for day-to-day administrative and oversight activities. In 2016 the organization conducted more than 25,000 procurement actions totaling more than $4.6 billion for goods and services. Of the 25,000 procurement actions, ACQ conducted over 21,000 actions for the Air Traffic Organization (ATO) Line of Business (LOB) with a total value over $3.1 billion and over 1,100 actions for Aviation Safety (AVS) with a total value over $102 million.



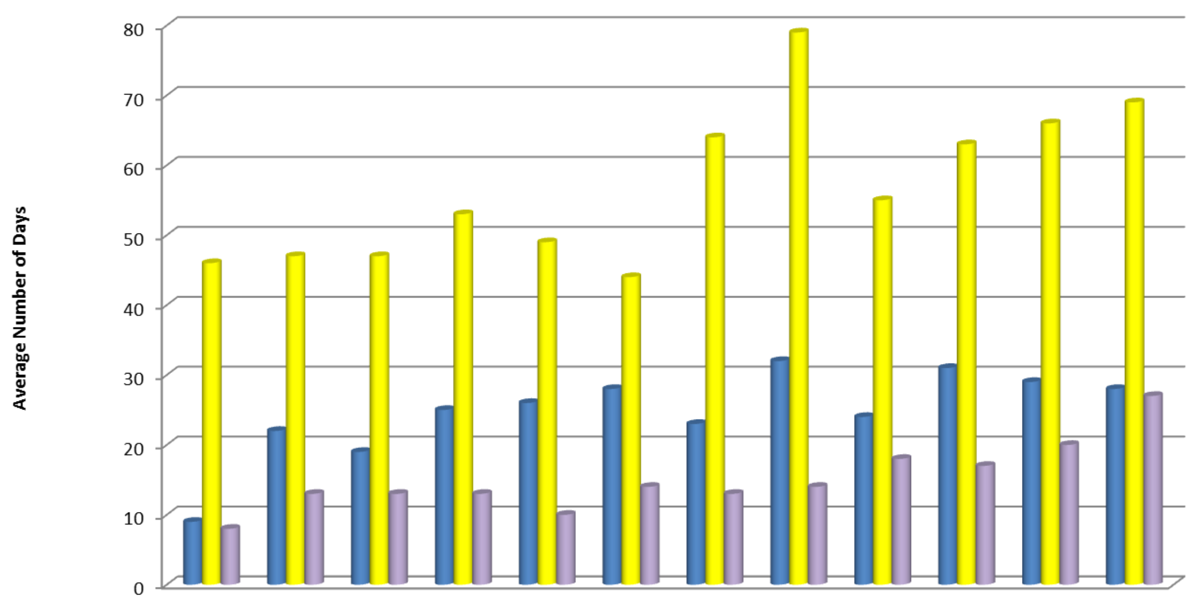
Acquisition and Business Services (ACQ) is led by FAA's Federal Acquisition Executive (FAE) and serves as the executive agent for FAA's Acquisition Management System (AMSACQ directly supports a variety of cost savings, efficiency targets, and government-wide acquisition and procurement initiatives established by OMB, DOT, and FAA.

As required by the FAA AMS, ACQ manages the investment decision making process for all investment decision authorities including the Joint Resources Council (JRC). The JRC is the FAA's investment review board. The FAA's investment management process ensures that capital investments including NextGen and other major systems acquisitions are properly evaluated and documented.

ACQ supports over 4,000 acquisition professionals throughout the acquisition lifecycle to achieve and maintain professional development and certification for critical acquisition functions. These critical positions include Contracting Officers, Program Managers, IT Specialists, Engineers, and Financial Specialists. ACQ develops and maintains the FAA's Acquisition Workforce Strategy; maintaining nine competency models and the tools necessary to operationalize them; managing seven certification programs; and providing over 200 training courses annually. This ensures that our acquisition professionals are able to perform at the highest levels required to procure, accept, develop, and deliver the programs that result in the safest aviation transportation system in the world.

As demonstrated in the metrics and information below, ACQ is consistently one of the top performers across its peer group and across the government.

The illustrations below provide a few samples of key measures:



	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
Purchase Order	9	22	19	25	26	28	23	32	24	31	29	28
Contract	46	47	47	53	49	44	64	79	55	63	66	69
DO/TO/BPA Call	8	13	13	13	10	14	13	14	18	17	20	27

Figure 1 - ACQ Time to Award

Figure 1 presents the average numbers of days to issue purchase orders and award contracts within ACQ in relation to Defense Contract Management Agency (DCMA) Estimated Acquisition Lead Time (EALT) standards for simple and complex awards.

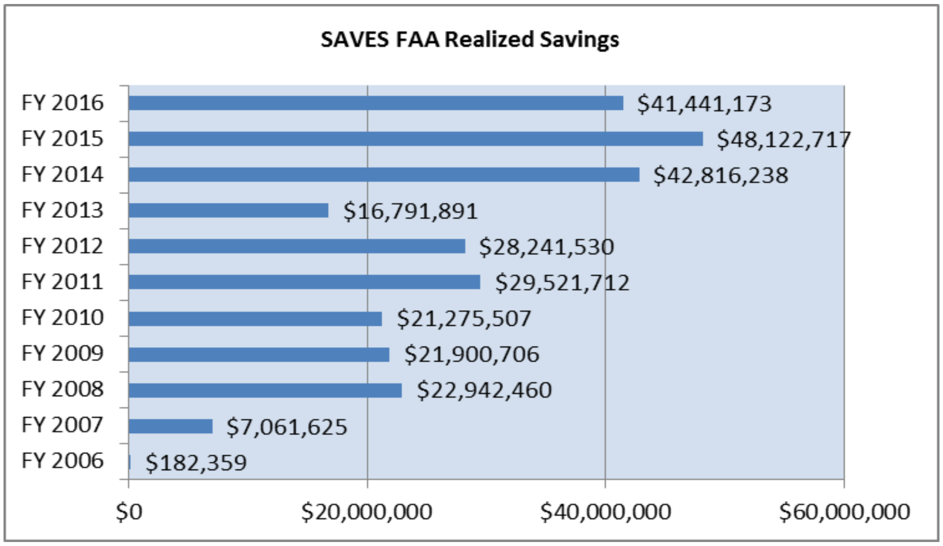


Figure 2 - SAVES Realized Savings

Figure 2 presents the FAA's historical savings realized through the use of select Strategic Acquisition of Various Equipment and Supply (SAVES) vendors with predefined cost savings and refunds.

ACQ works to meet the FAA's goals for small businesses including small disadvantaged, women-owned and service-disabled veteran-owned small business goals. The FAA has established a performance metric of 25 percent of total contract funding to be awarded to small businesses. In Fiscal Year 2016, the FAA exceeded all small business goals.

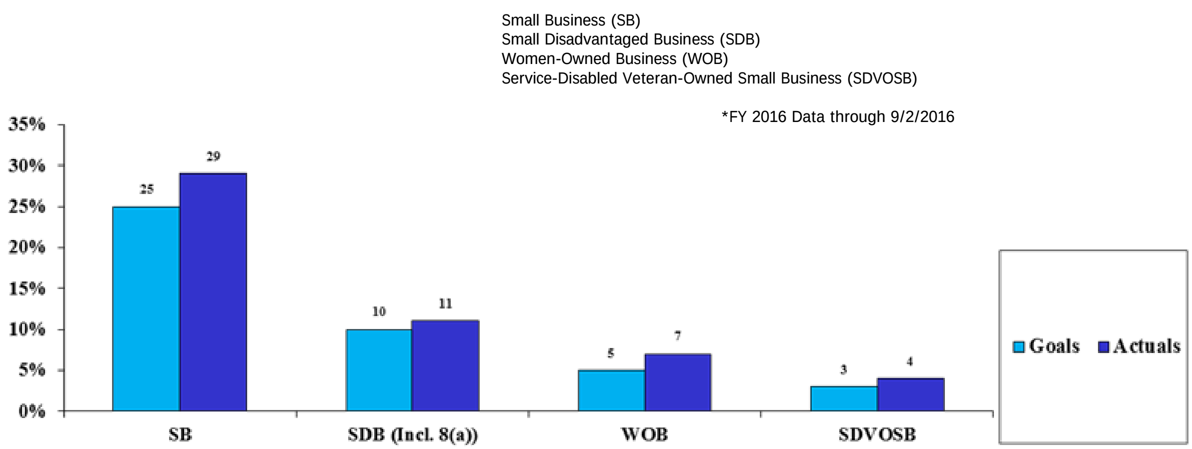


Figure 3 - Small Business Goals and Achievements

Figure 3 - Small Business Goals and Achievements – provides the actual percentage of contract funds awarded to small businesses for the respective year in comparison to the agency goal.

Anticipated FY 2017 Accomplishments:

Function	FY 2017 Anticipated 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. ▪ 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; ▪ Ensure contractor performance in accordance with contract terms and conditions, issue contract modifications, and monitor contract deliverables; and ▪ Reinforce subcontracting policies and requirements.
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; ▪ Identify opportunities to reduce 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; ▪ Provide direct cost/price analysis support for contract proposals to achieve savings for agency procurements; ▪ Improve pricing analyses, resulting in best value decisions and saving for agency acquisitions; ▪ Manage audits of cost reimbursable, time & material, and labor hour contracts with an estimated value of $100 million or more; and perform audits for at least 15 percent of these type contracts with estimated values below $100 million; ▪ Conduct audits of cost reimbursable, time & material, and labor hour contracts using commercial non-DCAA sources when FAA has primary administrative financial responsibility; ▪ Coordinate application of audited cost savings to agency contracts with contracting officers; and ▪ Provide subject-matter experts for pricing to assist acquisitions with protests, claims, proper billings, and closeout; 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, and ▪ Manage processes to enable timely, proper, and best-value acquisition of goods and services supporting safe and efficient operation of the NAS.

Function	FY 2017 Anticipated Accomplishments
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 acquisition reviews for compliance with policies and procedures, and implement corrective actions where necessary; ▪ Track findings and recommendations to promote consistent implementation of FAA's process improvement and procurement integrity policies; ▪ Analyze acquisition data to formulate trends and traceable metrics; and ▪ Recommend improvements regarding agency policy and processes based on lessons learned, potential deficiencies and best practices.
FAA's Purchase Card Program	▪ Provide oversight of FAA's purchase card program to ensure compliance with regulation and policy; ▪ Promote and employ uniform standards and policy interpretation, 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	▪ Manage FAA's investment decision-making process by collaborating with NextGen and other NAS system acquisition professionals and reinforcing informed investment decisions; ▪ Ensure that AMS requirements leading to an investment decision are met prior to requests for investment decisions being presented to the Joint Resources Council; facilitate the process by serving as the Executive Secretariat of the Joint Resources Council; ▪ Plan decision meetings, document decisions made and action items assigned, tracking them to closure; and ▪ Provide documentation to internal and external stakeholders on investment decisions.
Earned-Value Management (EVM)	▪ Ensure 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; ▪ Provide training as needed to investment programs in the application of EVM; and ▪ Conduct Integrated Baseline Reviews on investment programs along with validations of contractor EVM Systems.
Post-Implementation Reviews (PIR)	▪ Ensure implementation of the Post Implementation Review (PIR) policy as outlined in the AMS; facilitate the process by serving as the PIR Quality Officer; and ▪ Conduct investment program post-implementation reviews (PIRs) and act as independent reviewer of directorate lead PIRs to assess cost, performance, and benefits baseline expectations achievement.
Acquisition Workforce Strategy	▪ Manage annual updates of FAA's Acquisition Workforce Strategy, implement strategies and initiatives and ▪ Track gains, losses, and actual on-board data for personnel in the

Function	FY 2017 Anticipated Accomplishments
	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, implement, 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.

What does this funding level support?

The funding in this request allows ACQ to execute contractual actions on behalf of the FAA and other external customers. ACQ will continue to be involved in 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. The FAA contracted for more than $4.6 billion in goods and services in FY 2016 through approximately 25,000 procurement actions accomplished by warranted and certified Contracting Officers. It is essential that this work is funded. ACQ provides certified acquisition professionals to ensure all systems, equipment, material and services conform to the technical requirements established in the contract. FY 2018 funding will further allow ACQ to strengthen and streamline acquisition policy and processes and provide adequate procurement action oversight throughout the Agency. The FY 2018 budget request will allow ACQ to deliver its program and meet its mission requirements.

FY 2018 Anticipated Accomplishments:

Function	FY 2018 Anticipated 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. ▪ 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; ▪ Ensure contractor performance in accordance with contract terms and conditions, issue contract modifications, and monitor contract deliverables; and ▪ Reinforce subcontracting policies and requirements.
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; ▪ Identify opportunities to reduce 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.

Function	FY 2018 Anticipated Accomplishments
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; ▪ Provide direct cost/price analysis support for contract proposals to achieve savings for agency procurements; ▪ Improve pricing analyses, resulting in best value decisions and saving for agency acquisitions; ▪ Manage audits of cost reimbursable, time & material, and labor hour contracts with an estimated value of $100 million or more; and perform audits for at least 15 percent of these type contracts with estimated values below $100 million. ▪ Conduct audits of cost reimbursable, time & material, and labor hour contracts using commercial non-DCAA sources when FAA has primary administrative financial responsibility; ▪ Coordinate application of audited cost savings to agency contracts with contracting officers; and ▪ Provide subject-matter experts for pricing to assist acquisitions with protests, claims, proper billings, and closeout; 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; ▪ Manage, revise, and strengthen FAA's AMS to ensure acquisition policy and guidance complies with applicable laws and other directives through quarterly updates; and ▪ Manage acquisition processes to enable timely, proper, and best-value procurement of goods and services supporting the safe and efficient operation of the NAS.
Strategic Sourcing	▪ Implement strategic sourcing contracts and other strategic acquisition initiatives to realize cost control DOT-wide; ▪ Continue to implement and expand the use of SAVES by FAA and DOT to streamline the procurement process and realize cost efficiencies; ▪ Establish sourcing vehicles that realize administrative efficiencies and meet agency needs in a streamlined and consistent manner; ▪ Target a DOT FY2018 cost avoidance of $113M for SAVES; and ▪ Promote the expanded use of environmentally preferable products and services through "Green" requirements and processes embedded in strategic sourcing contracts.
Acquisition Oversight	▪ Perform periodic nationwide contract acquisition reviews for compliance with policies and procedures, and implement corrective actions where necessary; ▪ Track findings and recommendations from reviews to promote consistent implementation of FAA's process improvement and procurement integrity policies; ▪ Analyze acquisition data to formulate trends and traceable metrics that identify areas for improvement to leverage government leading practices; and ▪ Recommend improvements regarding agency policy and processes based on lessons learned, potential deficiencies, and best practices.
FAA's Purchase Card Program	▪ Provide oversight of FAA's purchase card program to ensure compliance with regulation and policy;

Function	FY 2018 Anticipated Accomplishments
	▪ Promote and employ uniform standards and policy interpretation, and identify and take appropriate action against improper use; and ▪ Increase usage of purchase cards by raising the micro-purchase threshold which will increase cost savings.
Investment Decision Process & Acquisition Program Governance	▪ Manage FAA's investment decision-making process by collaborating with NextGen and other NAS system acquisition professionals and reinforcing informed investment decisions; ▪ Ensure that AMS requirements leading to an investment decision are met prior to requests for investment decisions being presented to the Joint Resources Council; facilitate the process by serving as the Executive Secretariat of the Joint Resources Council; ▪ Plan decision meetings, document decisions made and action items assigned, tracking them to closure; and ▪ Provide documentation to internal and external stakeholders on investment decisions
Earned-Value Management (EVM)	▪ Ensure 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; ▪ Provide training as needed to investment programs in the application of EVM; and ▪ Conduct Integrated Baseline Reviews on investment programs along with validations of contractor EVM Systems.Conduct Integrated Baseline Reviews on investment programs along with validations of contractor EVM Systems.
Post-Implementation Reviews (PIR)	▪ Ensure implementation of the Post Implementation Review (PIR) policy as outlined in the AMS; facilitate the process by serving as the PIR Quality Officer; and ▪ Conduct investment program post-implementation reviews (PIRs) and act as independent reviewer of directorate lead PIRs to assess cost, performance, and benefits baseline expectations achievement.
Acquisition Workforce Strategy	▪ Provide the annual update of the FAA's Acquisition Workforce Strategy, implement 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, implement, 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.

What benefits will be provided to the American public through this request?

Acquisition and Business Services procures the goods and services to support the safe and efficient operation of the NAS. In FY 2016, 90 percent of our major system investments were on budget and schedule. Our goal is to maintain this level of service for FY 2017 and FY 2018. ACQ has undertaken initiatives to strengthen our capabilities in managing our systems acquisition programs by incorporating key practices into our investments and operational review processes. The capabilities and services that ACQ provides enables programs to procure and accept delivery of goods and services from over 12,000 different vendors in the most cost effective manner to the American taxpayer.

The acquisition of all FAA aviation related systems, services, and applicable infrastructure support the FAA's Make Aviation Smarter and Safer priority and benefit the long term safety of the flying public. 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.

In FY 2016, ACQ led a comprehensive review of the delivery, training, structure and content of AMS. The effort, called AMS 2016, analyzed AMS and its processes. The result of the comprehensive review confirmed that our AMS represents best practices across Government and private industry, effectively supports the changing business needs of FAA stakeholders, and efficiently delivers requirements to achieve the FAA mission. The unique authority offered under AMS has allowed the FAA to establish DOT-wide strategic sourcing and cost avoidance programs like the SAVES program, which through September 2016 has generated DOT a cost avoidance of over $252 million.

FAA's UAS activities are in direct response to public and private concerns and interest in the balance of the need to protect aircraft, to prevent unsafe events involving UAS, and to regulate UAS operations, while balancing the private and commercial opportunity presented by UAS. Contracting Specialists are necessary to ensure compliance with procurement laws and deliver best value to the taxpayer when FAA acquires systems, services, and expertise related to FAA's UAS responsibilities.

Detailed Justification for –Information Services (AIT)

What is the request and what funds are currently spent on the program?

FY 2018– Information Services (AIT)
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Office of AIT				
Salaries and Expenses	107,105	109,590	109,286	-304
Program Costs	193,486	187,170	187,615	445
Total	**$300,591**	**$296,760**	**$296,901**	**$141**

The FY 2018 funding request of $296,901,000 is for the costs of sustaining critical operations and systems, integrating effective new technology, and achieving efficiencies throughout AIT. Requested funds cover Information Technology (IT) federal staff, contract IT services, purchase and maintenance costs for hardware and software technology and IT mission support for infrastructure operations in Headquarters, Centers, Regions and Lines of Business (LOB) field facilities.

What is this program and why is it necessary?

AIT is the shared service provider for information technology across the FAA and is responsible for providing IT services, as well as accessible, reliable, and secure information to over 45,000 FAA employees, and approximately 10,400 federal contractors. As of April 2016, AIT maintains a current inventory of 321 Federal Information Security Management Act (FISMA) reportable systems, of which 72 are marked as mission critical (40 NAS and 32 Non-NAS systems).

As the number of public facing information systems grow, AIT currently remains focused on maintaining a transparent government, making agency data and information more available and accessible. Data on 75 FAA systems is public facing in searchable, sortable and downloadable format. This transparency requires AIT to assist LOBs in the development of custom applications, provide website support and hosting services, manage and store data for analytics, reports, and statistics. This is accomplished while maintaining systems and information security, privacy, and the protection of proprietary information.

AIT collaborates with other lines of businesses (LOBs) in support of agency mission to make aviation safer, more efficient, reliable, and secure. This includes supporting 61 Air Traffic (ATO) systems within En-Route and Visual Charting, Instrument Flight Procedures and Aeronautical Information Systems, as well as implementing innovations to the Aviation Safety (AVS) Regulation and Certification Infrastructure for System Safety (RCISS), Aviation Safety Knowledge Management Environment (ASKME).

FAA continues to focus on cyber security to ensure that critical FAA non-NAS systems, networks and infrastructure are designed and operated to ensure confidentiality, integrity and availability across the organization. This not only includes the mission critical systems, but the interdependencies of systems that connect or provide support.

The FAA operates under conditions of increased cyber terrorism and malicious activities by hackers and other unauthorized personnel. The Homeland Security Presidential Policy Directive 21 identifies the NAS as one of 16 critical infrastructure sectors and directs FAA to protect and ensure the integrity, confidentiality, and availability of all NAS Information Systems. Under the Federal Information Security Management Act of 2002, FAA must identify and provide information security protection commensurate with the risk and magnitude of potential harm that could result from unauthorized access, use, disclosure, disruption, modification, or destruction of information that supports the agency, aviation safety and security, and the NAS. The FAA Information Security & Privacy (IS&P) Directorate is a partnership between the FAA Chief Information Officer's organization and other FAA lines of business and staff offices (LOBs/SOs) with a focus on protecting FAA information and infrastructure.

FY 2017 Anticipated Accomplishments:

Function/Activity	FY 2017 Accomplishments
Technology/Infrastructure:	▪ Provide customers access to data anytime anywhere and on any approved device through Cloud computing; enable AIT to "leapfrog" from current more costly and dated technologies to platforms that provide our customers with more efficient and agile IT capabilities and services. In FY 2017, 100 percent FAA employees and contractors will be MyAccess compliant to enhance mobility capabilities. ▪ Leverage mobile and collaborative technologies such as smartphones, tablets, SharePoint, video-conferencing, social networks, and open portal blogs to deliver more transparent, accessible, productive and cost effective solutions to support the mission. ▪ Transition to three Cloud Deployment Models to meet agency, industry and public user security and operating needs. The models will serve the entire agency, both NAS and Non-NAS systems and users. In FY 2017, 50% of Tech Center, Mike Monroney Aeronautical Center and HQ IT infrastructure will be migrated to the cloud, and 100% of SharePoint/Knowledge Service Network (KSN) will transition to the cloud. ▪ Transition the Enterprise Information Management (EIM) Enterprise Capability (EC) from a demonstration environment into a pre-operational environment to include initiation of the required security work to obtain the Authority to Operate (ATO), provision of a development environment to maintain and introduce new capabilities. ▪ The EC establishes a foundation for the FAA to move to a service oriented IT organization; it allows enterprise-level data/information to be more easily discoverable and securely accessible to consumers both internal and external to FAA, including Air Traffic Safety analysis, incident investigation, risk and predictive analysis. ▪ Ensure 100 percent of "high-value" FAA data are recorded in the Federal Data Register. ▪ Develop applications for Web and Collaboration Services, Enterprise Information Management (EIM), Cybersecurity, Continuity of Operations (COOP) and other related services as needed for ATO and AVS as identified in the FAA Reauthorization Bill, and in support of the following FAA mission critical requirements: o Safety Data – make Aircraft Certification Performance, Centralized Safety Guidance Database and Flight Standards Performance data available to the public in a searchable, sortable, and downloadable format through the Internet Web. o Develop and modernize the NOTAM repository. o Unmanned Aerial Systems (UAS): Develop the Identification Standards and Commercial and Government Operators database and provide analysis. o Enhance Aviation Safety Information Analysis and Sharing (ASIAS): support the predictive capabilities of the program to identify precursors to

	accidents. o Improve Online Access to Aviation Consumer Protection Information.
IT Risk Management and Information Systems Security	▪ Assure consistent risk acceptance decisions by using metrics to identify the impact classifications of cyber incidents based on US-CERT Federal Incident Notification Guidelines and continue oversight by the Cybersecurity Steering Committee. ▪ Address 80 percent of high value threats and vulnerabilities within 30 days using the National Institute of Standards and Technology (NIST) mitigation protocols. ▪ Visualize vulnerabilities on all IP based systems: enhancements to the cybersecurity data visualization dashboard to include information about all three operating domains to provide near real-time information about the agency's hardware, software, and vulnerabilities ▪ Evaluate solutions and services to achieve Continuous Diagnostics and Mitigation (CDM) Phase 2; "Least Privilege and Infrastructure Integrity" goals established by the Department of Homeland Security (DHS): o Enhance network access control management, credentials and authentication management, account access management, and security-related behavior management o Deploy and maintain CDM capabilities and tools that increase network sensor capacity, automate sensor collections, and prioritize risk alerts. ▪ Validate full packet capture capability at two strategic network points. ▪ Integrate advanced and evolved vulnerability and United States Government Configuration Baseline (USGCB) scanning within the FAA's Internet Protocol (IP) based networks. ▪ Conduct software code vulnerability security analysis on 120 legacy and developmental agency systems. ▪ Provide/conduct Security and Privacy Awareness training to FAA personnel and contractors. ▪ Perform Security Assessments, conduct incident response, tests, scans, simulation exercises, analysis and compliance reviews to ensure information security and privacy of all FAA non-NAS systems. ▪ Identify/validate FAA's privileged user accounts for the FISMA defined categories (System, Network and Database Administrators) for all three operating domains. ▪ Focus on remediation for weaknesses highlighted by the FY15 Dyre malware incident: Ensure timely responses and design and implement enhanced on-line and role-based training for all personnel and contractors. ▪ Implement several GAO Information Security audit recommendations (GAO-15-221 - January 29, 2015 and GAO-15-370 - April 14, 2015), including risk mitigation associated with interconnectivity between NAS and Non-NAS systems.

	▪ Establish a rapid and effective response to intrusions through the increased use of IP based communications, enhanced training and communication, and increased testing.
Employees Resource Optimization	• Deliver more accessible, productive, and cost effective solutions to support the FAA air traffic and safety mission by leveraging mobile and collaborative technologies such as smartphones, tablets, and collaborative software. Expand wireless capabilities to the remaining FAA facilities to accomplish 100 percent implementation throughout the Agency. • Enable our customers to work together, engage with stakeholders, and increase cross-Division and LOB communications by promoting a social collaboration environment. • Implement cooperative learning and collaborative methods of instruction by using cloud solutions for new options, a significant amount of flexibility and scalability, and at a more manageable cost.

What does this funding level support?

The agency received 23 billion cyber alerts over the last twelve months; each of which is categorized and managed on the basis of the risk. Each high-risk determination triggers a full investigation, analysis and reporting. Requested funding levels are essential to the FAA to ensure the integrity and availability of all critical systems, data networks, and infrastructure. The requested funding supports:

- The cybersecurity program that protects the agency data and systems;
- AVS programs that ensure aviation safety data is reliably collected, stored and transmitted;
- The EIM program:
  - to allow enterprise-level data/information to be more easily discoverable and securely accessible to consumers both internal and external to FAA, and
  - to provide an efficient and effective framework for sharing and analyzing internal and external data.

Ensuring cybersecurity for our networks and data will remain an ongoing effort. We will continue to strengthen ties with our cybersecurity partners in the Departments of Transportation (DOT) and Homeland Security (DHS) in our efforts to harden our systems.

While heightened connectivity has transformed and improved access to government data, it has also increased the extent and complexity of the cybersecurity risk. As directed by Congress, DHS will work with departments and agencies to implement Continuous Diagnostic Mitigation (CDM) in a consistent manner that demonstrates measurable cybersecurity results and leverages strategic sourcing to achieve cost savings. In FY 2018, AIT will continue collaboration with DHS to implement Phase 2 of the CDM program, which fortifies FAA internal and public facing systems through network access control management, credentials and authentication management, account access management, and security-related behavior management. Working with DHS, the FAA CDM program provides risk-based and cost-effective cybersecurity, and more efficiently allocates cybersecurity resources.

The transition to the CDM program will inform Agency leaders, and provide timely, targeted, and prioritized information to enable high-risk vulnerability identification and mitigation. Subject Matter Experts from the Security Operations Center (SOC) Advanced Threat Analysis Group (ATAG) will provide comprehensive cyber threat intelligence analysis capability in response to a range of advanced and sophisticated cyber threats.

Organizational changes and efficiencies gained throughout the transition to shared services have afforded AIT the ability to develop enterprise-wide initiatives and apply solutions to multiple LOBs/SOs. As part of the "Total Access," AIT will work collaboratively with other LOBs, including NAS ATO and AVS mission support programs such as

Aeronautical Information Systems, Terminal and Air Traffic Products and RCISS and ASKME, to support aviation safety applications that impact all national and international aerospace activity.

AIT will support AVS devices, IT infrastructure components, and specialized software applications for over 7,000 AVS safety workers. AIT will also support the National Offload Program (NOP) to improve public safety by providing NAS flight data to Safety Analytics and Controller Training applications. The data made available by NOP is leveraged in Safety Investigations, Loss of Separation Analysis & Congressional Reporting, Search & Rescue Operations, Approach & Departure Efficiency, and many more functions.

FY 2018 funding will provide operations and maintenance activities for agency-wide infrastructure computing power, support multiple application systems that are used by all personnel to conduct work, and all security and privacy controls and protections to keep FAA data and systems safe, accessible and reliable.

The EIM system phase 4 (enterprise operations and innovation) will continue to conduct change management actions to ensure successful system implementation. EIM is a FAA-wide initiative backed by the FAA Business Council which includes executives within each Line-of-Business. AIT customers will be able to more easily find, access, and analyze the information needed to make important business and operational decisions by focusing on employing enterprise information management best practices and data/information management capabilities and services. EIM is an integrative discipline for structuring and governing information assets across organizational and technological boundaries to improve efficiency, reduce costs, promote transparency and enable business insight.

AIT will enhance and expand core services as necessary to meet agency and Departmental mandates and initiatives. In FY 2018, 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. The values that enable these activities 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.

In FY 2018 IT efficiency and quality of service will continue to increase as AIT leverages access to centralized expertise and infrastructure and achieves a higher degree of transparency and accountability. Economies-of-scale within each IT function is enabled while standardizing processes and eliminating redundancies. AIT and the SOC remain focused on maintaining the safest air transportation system in the world through an Enterprise Shared Services approach.

FY 2018 Anticipated Accomplishments:

Function/Activity	FY 2018 Anticipated Accomplishments
Optimize Information Access through Technology Innovation	▪ Transition to Cloud Deployment Models to meet agency, industry and public user security and operating needs. In FY 2018, additional 25% of Tech Center, AMC and HQ IT infrastructure will be migrated to the cloud, and SharePoint/Knowledge Service Network (KSN) transition to the cloud will be completed. Cloud based community Storage will be available with 50% of shared drive data migrated to it. ▪ Establish a program for bandwidth funding, implementation and governance including continuous re-assessments and upgrades on the Mission Support network. Approximately 50% of circuits will be upgraded.

	▪ Consolidate usernames and passwords for Internal and External Users into a common logon page that supports computers and mobile devices with secure, multi-factor authentication. ▪ Build on progress for Internal Users to use their federal PIV smartcards to access entry points to the internal network, information systems, and applications. ▪ Build on progress for External Users such as aircraft pilots and mechanics to use secure, multi-factor authentication to access FAA's information systems and applications. ▪ Implement phase 4 (enterprise operations and innovation) EIM program and ensure the successful implementation of the system by conducting change management actions. ▪ Provide application development, Web and Collaboration Services, Enterprise Information Management (EIM), Cybersecurity, Continuity of Operations (COOP) and other related services in support of FAA mission critical requirements: o Safety Data – Aircraft Certification Performance, Centralized Safety Guidance Database and Flight Standards Performance make data available to the public in a searchable, sortable, and downloadable format through the Internet Web. o Continue developing and modernizing the NOTAM repository. o UAS: Identification Standards and Commercial and Government Operators database and analysis. o Enhance Aviation Safety Information Analysis and Sharing (ASIAS): support the predictive capabilities of the program to identify precursors to accidents. o Improve Online Access to Aviation Consumer Protection Information.
IT Risk Management and Information Systems Security	▪ Update Notices, Policies, Orders, Directives, such as SORN (System of Records Notice), Privacy Management Process, Privacy Appeal Process, Cyber Incident Response Process. ▪ Collaborate with AIT service offices to update the FAA's security architecture in accordance with FAA's and Federal's enterprise architecture framework. ▪ Validate full packet capture capability at two strategic network points. ▪ Conduct incident response, tests, scans, simulation exercises, analysis and compliance reviews to ensure information security and privacy of all FAA information systems. ▪ Validate FAA's privileged user accounts for the FISMA defined categories (System, Network & Database Administrators) for all three operating domains. ▪ Evaluate solutions and services to achieve Continuous Diagnostics and Mitigation (CDM) Phase 3 goals. ▪ Implement Risk Based Decision Making (RBDM) during logon so that systems ask a live person to investigate suspicious activity.

	▪ Enable FAA personnel in foreign locations with access using Department of State issued smartcards if PIV smartcard is not feasible.
Employee Resource Optimization	▪ Enhance the FAA process for new hire computer and network user accounts setup by using the same process FAA uses for departing personnel. ▪ Support and promote a social collaboration environment, enabling our customers to work together and engage with stakeholders, and increase cross-Division and LOB communications. ▪ Identify and remediate operational and technical risk to improve the Application Enterprise Repository. Gather and analyze an expanded set of data about the application portfolio resulting in a better managed portfolio. Identify technology reaching end of life, better track security vulnerabilities, and capitalize on opportunities for application rationalization and migration to the Cloud.

What benefits will be provided to the American public through this request?

AIT operates and maintains systems that benefit the American public and directly support the NAS. For most Americans, faa.gov and related sites are the public face of the FAA. Accessible, searchable, and reliable databases developed and maintained by AIT include on-line USA registration and safety guidance, aviation consumer protection information, air ambulance operations, and passenger air service improvements. In developing database information security and user access management, AIT projects as many as 10 million unique and repeat users by 2018.

Within the aviation community, AIT supports safety mission goals through direct support to the NAS. For example, RCISS provides the infrastructure vital for the safety workforce to enable access to safety data, at the time and location needed to assess safety factors in real-time. The ASKME program provides Aircraft Certification Service aviation safety professionals with a repository of critical safety technical information and data, as well as analysis tools for knowledge collection, dissemination, and analysis. The Navigation Procedures project (NAVLean) improves and streamlines Instrument Flight Procedure (IFP) processes, and enables operational initiatives that minimize equipment and procedure outages at airports nation-wide. AIT's support and maintenance programs such as NOP improve public safety by providing NAS flight data to Safety Analytics and Controller Training applications.

AIT's public facing systems and IT infrastructure that support the NAS and FAA's people are essential components of an effective air transportation system that the American public relies on every day.

Detailed Justification for –Regions and Property Operations (ARO)

What is the request and what funds are currently spent on the program?

FY 2018 – Regions and Property Operations (ARO)
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Office of ARO				
Salaries and Expenses	71,222	55,649	53,557	-2,092
Program Costs	217,186	188,657	191,170	2,513
Total	**$288,408**	**$244,306**	**$244,727**	**$421**

For FY 2018, $244,727,000 is requested for FAA's Deputy Assistant Administrator for Regions and Property Operations (ARO). The request provides for base salaries, locality, and benefits and requests additional funding for FY 2018 pay-related increases. Non-pay inflation of $2,513,411 covers costs associated with escalation costs of the General Services Administration (GSA) and FAA direct lease portfolios.

Current funding provides ongoing regional facility and emergency operations, real property management and support, personal property management and support, training and other critical services to both internal and external customers for the FAA. As a shared services provider ARO has the lead role and responsibility of Property Management Official for the FAA as currently defined in FAA Order 4600.27C "Personal Property Management."

What is this program and why is it necessary?

ARO offices are located at the Washington headquarters and each of the nine regions.

Regional Administrators and their staffs represent the Agency among regional stakeholders that include, but are not limited to military services, aviation industry, government agencies, and aviation organizations, elected officials, educational institutions, and civic and private groups. The Regional Administrators serve as local representatives for the FAA Administrator and they are responsible for communicating with FAA's internal and external customers, disseminating information, and answering inquiries. Regional Administrators also manage the Regional Operations Centers (ROCs). ROCs provide critical 24/7/365 crisis response capability, immediate command, and control for all incidents related to National Air Space (NAS) continuity. They monitor all Air Traffic events (Mandatory Occurrence Reports – MORs) and make appropriate notifications to Air Traffic offices in the service centers. Upon notification of an aircraft accident or incident, they make notifications to regional Flight Standards Offices and local Flight Standards District Offices (FSDOs). Additionally, when requested, they establish communication conferences to obtain, analyze, and relay DOT crisis response capabilities information so that all involved FAA participants are kept informed enabling timely decision-making.

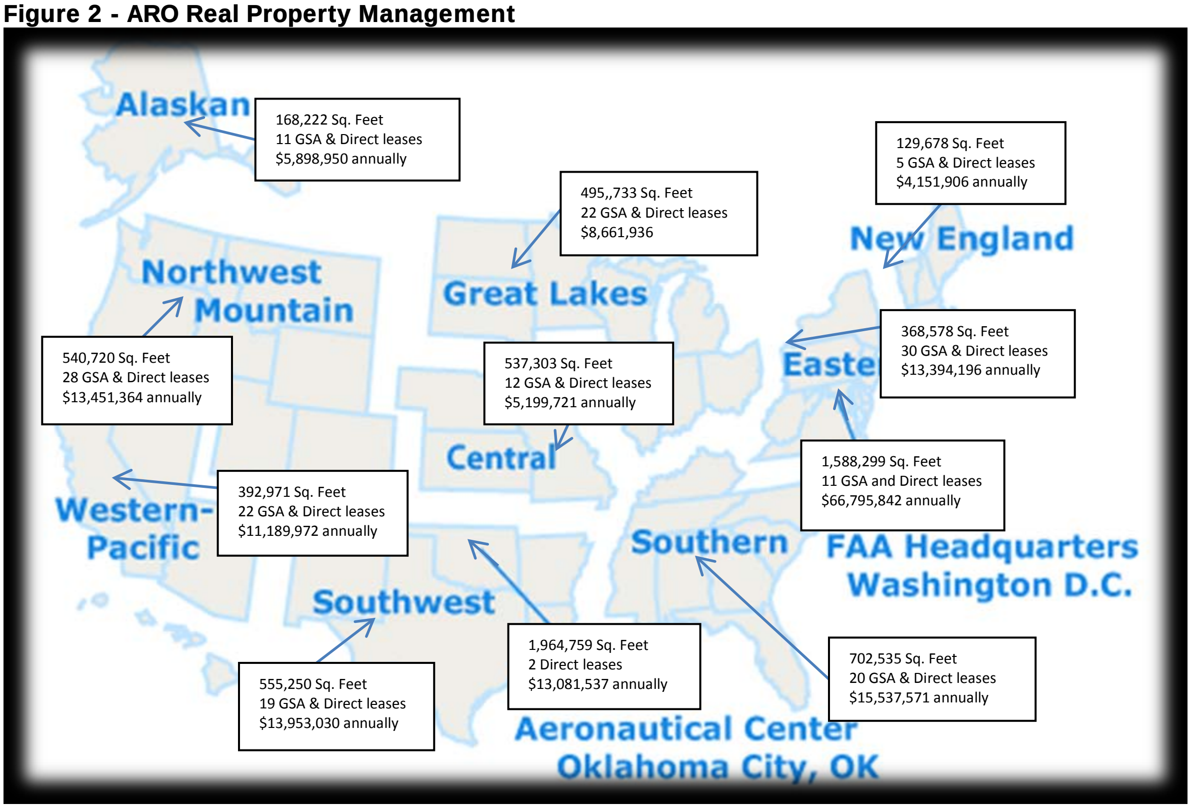
Real property management services are provided in support of the FAA. ARO maintains the Department-wide inventory of real property and the data and performance measures associated with more than 58,300 buildings, structures, and land parcels. These include administrative offices, structures, and land leases for NAS operational sites. ARO establishes customer commitment agreements with customers for ARO's real property management responsibilities. This includes overseeing administrative space leases within each of the nine regions administered by the GSA and field facilities for the Agency's Aviation Safety (AVS) and Security Hazard Material (ASH) organizations.

Executive branch departments and agencies are required to establish clear goals and objectives to promote the efficient and economical use of America's real property assets and to assure management accountability for improving Federal real property management. The FAA has the lead responsibility for the DOT, and within the FAA, ARO leads the Federal Real Property Asset Management initiative. Assets that are surplus, not mission critical, in poor condition, under-utilized, and/or reflect high annual operation and maintenance costs are considered candidates for disposition. Real Property Asset Management continues to be one of the six agency wide initiatives - http://www.performance.gov/initiative/manage-property/home. On March 25, 2015, OMB released the ***National Strategy for Real Property*** and the companion ***Reduce the Footprint***. The National Strategy is a three-step framework to improve real property management:

1) freeze growth in the inventory,
2) measure performance to identify opportunities for efficiency improvements through data driven decision-making, and
3) reduce the size of the inventory by prioritizing actions to consolidate, co-locate, and dispose of properties.

Since 2006 the removal of real property assets worth more than $763 million from the FAA portfolio has reduced the Agency's operation and maintenance costs by more than $77 million. The graph below depicts ARO's GSA and Direct Lease Portfolio across the country.

Figure 2 - ARO Real Property Management



Notes: Total square footage is reported as it appears in the Real Estate Management System (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 are antennas, parking leases, service contracts, and operating expense contracts.

Personal Property management provides support in leading and integrating logistics initiatives within the FAA and the DOT. ARO establishes and oversees the agency's property management system for the management and physical control of over $7 billion in global agency assets throughout the National Airspace System and international facilities. This includes providing national policy, guidance, training, and automated system support and program oversight of agency-wide assets (leased and owned) from the point of delivery to retirement. All property is inventoried and the records are maintained in support of the agency's Capitalization Program.

ARO support provides for securing, operating and maintaining all GSA buildings; managing the nationwide rent portfolio, and the design and construction of all administrative space. Additionally, ARO manages the Agency wide mail program, the government furnished property program, the motor vehicle fleet program, parking programs, and transit benefits programs.

FY 2017 Anticipated Accomplishments:

Function / Office	FY 2017 Anticipated Accomplishments
Regional Administrators ▪ Regional Operations Centers (ROCs)	▪ Conduct two 8-hour Service Area ROC transfer of operations exercises to maintain and enhance emergency preparedness; ▪ Conduct two ROC Emergency Operations Facility (EOF) exercises at the Service Center EOFs; ▪ Conduct one DOT Crisis Management Center (CMC) devolution exercise with the Southern Region Operations Center covering operations for the CMC; and ▪ Conduct one FAA Washington Operations Center (WOC) devolution exercise with the Southwest Region Operations Center covering operations for the WOC.
Real Estate and Personal Property ▪ **Real Estate Management**	▪ Ensure that 100% of 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; ▪ Complete 95 percent of the annual real property inventory target and report to DOT; and ▪ Achieve 32,000 square feet space reduction goal across FAA administrative space.
▪ **Personal Property Management**	▪ Develop standardized method for assessing the performance of the management of agency owned assets in a structured and consistent manner to identify opportunities for improvement, determine compliance with federal regulations and policies, and assure that adequate management controls are in place; ▪ Develop management indicators that measure adequacy of property management policies and procedures, staffing and training, performance review and improvement program; and, ▪ Develop performance targets that measure the quality and appropriateness of property management activities, staff productivity, and adequacy of checks and balances.

What does this funding level support?

Requested funding will allow ARO to oversee and manage facilities at FAA Headquarters, six Regional Offices, and three Regional Service Centers. There are three Regional Operations Centers (ROCs) located in the Regional Service Centers that provide critical backup support to the NAS. The funding will:

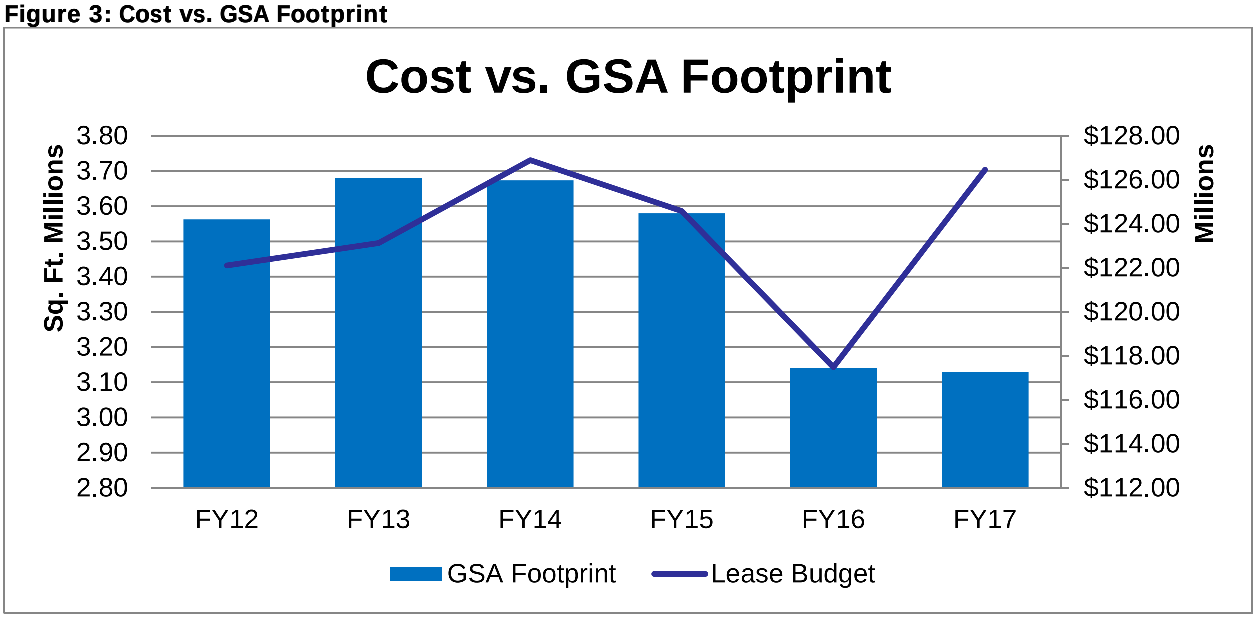
- keep facilities open, secure, and available to FAA personnel across the country; and
- keep all ROCs at peak readiness to respond to any NAS related incidents.

The request of $245 million supports $227 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, Agency wide mail services, personal property oversight and policy, and payments to the DOT working capital fund.

ARO'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. ARO is able 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 requested funding supports all of these activities conducted by FAA personnel across the country supporting all types of aviation projects.

The administrative lease portfolios include both GSA and FAA direct leases and house approximately 21,600 employees in 7.4 million square feet of space. These facilities house all Lines of Business and cover the Headquarters and DC area offices, Regional Offices, as well as field facilities for personnel directly supporting aviation operations and safety. The ARO lease requirements will increase in FY 2018 due to the contractual terms of the existing and anticipated market rates for planned leases. Lease contracts dictate increases in base rent, and operating and maintenance costs, such as utilities, real estate taxes, repairs, janitorial, safety upgrades, guard services, and required renovations. New or succeeding leases that are negotiated are subject to rising market rents. ARO's primary avenue for mitigating rising budget costs is exiting or renegotiating unfavorable or underutilized leases and relocating staff into space at the appropriate size and rent. While these ongoing efforts have produced a onetime offset credit in FY 2016 and a reduction in administrative square footage, the overall portfolio cost continues to increase. The below graph illustrates the reduction in GSA footprint and increase in lease cost for FY 2017. To note, the decrease in cost from FY 2015 to FY 2016 was due to the Agency receiving a one-time commission credit for the Southwest Regional Headquarters consolidation prospectus project. Without this one-time credit, the cost would have been significantly higher.

Figure 3: Cost vs. GSA Footprint



ARO's Regional Optimization project further enriches the "Shared Services" concept. It has identified multiple areas for realigning services and functions, 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 acquisition services as discussed under ACQ and the following ARO areas:

- Regional Operations Centers,
- Logistics and Real Estate Acquisitions,
- Aviation Education,
- International Work,
- Freedom of Information Act (FOIA),
- Budgeting, and
- Human Resource Management.

FY 2018 Anticipated Accomplishments:

Function/Office	FY 2018 Anticipated Accomplishments
Regional Administrators ▪ Regional Operations Centers (ROCs)	▪ Conduct two 8-hour Service Area ROC transfer of operations exercises to maintain and enhance emergency preparedness; ▪ Conduct two ROC Emergency Operations Facility (EOF) exercises at the Service Center EOFs; ▪ Conduct one DOT Crisis Management Center (CMC) devolution exercise with the Southern Region Operations Center covering operations for the CMC; and ▪ Conduct one FAA Washington Operations Center (WOC) devolution exercise with the Southwest Region Operations Center covering operations for the WOC.
Real Estate and Personal Property ▪ **Real Estate Management**	▪ Realize savings of the annual real property lease and purchase costs through improved business processes; ▪ Complete 95 percent of the annual real property inventory target and report to DOT; ▪ Complete consolidation of FAA personnel in 5 facilities into the new ANM Regional Office building. The Agency footprint will be reduced by 77,710 Rentable Square Feet (RSF), a reduction of approximately 21 percent. ▪ Ensure that all FAA employees engaged in real estate are trained in the latest real estate law and policies throughout the real property lifecycle; and
▪ **Personal Property Management**	▪ Ensure standardized method for assessing the performance of the management of agency owned assets in a structured and consistent manner to identify continued opportunities for improvement, compliance with federal regulations and policies, and adequate management controls are in place; ▪ Implement management performance targets that measure adequacy of property management policies and procedures, staffing and training, performance review and improvement program; and ▪ Implement performance targets that measure the quality and appropriateness of property management activities, staff productivity, and adequacy of checks and balances.

What benefits will be provided to the American public through this request?

ARO 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. ARO 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. ARO Regional Offices are actively engaged in community outreach, educating the public in Unmanned Aerial System (UAS) policies and Noise Control initiatives.

ARO is responsible for the acquisition of leases and the operations and maintenance of facilities that house all LOBs throughout the NAS. This includes key personnel safety and security services including guard services, environmental monitoring, 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.

ARO continues to make progress in greening by minimizing pollution and waste, and conserving natural resources. Embracing environmental greening initiatives not only benefits the American public now, it helps protect generations to come throughout the world.

Detailed Justification for –Mike Monroney Aeronautical Center (AMC)

What is the request and what funds are currently spent on the program?

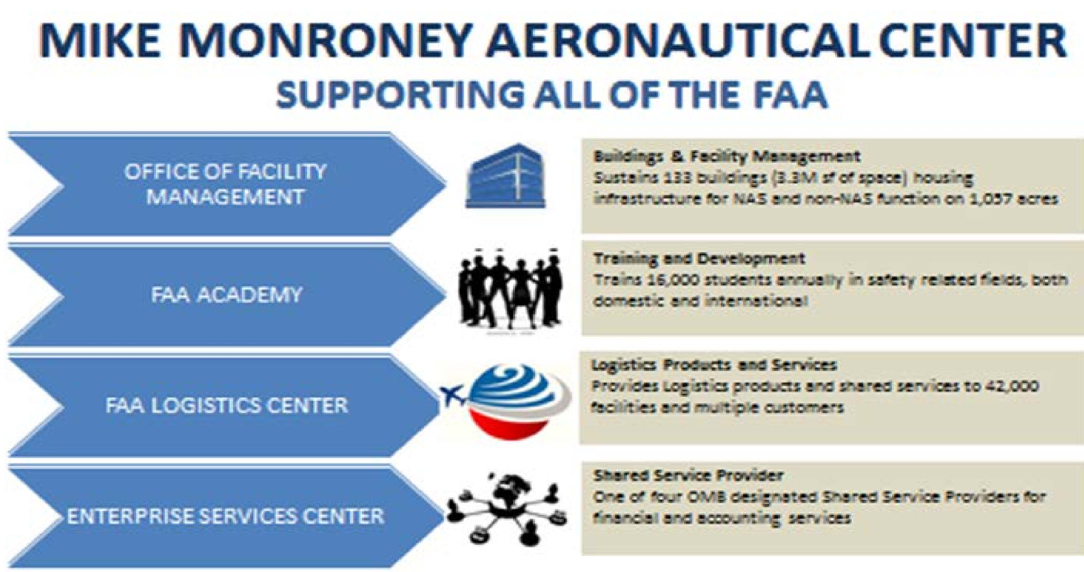
FY -2018 – Mike Monroney Aeronautical Center (AMC)
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Office of AMC				
Salaries and Expenses	-	13,281	12,934	-347
Program Costs	-	29,534	29,534	-
Total	**-**	**$42,815**	**$42,468**	**-$347**

For FY 2018, $42,468,000 is requested for FAA's Mike Monroney Aeronautical Center (AMC). In FY 2017 AMC was designated as a stand-alone functional area under the Assistant Administrator for Finance and Management with one sub-element realigning within AFN and thereby producing a slight decrease from FY 2017 to FY 2018. The request provides for base salaries and benefits including additional funding for FY 2018 pay-related increases.

Current funding provides ongoing campus, facility, environmental, safety, corporate technical training, excess and utilization of property, IT, telecommunications and associated campus-wide functional activities, and other critical services to both internal AFN and FAA LOB's and external FAA customers through cost-sharing arrangements and the FAA MMAC campus.

What is this program and why is it necessary?



The AMC program depicted above provides essential support and services to FAA's three key structures – The FAA Academy, the Logistics Center, and the Enterprise Service Center. The program funding supports the sustainment of 133 buildings located in Oklahoma City, OK that house staff and infrastructure for both NAS and non-NAS functions.

The FAA Academy is the primary provider of technical training for the Agency in direct alignment with the FAA Lines of Business and is the largest training facility within the DOT. The mission of the FAA Academy is to provide leadership in training and development of the FAA's workforce and aviation community. In fulfillment of the mission, the FAA Academy develops and conducts training courses, plans, maintains, and manages the FAA's distance learning systems, and provides training program management and consultation services.

The FAA Academy offers a wide array of training and assistance to our customers. The FAA Academy trains almost 16,000 resident students in safety related occupations annually. All FAA Academy infrastructure is managed for Air Traffic Controller training, Technical Operations training, Aviation Systems Standards training (including Air Certification), International training, and Office of Airports training programs just to name a few along with many other organizations across FAA. Funds support the operation and maintenance of the FAA Academy facilities (classroom, specialized technical labs with various levels of fidelity, and administrative space) which provide various types of required technical training, either through resident, field-delivered, managed out-of-agency training, and distance learning programs.

FAA ACADEMY TRAINING

Media Type	FY-14	FY-15	FY-16
Resident	14,950	15,700	15,643
OAT/Field-Conducted	2,356	4,415	1,872
International	616	602	672
Distance Learning			
- eLMS/eLearning	44,343	58,375	52,817
- Aviation Training Network	2,145	1,670	1,686
- Correspondence Study	1,710	2,549	3,470
- Blackboard	229	334	235
Grand Total:	**66,349**	**83,645**	**76,395**
Scheduled Offerings	**2,028**	**1,967**	**1,564**

The FAA Logistics Center (FAALC) is the primary provider for parts and logistics services in support of the Air Traffic Organization (ATO) and the National Airspace System (NAS). The FAALC manages the central NAS inventory warehouses and distribution facilities for FAA, providing routine and emergency logistics products and services to over 8,000 FAA customers at 42,000 facilities and 28,000 sites, as well as to the Department of Defense (Air Force, Navy, and Army), Department of Homeland Security (Customs and Border Protection), state agencies, and foreign countries. Supporting multiple agencies provides significant cost efficiencies associated with labor, processes, and infrastructure through economies of scale. The FAALC provides core logistics support functions including:

- Supply chain management, for approximately 62,000 National Stock Numbers (NSNs), with a net operational inventory value of $640 million;
- Centralized depot-level overhaul, maintenance and repair of NAS equipment, and on-site overhaul and maintenance for certain large systems such as towers and radar arrays;
- Storage and distribution management of NAS assets with 725,000 square feet of centralized warehouse space;
- Depot-level engineering support; and
- Agency focal point for depot-level integrated logistics planning and implementation for NAS acquisition programs.

Air traffic control systems use the products managed and repaired by the FAALC to ensure the safe and effective movement of aircraft through the NAS. The Agency is continuously seeking to improve its core logistics support functions, striving to reduce NAS asset delivery times and improve repair item quality. Expanding and improving system capabilities and performance will reduce operating costs by right-sizing the Agency's spares inventory, better managing depot throughput, and increasing visibility into vendor and parts performance. The FAALC is taking the lead in applying 2-D barcode technology to improve NAS asset visibility and tracking throughout the supply chain. Life-cycle logistics support is critical to the efficient, effective, and safe operation of the NAS. As the Agency moves toward NextGen technology, a fully-integrated logistics support approach is vital to ensure operational efficiency well into the future.

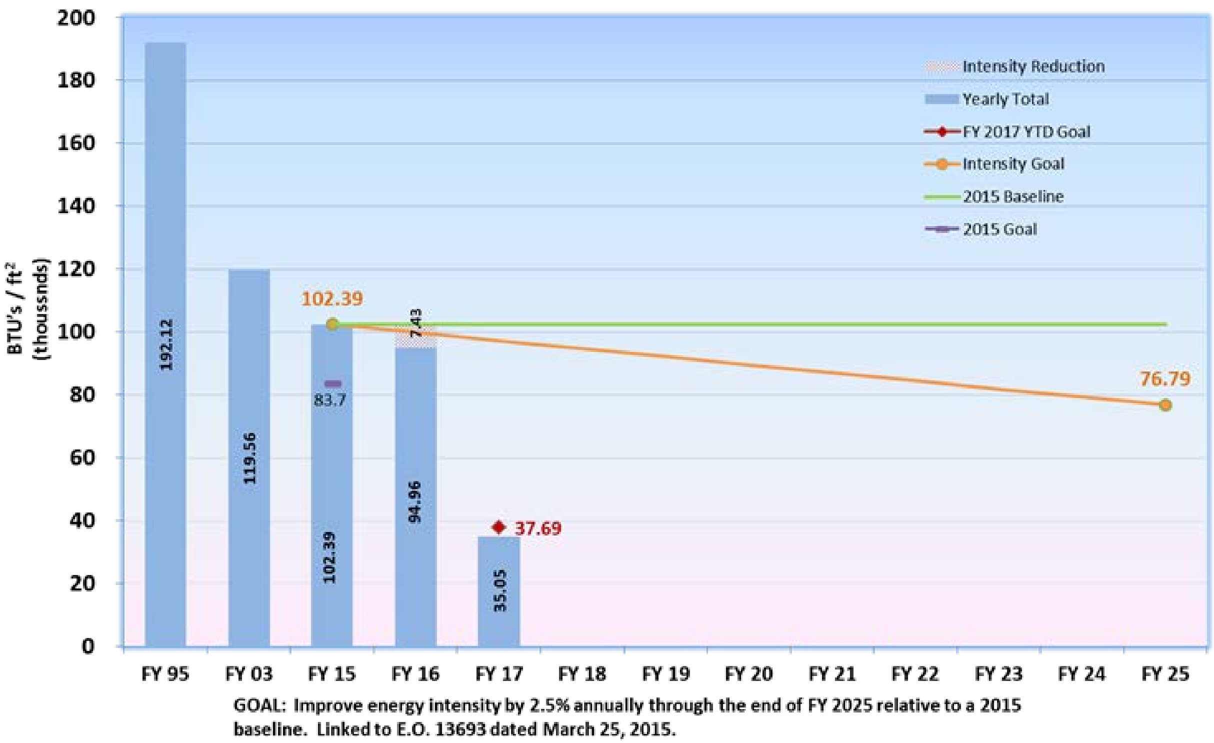
The **Enterprise Services Center (ESC)** is one of OMB's four designated Shared Service Providers for financial and accounting services within the federal sector. ESC provides comprehensive enterprise system design, and technical and administrative management of information resource programs, operations, systems and programming services for assigned national and local programs. ESC operates DOT's financial accounting system (Delphi) and procurement system (ESC PRISM) provides a range of accounting services and financial management information system services to DOT and seven other governmental agencies ESC's value lies in its ability to strengthen financial controls and transparency; improve efficiency; and standardize government services through partnerships and innovation.

The **Office of Facility Management (AMP**) provides facility oversight, operations, and maintenance for the AMC campus which is comprised of 133 buildings for a total of $3.379M square feet of space located on 1,057 acres; 7400 employees, students, and contractors; and 10-11,000 annual visitors. AMP directly supports the functions of the FAA Academy, FAA Logistics Center, and the Enterprise Services Center as well as other FAA organizations located at the AMC that do not report to AFN. Other facilities services include:

- Safety & Health Compliance Programs
- Environmental Compliance Programs
- Energy Conservation Programs
- Professional Architectural & Engineering Services
- Construction Administration
- Space Management
- Utilities (electricity, gas, & water)
- Building Operations & Maintenance, Physical Security, Emergency Readiness, Janitorial, Motor Fleet Management, Moving, and Mail & Distribution

AMC 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 AMC.

AMC Energy Intensity FY 2003 – 2015



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. New Executive Order 13693 requires federal agencies to reduce energy intensity by 2.5% annually through the end of FY-2025 relative to the 2015 baseline. The AMC continues to achieve significant reductions in energy consumption.

FY 2017 Anticipated Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Mike Monroney Aeronautical Center ▪ FAA Academy	▪ Maintain the focus on quality improvement by refining metrics to increase the level of excellence in the FAA Academy's products and services to continuously improve and evolve the FAA Academy as the leader in aerospace learning solutions. ▪ Incorporate best practices for technical training from the public-private partnership research effort performed by the Air Transportation Center of Excellence for Technical Training and Human Performance (COE TTHP) team. ▪ Continue to serve on the ANG/AMC NextGen Integration Committee (ACNIC) to help identify priorities and opportunities. ▪ Expand the FAA's capability by developing partnerships to expand influence as a global training leader and provide relevant training to the global community. ▪ Support the Technical Operations Training Transformation effort by providing cost effective learning solutions in course conversion of an instructor-led "Concepts"

	course to blended learning. ▪ Collaborate and support the Air Traffic Learning Integration and Training Efficiency initiatives.
▪ Logistics Services	▪ Ensure significant increase in work associated with Customs and Border Protection (CBP), in the areas of life cycle supply chain management and tower inspection/ maintenance, to drive higher levels of synergy resulting in improved cost efficiencies and quality of logistics services provided to all customers; ▪ Increase cumulative fill rate for stocked items (expendable items and repaired items); ▪ Ensure full implementation of commercial-off-the-shelf software solution and integration with existing business applications; and ▪ Use root cause analysis, trending, and action plan tools to decrease defective parts while improving quality of assets provided to field technicians.
▪ 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. ▪ Achieve no more than 1.15 OSHA recordable mishaps per 100 FTE's. ▪ Reduce energy intensity by 2.5% annually through the end of FY2025 to meet goals specified in Executive Order 13693 as compared to FY2015 baseline.
▪ Information Technology / Financial Services at AMC	▪ Maintain 99.5 percent availability for IT systems as defined in customer agreements detailing specific commitments; ▪ Manage overhead costs through establishment of targets and application of continuous improvement principles; and ▪ Improve service provision through timely mitigation of audit findings focusing on strengthening processes and closing process gaps.
▪ Franchise Fund Director	▪ Manage over 2,000 active agreements worth $400M of activity across FAA and the Federal space employing best practices for an Office of Management and Budget (OMB) and a General Services Administration (GSA) designee. These agreements are a part of the Franchise fund activities which include six franchise services lines.

What does this funding level support?

Requested funding will allow AMC to oversee and manage facilities at the AMC, a key technical aeronautical center. This funding level supports building operations & maintenance, utilities, janitorial, physical security, emergency readiness, and environmental, safety & health compliance programs for all organizations located at the Mike Monroney Aeronautical Center. Funding at the requested level is critical to support the MMAC.

FY 2018 Anticipated Accomplishments:

Function / Office	FY2018 Anticipated Accomplishments
Mike Monroney Aeronautical Center FAA Academy	▪ Strengthen the FAA Academy's strategic partnerships with other lines of business to include: Air Traffic Organization (ATO), Aviation Safety (AVS), Customs and Border Patrol (CBP), Airports (ARP), and International Civil Aviation Organization (ICAO) through quarterly program reviews. ▪ Provide cost effective learning solutions at the best value for our strategic partners by incorporating innovative learning technologies. ▪ Insure the safety and security of US lives as the global training leader in helping to maintain the highest standards of aviation safety worldwide. ▪ Continue to engage a new generation of learners through ensuring the FAA's workforce of the future is equipped with the technical skills necessary to maintain the National Airspace System (NAS) as the safest and most efficient aviation system in the world.
▪ Logistics Services	▪ Ensure significant increase in work associated with Customs and Border Protection (CBP), in the areas of life cycle supply chain management and tower inspection/maintenance, will drive higher levels of synergy resulting in improved cost efficiencies and quality of logistics services provided to all customers; ▪ Seek to improve cumulative fill rate for stocked items from the LCSS target once the system is baselined (expendable items and repaired items); ▪ Ensure full implementation of commercial-off-the-shelf software solution and integration with existing business applications; and ▪ Use root cause analysis, trending, and action plan tools to decrease defective parts from the LCSS target once the system is baselined while improving quality of assets provided to field technicians.
▪ Facilities	▪ Provide operations & maintenance, physical security, janitorial, and environmental, safety & health compliance programs. ▪ 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. ▪ Achieve no more than 1.15 OSHA recordable mishaps per 100 FTE's.

▪ Information Technology / Financial Services at AMC	▪ Reduce energy intensity by 2.5% annually through the end of FY-25 to meet goals specified in Executive Order 13693 as compared to FY-15 baseline. ▪ Maintain 99.5 percent availability for IT systems as defined in customer agreements detailing specific commitments; ▪ Manage overhead costs through establishment of targets and application of continuous improvement principles; and ▪ Improve service provision through timely mitigation of audit findings focusing on strengthening processes and closing process gaps.
▪ Franchise Fund Director	▪ Manage over 2,000 active agreements worth $400M of activity across FAA and the Federal space employing best practices for an Office of Management and Budget (OMB) and a General Services Administration (GSA) designee. These agreements are a part of the Franchise fund activities which include six franchise services lines.

What benefits will be provided to the American public through this request?

AMC is responsible for the operation and maintenance of the AMC campus which houses all LOBs. This includes key personnel training, safety and security services including guard services, environmental monitoring, and occupational safety. 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 in direct alignment with the FAA Lines of Business. AMC trains 16,000 resident students in safety related occupations annually, including air traffic control new hires and safety inspectors. The FAA Academy delivers training and related support services to the Agency and other aviation organizations, both domestic and international. The Academy keeps the flying public safe by providing well-trained, certified air traffic controllers to manage flights across the country and beyond.

AMC continues to make progress in greening by minimizing pollution and waste, and conserving natural resources. AMC has reduced petroleum fuel usage in its facility maintenance fleet since 2005 and expects the downward trend to continue through 2018 and beyond. Embracing environmental greening initiatives not only benefits the American public now, it helps protect generations to come throughout the world.

AFN Explanation of Funding Changes

	Dollars ($000)	FTE
Finance and Management	**-$862**	**-59**
Overview: For FY 2018, the Assistant Administrator for Finance and Management (AFN) requests $758,192,000 and 1,595 FTEs to meet its mission. The FY 2018 request level reflects adjustments to base, and other changes. This represents a decrease of $862,000 from the FY 2017 annualized CR level.		
Adjustments to Base	**$8,019**	**-**
FY 2018 Pay Raises: 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 1.9 percent.	3,754	
Annualization of FY 2017 Pay Raises: This increase is required to provide for the remaining quarter of the FY 2016 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 1.0 percent.	1,307	
GSA Rent: The increase for FY 2018 is due to annual escalations in rent, utilities, and taxes outpace base funding. The GSA and FAA direct lease cost portfolios escalation for FY18 equal 3.21% above the FY17 request. These costs are determined by actual contract lease costs, estimated utility, taxes, or other included costs per contract clauses. Cost escalation is projected to continue as real estate market conditions improve and utility costs increase. An increase is required to cover contractual obligations. The administrative lease portfolios include both GSA and FAA direct leases and house approximately 26,000 employees in 7.9 million square feet of space. These facilities house all Lines of Business directly supporting operations (ATO) and safety (AVS) throughout 18 states and the District of Columbia.	2,513	
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.	445	
Other Changes	**-$8,881**	**-59**
Workforce Reduction Through Attrition: Restricted hiring to achieve savings through attrition.	- 8,881	-59

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NEXTGEN (ANG)

NextGen and Operations Planning (ANG)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$59,975**	**201**	**7**	**201**
Adjustments to Base	**$566**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	416			
Annualization of FY 2017 Pay Raise 2.1%	150			
Other Changes	**-$738**	**-10**	**0**	**-5**
Workforce Reduction Through Attrition	-738	-10		-5
Base Transfers	**-$762**	**-5**	**0**	**-5**
Global Leadership Initiative	-250	-1		-1
Flight Program Operations	-512	-4		-4
FY 2018 Request	**$59,041**	**186**	**7**	**191**

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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 $59,041,000 and 191 full-time equivalent personnel in FY 2018 to provide management and direction to the FAA's NextGen portfolio and to manage the day-to-day operations and maintenance of the FAA's William J. Hughes Technical Center (WJHTC) campus in Atlantic City, N.J

The NextGen organization is responsible for providing executive leadership and direction for the FAA's evolutionary "NextGen" blueprint for modernizing air transportation. NextGen 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.

The WJHTC owns and operates approximately 1.6 million square feet of test and evaluation facilities, National Airspace System (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. Nearly 48 percent of ANG's Operations budget is for payroll. In addition, annual operations and maintenance costs (non-pay) for WJHTC are approximately $24,671,300, or 42 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 is this Program and Why is it Necessary?

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. 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 ANG organization champions the evolution of NextGen through program management, enterprise system engineering, and technical integration expertise.

The Technical Center laboratories are the only location where it is possible to realistically simulate the National Airspace System (NAS). The test beds can be configured to replicate desired field configurations and provide 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. This keeps systems operational, avoiding service degradation and costly interruptions.

What does this funding level support?

The budget request of $59,041,000 supports the ongoing operations of the 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.

Budget Summary:

FY 2018 – NextGen and Operations Planning (ANG)

($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	28,434	29,197	28,263	-934
Program Costs	31,655	30,778	30,778	-
Total	**$60,089**	**$59,975**	**$59,041**	**-$934**
FTE	**192**	**201**	**191**	**-10**

The NextGen Organization requests $59,041,000 and 186 full-time permanent (191 full-time equivalent) personnel to support operations at the William J. Hughes Technical Center (WJHTC) and to further the successful transition to NextGen.

This includes increases of $150,000 for the annualized cost of the FY 2017 pay raise; $416,000 for the FY 2018 pay raise; and -$738,000 for the Workforce Reduction Through Attrition initiative in FY 2018. In addition, this request includes a decrease of $762,000 and -5FTP/5FTE for two base transfers: Global Leadership Initiative -$250,000 -1FTP/1FTE and Flight Program Operations -$512,000 -4FTP/4FTE.

Detailed Justification for – NextGen (ANG)

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

FY 2018 – NextGen and Operations Planning (ANG)

($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	28,434	29,197	28,263	-934
Program Costs	31,655	30,778	30,778	-
Total	**$60,089**	**$59,975**	**$59,041**	**-$934**
FTE	**192**	**201**	**191**	**-10**

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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.

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. WJHTC also provides 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 $24,671,300 or 42 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.

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.

FY 2017 Anticipated Accomplishments:

Function / Activity	FY 2017 Anticipated Accomplishments
Facility & NextGen Related:	▪ Provide operational test and evaluation, including flight testing, of all FAA systems prior to implementation in the NAS. ▪ Provide world class laboratories for research, engineering, development, test, evaluation, and maintenance of air navigation, air traffic management, and future air transportation system capabilities. ▪ Provide development of long-range innovative aviation systems and concepts, development of new air traffic control equipment and software, and modification of existing systems and procedures. ▪ Conduct, coordinate, and support domestic and international research and development of aviation-related products and services. ▪ Characterize performance of current system and effects of proposed NextGen changes on pilots, controllers, aircraft, and related system components. ▪ Address and meet 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.

What does this funding level support?

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.

FY 2018 Anticipated Accomplishments:

Function / Activity	FY 2018 Anticipated Accomplishments
Facility Related:	• 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: o Conducting integrated concept evaluations, modeling and simulations, and test and evaluation for all NextGen technologies in the National Airspace System (NAS). o 24x7x365 field support for all operational systems within the NAS. • 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.
NextGen and Operational Related:	• Conduct successful research, development, testing and evaluation that 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. • Prepare NextGen Program Performance measurement and benefits analyses. • Develop and coordinate the annual publication of the NextGen Implementation Plan. • 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 improved advisories for Flight Operations Center (FOC)/Airline Operations Center (AOC)

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).
- 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.

The WJHTC is a world class research institution that provides the American public with research, engineering, development, test, evaluation, and maintenance of air navigation, air traffic management, and future air transportation system capabilities. These capabilities directly affect the day-to day operation of the National Airspace System, ensuring that safety critical operational systems to are constantly maintained and improved. The technical expertise provided by the labs is also key to the implementation of future NextGen capabilities.

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 $13 billion in cumulative benefits through 2020. NextGen delay reductions are in addition to any reduction from future runway construction or expansion.

ANG Explanation of Funding Changes

	Dollars ($000)	FTE
NextGen	**-$934**	**-10**
Overview: For FY 2018, the Office of the Assistant Administrator for NextGen requests $59,041,000 and 191 FTEs to meet its mission. The FY 2018 request level reflects adjustments to base, other changes, and discretionary adjustments. This represents a decrease of $934,000 from the FY 2017 annualized CR level.		
Adjustments to Base	**$566**	**-**
FY 2018 Pay Raises: 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 1.9 percent.	416	
Annualization of FY 2017 Pay Raises: This increase is required to provide for the remaining quarter of the FY 2016 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 1.0 percent.	150	
Other Changes	**-$738**	**-5**
Workforce Reduction Through Attrition: Restricted hiring to achieve savings through attrition.	- 738	-5
Base Transfers	**-$762**	**-5**
Global Leadership Initiative (ANG to APL): This request transfers funding $250K and 1FTP/1FTE from NextGen, ANG to Policy, International Affairs & Environment, APL.	-250	-1
Flight Program Operations (AVS, ANG to ATO): This request transfers $15.2K and 34 FTP / 34 FTE from the Aviation Safety Organization, AVS (30 FTP/FTE) & NextGen and Operations, ANG (4 FTE/FTP) to the Air Traffic Organization, ATO. In addition, 34 FTP / 34 FTE transfers from the ATO Franchise Fund account into the ATO Operations account.	-512	-4

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SECURITY AND HAZARDOUS MATERIALS SAFETY (ASH)

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

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$100,688**	**522**	**0**	**516**
Adjustments to Base	**$1,389**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	1,061			
Annualization of FY 2017 Pay Raise 2.1%	384			
Working Capital Fund	-56			
Other Changes	**-$1,208**	**-16**	**0**	**-8**
Workforce Reduction Through Attrition	-1,208	-16		-8
Base Transfers	**$92**	**1**	**0**	**1**
FY 2017 Security and Hazardous Materials Safety Staffing	92	1		1
FY 2018 Request	**$100,961**	**507**	**0**	**509**

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Executive Summary: Security and Hazardous Materials Safety (ASH)

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

The FY 2018 request for the Office of Security and Hazardous Materials Safety is $100,961,000 and 509 FTEs. ASH will work to meet its core inspection and security mission requirements with this request.

What Is This Program And Why Is It Necessary?

The Office of Security and Hazardous Materials Safety ensures aviation safety, supports national and homeland security, and promotes an efficient airspace system through focused development and execution of its safety and security policies and programs. ASH develops and implements policies to protect the flying public, FAA employees, contractors, information, facilities and assets; provides Agency crisis management coordination, manages continuity of operations/continuity of government plans, facilities, and communications, executes and supports FAA and other government agencies' national security responsibilities, and protects the flying public, through identification and analysis of threats to FAA and civil aviation and the regulatory oversight of safe air transport of hazardous materials. Any failures or lapses in executing these programs negatively impacts NAS safety and security and degrades FAA's ability to provide one of the key components of our country's transportation infrastructure and emergency response.

In recent years, high-profile personnel and information security-related incidents, such as the Navy Yard and Fort Hood shootings; the deliberately set fire at the Chicago Air Route Traffic Control Center (ARTCC); terrorist threats against aviation; the release of sensitive classified information; and safety-related accidents and incidents involving hazardous materials, such as lithium batteries; have underscored the criticality of ASH's safety role in the NAS, and security role within the agency.

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

The requested level enables the essential missions of protection of FAA personnel, systems, information and facilities, civil aviation threat analysis, and crisis response, and maintains base level Hazardous Materials Safety Program activities that promote the safety of the flying public globally.

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, each year ASH has consistently met projected targets for success 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 internal auditing and program oversight. ASH's execution of its safety and security missions minimizes the safety risk in the NAS for the flying public globally and protects the nation's economic and national security.

Budget Summary

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

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	73,031	74,458	74,787	329
Program Costs	26,208	26,230	26,174	-56
Total	**$99,239**	**$100,688**	**$100,961**	**$273**
FTE	**465**	**516**	**509**	**-7**

The request of $100,961,000 and 509 FTEs allows the Office of Security and Hazardous Materials Safety to protect the safety of FAA employees, facilities and assets, provide Agency crisis management coordination, and protect the flying public through the regulatory oversight of safe air transport of hazardous materials and civil aviation threat identification and analysis. This request includes a $56,000 reduction in the Working Capital Fund; a reduction of $1,208,000 associated with the Workforce Reduction Through Attrition initiative; an increase of $384,000 for the annualization of the FY 2017 2.1% pay raise; an increase of $1,061,000 for a 1.9% projected pay raise; and a $92,000 PC&B base transfer from the Air Traffic Organization.

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

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

**FY 2018 - Security and Hazardous Materials Safety (ASH)
($000)**

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	73,031	74,458	74,787	329
Program Costs	26,208	26,230	26,174	-56
Total	**$99,239**	**$100,688**	**$100,961**	**$273**
FTE	**465**	**516**	**509**	**-7**

The FY 2018 request for the Office of Security and Hazardous Materials Safety (ASH) is $100,961,000 and 509 FTEs. This reflects a net of $237,000 in increases for pay-related adjustments; a base transfer of $92,000 for one FTP/FTE from the Air Traffic Organization; and a $56,000 decrease in ASH's payment to the Department's Working Capital Fund. ASH will work to meet its core safety and security mission requirements with this request.

What Does This Funding Level Support?

The mission of the Office of Security and Hazardous Materials Safety is to ensure aviation safety, support national and homeland security, and to promote an efficient airspace system through focused development and execution of its safety and security policies and programs. ASH develops and implements policies 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 and other government agencies' national security responsibilities; and protects the flying public through identification and analysis of threats to FAA and civil aviation; and the regulatory oversight of safe air transport of hazardous materials. Any failures or lapses in executing these programs negatively impacts NAS safety and security, and degrades FAA's ability to provide one of the key components of our country's transportation infrastructure and emergency response.

Passenger air traffic and air cargo, including hazmat onboard aircraft, have skyrocketed as our economy recovers and e-commerce continues to supplant brick and mortar retail stores. FAA's Hazardous Materials Safety Program protects passengers, property, and air commerce by carrying out its regulatory responsibilities over air transport of a wide array of hazmat, including but not limited to lithium batteries, which, due to their power and energy storage capacities, can initiate and fuel fires onboard aircraft that cannot be readily suppressed by current aircraft systems. This request will support certificate management coordination; safety assurance and risk management through systematic and continuous risk analyses and data management; engagement of stakeholders from industry and other sectors; safety outreach to those that transport hazmat by air; and development of automation that leverages current FAA IT capabilities, achieves economies of scale, and facilitates sharing of data for safety risk analysis.

FY 2017 Anticipated Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Office of Hazardous Materials Safety (ADG) is responsible for ensuring and promoting the safe transportation of hazmat in air commerce ▪ Regulatory oversight of hazmat carried by the flying public or transported on aircraft ▪ Utilization of a Safety Management System (SMS) approach to identify and address risks ▪ National and international outreach to address the risk from air transportation of hazmat ▪ Representation of FAA on hazmat-related International Panels and Committees to develop standards and regulations for safe transportation of hazmat by air, and oversight and coordination of rulemaking efforts through DOT PHMSA	▪ Resource all FAA Hazardous Materials Safety Program oversight activities of FAR Part 121 air carriers using SMS and certificate management principles; begin integration of these principles into oversight activities of Part 135 air carriers; coordinate closely with air carriers and FAA's Office of Aviation Safety on surveillance and other certificate management activities related to safe air transportation of hazardous materials. ▪ Use risk-based decision making processes to support national surveillance of regulated entities; conduct continuous improvement and internal evaluations of safety program data; and collaborate with other FAA Lines of Business to increase access and improve agency safety data for analysis, hazard tracking, and risk mitigation. ▪ Lead/support global activities and initiatives through ICAO, International Air Transport Association (IATA) and other international bodies, such as the SAE Lithium Battery Packaging Performance Committee, U.N. Informal Working Group on Lithium Batteries, and the ICAO Dangerous Goods Panel Working Groups on Competency Based Training and Investigations/Reporting. ▪ Develop a stakeholder engagement strategy to educate domestic and international regulated entities, including passengers, on the safety ramifications of transporting lithium batteries and undeclared hazardous materials. Engage industry associations, distributors, airports, and other stakeholders, to more efficiently promote hazardous materials safety. ▪ Coordinate and collaborate with FAA Flight Standards (AFS0) to capitalize on technology, including using AFS's Safety Assurance System (SAS) for air carrier activities, and beginning the process to integrate hazardous materials self-disclosures into AFS's Voluntary Disclosure Reporting Program application, to gain additional safety data and information for quantitative and qualitative analysis of trends that can be used to identify and focus outreach and inspection activities.
Office of National Security Programs and Incident Response (AEO) ensures Agency-level emergency readiness, crisis management, threat identification and analysis, and national security support to promote and ensure national airspace and aviation safety and security. ▪ Laser and UAS Investigations ▪ Law Enforcement Assistance Program ▪ Airmen, employee, and contractor Investigations	▪ Ensure FAA executives have real-time access to and analysis of current events impacting the NAS and civil aviation globally, including intelligence and threat information, particularly during crisis and security incidents, through continuous interaction with Aviation Stakeholders and the federal Intelligence, Defense, Homeland Security, and Law Enforcement Communities. ▪ Provide intelligence threat and analysis regarding emerging threats from new technologies, such as UAS, or in potentially hostile overseas locations into or over which U.S. operators and airmen fly, to support FAA

Function / Office	FY 2017 Anticipated Accomplishments
▪ Current Intelligence and Threat Evaluation Watch Operations and Operations Center Management 24/7 ▪ Insider Threat Detection and Mitigation ▪ Defensive Counterintelligence Program (DCIP) ▪ Command and Control Communications and Continuity of Operations ▪ Incident and Crisis Management	execution of regulatory aviation safety responsibilities. ▪ Identify potential national security threats to and protect classified and sensitive security information related to the NAS. Information and networks remain at considerable risk to cyber compromise and economic espionage perpetrated by malicious insiders. ▪ Continue to implement an Insider Threat Program within the FAA that meets the requirements of EO 13587 and the minimum standards. ▪ Conduct counterintelligence awareness briefings for all FAA employees and targeted travel pre-briefings for executives and employees traveling to high-threat locations. ▪ Expeditiously analyze and share intelligence information regarding cyber threats to FAA data and networks. ▪ Revoke or suspend certificates of airmen convicted of drug- or some alcohol-related offenses. ▪ Partner with other agencies to investigate and take appropriate actions to reduce the number of individuals who shine lasers at aircraft who fly UAS contrary to Section 336 of the FAA Reauthorization Act of 2012. ▪ Ensure timely and thorough investigations are conducted in support of the safety whistleblower mission of the Office of Audit and Evaluation. ▪ Ensure FAA is able to maintain mission essential functions during all-hazard situations through availability of continuity facilities and emergency communications capabilities. ▪ Ensure priority access on landlines and cellular phones for FAA executives and crisis management personnel by managing the Government Emergency Telephone Service cards and the Wireless Priority Service programs.
Office of Security (AIN) supervises nationwide security programs and provides program policy guidance, oversight, and evaluations. ▪ Facility Security Management Program (FSMP) ▪ Personnel Security Program ▪ Information Security Program ▪ Identification Media and Credential Program	▪ Support enhancement of the Facility Security Management Program and the Personnel Security Program that protect critical FAA infrastructure and personnel in the NAS. ▪ Increase complexity of FAA facility inspections and assessments and provide oversight to ensure FAA facilities are in compliance with facility and information security requirements that protect agency employees, visitors, information, systems and facilities at every level daily. ▪ Implement a consistent active shooter threat response awareness program at FAA facilities. ▪ Develop standards, programmatic safeguards and controls for protecting classified national security and sensitive unclassified information from loss, compromise or unauthorized disclosure. ▪ Process background investigations and fingerprint checks for FAA employees and contractors. ▪ Issue PIV cards to new employees and contractors, and renew expired ones and enable 100 percent of

Function / Office	FY 2017 Anticipated Accomplishments
	issued PIV cards for use within FAA facilities and information systems. ▪ Accelerate the installation of PIV-compliant Physical Access Control Systems (PACS) system to enable system-wide cancellation of PIV card, at select NAS Tier 1 facilities, when a FAA employee or contractor stops working at his or her assigned facility.

What Does This Funding Level Support?

The requested funding is needed to maintain base level critical safety and security mission responsibilities that promote the safety and security of civil aviation and the flying public and protect FAA personnel, systems, information and facilities. Any reduction to our request will negatively impact our ability to meet critical FAA safety and security mission requirements that are critical to safe and secure civil aviation and NAS operations.

Anticipated FY 2018 Accomplishments

Function / Activity	FY 2018 Anticipated Accomplishments
Office of Hazardous Materials Safety (ADG)	▪ Integrate SMS and certificate management principles into hazardous materials safety oversight of FAR Part 135 air carriers; leverage industry's use of safety management principles among FAR Part 121 air carriers to continue resourcing and focusing safety oversight efforts on areas of highest risk. ▪ Through collaboration with other FAA Lines of Business, gain access to additional safety data sources, such as FAA's Aviation Safety Information Analysis and Sharing (ASIAS), Aviation Safety Action Program (ASAP), and Voluntary Disclosure Reporting Program (VDRP), for analyses to support risk based decision making. ▪ Advance safety in the NAS through continued leadership and participation in International Safety Organizations, collaborations with State Civil Aviation Authorities (CAAs), engagement with stakeholders, such as lithium battery manufacturers and/or distributors, and interdisciplinary cargo safety groups, to address global safety oversight issues and international standards. ▪ Continue to identify ways to drive efficiencies and reduce duplication through collaboration with other FAA Lines of Business and Offices.
Office of Security (AIN)	▪ Continue actions to complete recommendations from the ZAU Security Review to enhance the Personnel, Information, and Facility Security Programs that protect critical FAA personnel, infrastructure, and information in the NAS that were funded in FY 2016. ▪ Provide oversight to ensure FAA facilities are in compliance with facility and information security requirements that protect agency employees, visitors, and information.
Office of National Security Programs and Incident Response (AEO)	▪ Operate 24/7 Intelligence Watch to ensure the Washington Operations Center Complex (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, as well as provide threat analysis to support FAA decision-making regarding emerging threats to aviation safety from technologies or in overseas locations. ▪ Continue the development of FAA Counterintelligence and Insider Threat Detection and Mitigation Programs to detect and respond to foreign intelligence and insider threats.

Function/Activity	FY 2018 Anticipated Accomplishments
	▪ 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 minimum communications requirements for Executive Department and Agency headquarters, and operating continuity facilities that support the continuation of the Agency Mission Essential Functions (MEFs). ▪ Maintain emergency operations network capability and ensure continued situational awareness of daily and emergency events. The planned capabilities include fully integrating the WOCC and Regional Operations Centers (ROCs) with the Emergency Notification System (ENS). ▪ Partner with other agencies to investigate and take appropriate actions to reduce the number of individuals who shine lasers at aircraft or conduct non-compliant UAS operations that threaten public safety or national security.

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

We are responsible for the FAA's critical infrastructure protection, personnel security, emergency operations, threat identification and analysis, contingency planning, and the safe transportation of hazardous materials in air commerce. Protecting our critical infrastructure is a national and homeland security concern, which continues to demand a high level of attention and innovation. In recognition of the criticality of the NAS in our country's transportation infrastructure and economic health, ASH develops and executes policies and programs to protect FAA employees, contractors, facilities, and assets, as well as airmen and the flying public. We are committed to continuously improving the safety, security, and efficiency of flight, and continue to work with all of our partners to focus our experience, expertise, and new technology to ensure a safer and more secure global airspace.

ASH Explanation of Funding Changes

	Dollars ($000)	FTE
Security and Hazardous Materials Safety (ASH)	**$273**	**-7**
Overview: For FY 2018, ASH requests $100,961,000 and 509 FTEs to meet its mission. The FY 2018 request level reflects adjustments to base, other changes, and a base transfer. This represents an increase of $273,000 over the FY 2017 annualized CR level.		
Adjustments to Base	**$1,389**	**-**
FY 2018 Pay Raises: 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 1.9 percent.	1,061	
Annualization of FY 2017 Pay Raises: This increase is required to provide for the remaining quarter of the FY 2016 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 1.0 percent.	384	
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.	-56	
Other Changes	**- $1,208**	**-8**
Workforce Reduction Through Attrition: Restricted hiring to achieve savings through attrition.	- 1,208	-8
Base Transfers	**$92**	**1**
FY 2017 Security and Hazardous Materials Safety Staffing (ATO to ASH): This request transfers funding $92,000 and 1FTP/1FTE from the Air Traffic Organization, Technical Operations Services (ATO/AJW) to the Office of Security and Hazardous Materials Safety (ASH).	92	1

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STAFF OFFICES

Staff Offices
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$206,358**	**1,092**	**56**	**1,073**
Adjustments to Base	**$4,675**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	2,304	0	0	0
Annualization of FY 2017 Pay Raise 2.1%	843	0	0	0
Working Capital Fund	1,528	0	0	0
Other Changes	**-$6,672**	**-89**	**0**	**-45**
Workforce Reduction Through Attrition	-6,672	-89	0	-45
Base Transfers	**$507**	**2**	**0**	**2**
FY 2017 Civil Rights Staffing	257	1	0	1
Global Leadership Initiative	250	1	0	1
FY 2018 Request	**$204,868**	**1,005**	**56**	**1,030**

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Executive Summary: **Staff Offices**

What is the request and what funds are currently spent on the program?

The request of $204,868,000 and 1,030 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 base transfers. The base transfer reflects 1 FTE for Civil Rights Staffing (ATO to ACR) and 1 FTE for Global Leadership Initiative (ATO to APL).

What is the program and why is it necessary?

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.

What does this funding level support?

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. 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.

What benefits will be provided to the American public through this request?

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.

Budget Summary

Staff Offices
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	160,622	161,840	158,822	-3,018
Program Costs	46,129	44,518	46,046	1,528
Total	**$206,751**	**$206,358**	**$204,868**	**-$1,490**
FTE	**1,004**	**1,073**	**1,030**	**-43**

The FY 2018 request of $204,868,000, 1,005 full-time permanent, and 1,031 full-time equivalent personnel supports the eight staff offices. This request also includes an increase of$1,528,000 in the Department of Transportation's Working Capital Fund, -$6,672,000 for the Workforce Reduction Through Attrition initiative, and base transfers of $257,000 for Civil Rights (ACR) and $250,000 for Policy, International Affairs and Environment (APL).

Office of the Administrator (AOA)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$4,071**	**20**	**4**	**24**
Adjustments to Base	**$67**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	48			
Annualization of FY 2017 Pay Raise 2.1%	19			
Other Changes	**-$161**	**-2**	**0**	**-1**
Workforce Reduction Through Attrition	-161	-2		-1
FY 2018 Request	**$3,977**	**18**	**4**	**23**

Detailed Justification for – Office of the Administrator (AOA)

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

FY 2018 – Office of the Administrator (AOA) – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	3,527	3,415	3,321	-94
Program Costs	552	656	656	-
Total	**$4,079**	**$4,071**	**$3,977**	**-$94**
FTE	**21**	**24**	**23**	**-1**

In FY 2018, the Administrator requests $3,977,000 and 23 FTE to meet its mission. This includes increases of $19,000 for the annualized cost of the FY 2017 pay raise; $48,000 for the FY 2018 pay raise; and a reduction -$161,000 for the Workforce Reduction Through Attrition initiative.

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. Throughout FY 2018, 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 FAA in its work with the Department of Transportation and other agencies, the White House, Congress, the aviation community and the general public.

In leading FAA, the Administrator oversees the Agency's employees in maintaining, operating, and overseeing the largest and most complex aviation system in the world. The agency determines the regulatory and operational standards for the United States, and effectively sets the benchmark for aviation safety around the world.

What does this funding level support?

The funding level supports Executive direction of the FAA and provides for the Administrator's and Deputy Administrator's direct staff.

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

AOA provides direction and executive oversight for the management and operation of the world's largest, safest, and most efficient airspace system. Aviation is a significant contributor to the U.S. economy and the FAA provides continuous operational Air Traffic Control services to airlines and general aviation; safety oversight of operators and manufacturers; management of airport improvement grants; and acquisition of the FAA's NextGen air traffic control system.

Audit and Evaluation (AAE)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$3,248**	**20**	**0**	**20**
Adjustments to Base	**$61**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	45			
Annualization of FY 2017 Pay Raise 2.1%	16			
FY 2018 Request	**$3,309**	**20**	**0**	**20**

Detailed Justification for –Audit and Evaluation (AAE)

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

FY 2018 – Audit and Evaluation (AAE) – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	2,927	3,184	3,245	61
Program Costs	327	64	64	-
Total	**$3,254**	**$3,248**	**$3,309**	**$61**
FTE	**19**	**20**	**20**	**-**

In FY 2018, the Office of Audit and Evaluation requests $3,309,000 and 20 FTE to meet its mission. This includes increases of $16,000 for the annualized cost of the FY 2017 pay raise; and $45,000 for the FY 2018 pay raise.

The mission of the office primarily and directly supports the Departmental goal of increased safety, but also supports in a more generalized way the goal of building and enhancing our high performance work place. The FY 2018 funding will support the operation and management of consolidated safety hotlines and provide a centralized focus for internally and externally generated safety-related complaints, critical audits, and investigations. Additionally, the Office provides an impartial agency venue for investigation and early resolution of safety disclosures.

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 **safety audit and analysis** staff perform audit and investigative review functions primarily for internal safety disclosures and concerns, including the FAA Whistleblower Protection Program. It also coordinates and evaluates FAA responses to DOT- OIG, GAO and OSC generated audits, investigations and evaluations.
- **Hotline operations** 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:

- Serving as primary interface and maintaining a continuous liaison with GAO, OSC, and the DOT OIG investigations/audit staffs concerning safety-related investigations.
- Recording, tracking, reviewing, and confirming implementation of FAA responses to DOT OIG, OSC, and GAO audits and investigations that are under the purview of AAE.
- Managing the Whistleblower Protection Program established under 49 U.S.C. § 42121.
- Analyzing data from the Safety Hotline, the Administrator's Hotline, 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 of 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.

AAE has established itself as a viable forum for raising and 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.

What does this funding level support?

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.

Anticipated FY 2018 accomplishments include:

- Complete an analysis of FY 2017 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 85 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.

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, whistle blower contributions, and employee workplace conflicts. 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 raise, address and resolve safety complaints, concerns or whistleblower contributions.

Civil Rights (ACR)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$11,945**	**80**	**4**	**80**
Adjustments to Base	**$198**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	146			
Annualization of FY 2017 Pay Raise 2.1%	52			
Other Changes	**-$586**	**-8**	**0**	**-4**
Workforce Reduction Through Attrition	-586	-8		-4
Base Transfers	**$257**	**1**	**0**	**1**
FY 2017 Civil Rights Staffing	257	1		1
FY 2018 Request	**$11,814**	**73**	**4**	**77**

Detailed Justification for – Civil Rights (ACR)

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

FY 2018 – Civil Rights (ACR) – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	9,892	10,283	10,152	-131
Program Costs	2,076	1,662	1,662	-
Total	**$11,968**	**$11,945**	**$11,814**	**-$131**
FTE	**80**	**80**	**77**	**-3**

The FY 2018 funding request of $11,814,000 including 73 full-time permanent and 77 full-time equivalent personnel allows ACR to help prevent and address discrimination by providing civil rights training, guidance, compliance, and oversight in the FAA workplace and at airports throughout the country. Requested funds cover Civil Rights (CR) federal staff, contract support services, and Equal Employment Opportunity (EEO) counseling, audits, and training at Headquarters, Centers, Regions, Lines of Business (LOB) field facilities, as well as airports across the country. This request also includes -$586,000 from the Workforce Reduction Through Attrition initiative, and $257,000 and 1 FTE as a base transfer from the Air Traffic Organization (ATO).

What is this Program and Why is it Necessary?

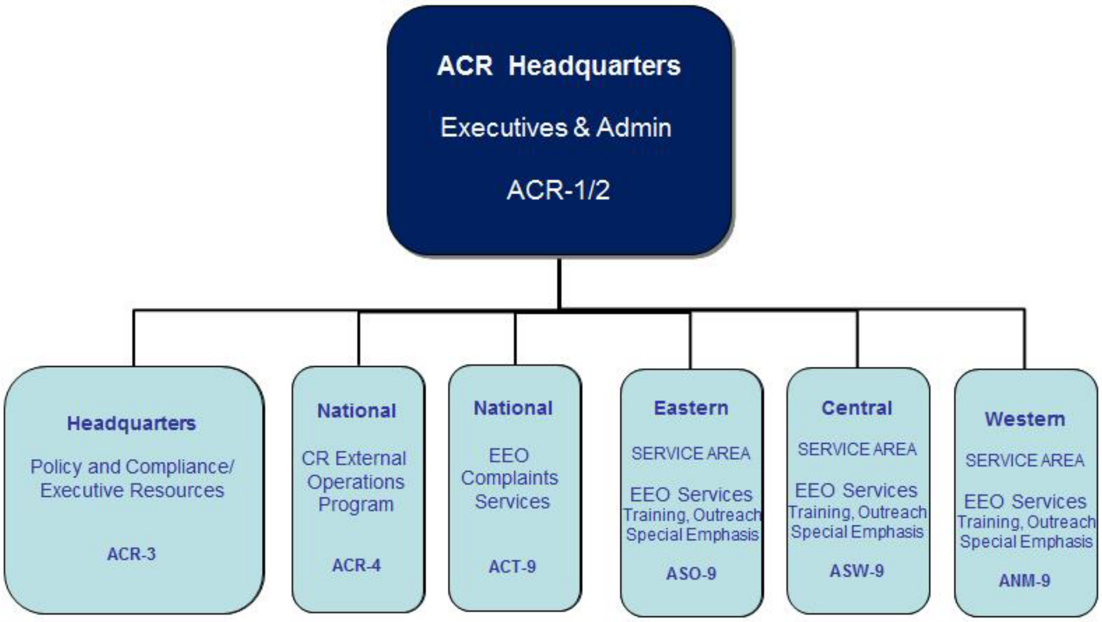
The FAA Office of Civil Rights (ACR) provides leadership and direction with regard to civil rights, diversity, and equal opportunity matters.

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

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. These efforts address airport compliance with the Americans with Disabilities Act (ADA), Rehabilitation Act, Disadvantaged Business Enterprise Program, Title VI, Limited English Proficiency (LEP), Environmental Justice (EJ), and other civil rights regulations.

The ACR organizational structure is depicted below:

Figure 1 – ACR Organizational Chart



FY 2017 Anticipated Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Internal Civil Rights Services ▪ EEO Complaint Services/Alternative Dispute Resolution Services ▪ Model EEO Program ▪ Diversity and Inclusion ▪ EEO Training	▪ Process 100% of the allegations and inquiries regarding EEO complaints by providing quality counseling, mediation and consulting services. ▪ Assist and provide resources for agency selecting officials to meet the goal of increasing the hiring of People with Targeted Disabilities (PWTD) for eligible positions to 3% by FY 2018. ▪ Assist the Agency in building a Model EEO Workplace through outreach, consultations, collaboration, and educational partnerships. ▪ Manage nationwide Special Emphasis Programs (SEPs) to foster a diverse applicant pool for FAA vacancies, promote EEO, and oversee the advancement and retention of a diverse workforce. ▪ Encourage the FAA workforce to engage in the Alternative Dispute Resolution (ADR) process as a method to resolve disputes in the EEO Complaint Process at the lowest possible level to avoid the cost, delay, and unpredictability of the traditional adjudicatory processes. ▪ 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. ▪ Assist Agency efforts to create a FAA culture in which managers and employees understand their role in developing and maintaining an inclusive workplace by providing training on EEO laws, FAA policies, and appropriate workplace behavior. ▪ Increase FAA managers and employees conflict resolution skills through the Conflict Coaching Program and reduce the number of EEO complaints that are filed in the agency through the use of early intervention techniques.
External Civil Rights Services ▪ Disability Airport Compliance ▪ Airport Non-discrimination Compliance (Title VI of the Civil Rights Act) ▪ Disadvantaged Business Enterprise (DBE) Compliance	▪ Conduct DBE compliance reviews and ensure that small and disadvantaged business enterprises are able to compete with larger companies for airport construction projects and concessions. ▪ Adjudicate external complaints from the public and other customers. ▪ Maintain an online FAA dbE-connect system to connect DBEs and relevant airport opportunities and allow airports to identify certified DBEs in areas of work needed to support their DBE goals. ▪ Deliver training, technical assistance and consultations in order to increase knowledge in the areas of DBE/ACDBE, ADA/ 504 and Title VI/LEP/EJ at our nation's airports.

Over the past several years, ACR has taken a very proactive approach to conflict management. Alternative Dispute Resolution (ADR) is a means for employees and managers to resolve disputes before they become formal EEO complaints. ACR has helped to reduce the number of informal complaints by utilizing a robust EEO training program. The following chart illustrates the agency's level of informal complaint activity over a six-year span.

Figure 2 – Informal EEO Complaint Activity

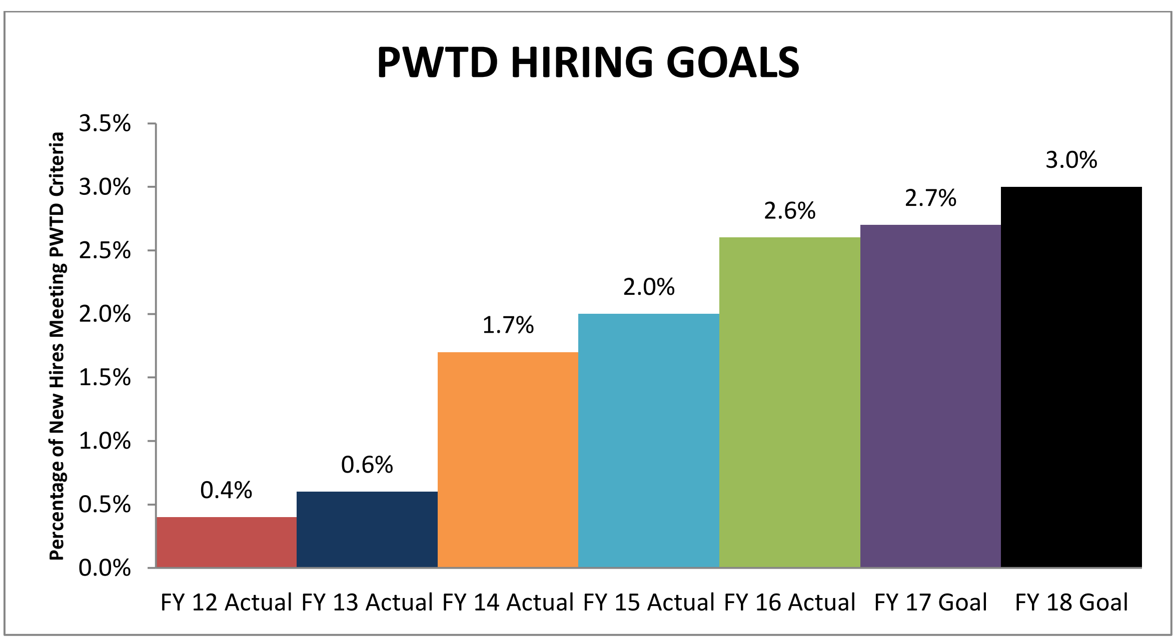
Internal EEO Activities[1]

Informal EEO Complaints (FAA-wide)							
Fiscal Year	Cases Initiated	FAA Employment[3]	Complaint Ratio[4]	ADR Settlements	Non-ADR Settlements	With-drawls	Cases Closed
2012	474	47,739	0.0099	50	6	49	446
2013	447	45,869	0.0097	44	2	52	488
2014	422	45,561	0.0093	35	4	37	401
2015	484	45,639	0.0106	41	7	57	482
2016	437	45,908	0.0095	57	2	53	432
2017[2]	214	46,168	0.0093[5]	18	3	5	198

[1] Per iComplaints Tracking System (iTS)
[2] As of 04/10/2017
[3] Per Federal Personnel Payroll System (FPPS)
[4] Complaint Ratio = Cases Initiated ÷ FAA Employment
[5] Annualized Complaint Ratio = Cases Initiated ÷ FAA Employment x 12 ÷ 6

ACR conducts numerous outreach activities related to the DOT goal to increase the representation of People with Targeted Disabilities (PWTD) in the workforce. The chart below illustrates the progress that FAA has made in the hiring of PWTD. The goal is to increase the hiring of these individuals by approximately 0.33% each year ultimately meeting the 3% mark by FY 2018.

Figure 3 – PWTD Hiring



What does this funding level support?

EEO complaints can be very costly to FAA in terms of employee productivity as well as funding. ACR's 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. ACR aids in the prevention of discrimination through the implementation of agency-wide EEO policies, practices, and procedures including a Model EEO Program that stresses the prevention of discrimination before it occurs.

In FY 2018, ACR will continue to provide guidance and support in numerous areas including:

- EEO Compliance
- Workforce Diversity
- Conflict Resolution
- Training

Anticipated FY 2018 Accomplishments:

Function/Activity	FY 2018 Anticipated Accomplishments
EEO Compliance	• Provide oversight regarding civil rights laws and regulations by administering the agency's Internal Civil Rights and the External Civil Rights (Airports) Programs. • Utilize information technology to increase compliance at airports in the areas of DBE/ACDBE, ADA/ 504 and Title VI/LEP/EJ. • Oversee the process for developing and reporting to the EEO Commission (EEOC) the Annual MD-715 EEO Plan and continue to monitor Agency accomplishments. • Conduct and follow up on MD-715 EEO Assessments.
Workforce Diversity	• Increase the effectiveness of the EEO Outreach Program to minority groups with lower than expected employment rates in the agency. • Conduct 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. • Manage, coordinate, and promote activities that support the Office of Personnel Management (OPM) Executive Order on Diversity and Inclusion.
Conflict Resolution	▪ Assist agency efforts to address discrimination by addressing EEO complaints through the National Intake Unit, EEO counseling, and EEO consultation services. ▪ Provide 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. • Continue to encourage the FAA workforce to engage in the ADR process as a method to resolve disputes in the EEO Complaint

Function/Activity	FY 2018 Anticipated Accomplishments
	Process at the lowest possible level to avoid the cost, delay, and unpredictability of the traditional adjudicatory processes.
Training	▪ Develop, revise, track, and report on EEO training activities throughout FAA. ▪ Deliver training and provide technical assistance to external stakeholders regarding disability, disadvantaged businesses, and nondiscrimination.

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

ACR provides leadership and direction with regard to civil rights, diversity, and Equal Employment Opportunity (EEO) matters. The ACR mission is to implement civil rights and EEO policies and operational programs to ensure their full and successful development in support of FAA's mission which is to provide the safest, most efficient aerospace system in the world. ACR ensures the elimination of unlawful discrimination on the basis of race, color, national origin, sex, age, religion, sexual orientation, genetic information, and individuals with disabilities in federally operated and federally assisted transportation programs; that all beneficiaries and potential beneficiaries of these programs, including employees and job applicants are offered equal opportunities to participate in them; and a positive environment in the FAA by valuing, using, and managing the differences that individuals bring to the workplace.

ACR works to foster diversity and inclusion activities that lead to a healthy work environment that promotes diversity in all its dimensions and harmony across the FAA. Inclusion means a work environment where everyone has an opportunity to fully participate in creating an organizational success and where every person is valued for his or her distinctive skills, experiences, and perspectives. Inclusion is also about creating a global community where the FAA connects everyone and everything through our programs, our activities, our products, our services and our winning workforce. Inclusion also cultivates a culture that encourages collaboration, flexibility, and fairness to further retention and enables individuals to contribute to their full potential. ACR helps to develop structures and strategies to equip leaders with the ability to manage diversity, be accountable, measure results, refine approaches on the basis of such data, and institutionalize a culture of inclusion.

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 needs to be properly funded and staffed to ensure we can maintain a proactive EEO program. The result of these efforts is a diverse and satisfied workforce that collaboratively helps to ensure the safety of the flying public.

Government and Industry Affairs (AGI)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$1,553**	**10**	**0**	**10**
Adjustments to Base	**$26**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	18			
Annualization of FY 2017 Pay Raise 2.1%	8			
Other Changes	**-$79**	**-1**	**0**	**-1**
Workforce Reduction Through Attrition	-79	-1		-1
FY 2018 Request	**$1,500**	**9**	**0**	**9**

Detailed Justification for – Government and Industry Affairs (AGI)

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

FY 2018 – Government and Industry Affairs (AGI) – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	1,482	1,293	1,240	-53
Program Costs	74	260	260	-
Total	**$1,556**	**$1,553**	**$1,500**	**-$53**
FTE	**8**	**10**	**9**	**-1**

The FY 2018 budget request of $1,550,000 and 9 FTEs will support the Office of Government and Industry Affairs program. It includes $18,000 in FY 2018 pay raises, $8,000 in annualization in FY 2017 pay raises, and -$79,000 from the Workforce Reduction Through Attrition initiative.

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 other staff organizations to coordinate and present FAA's legislative message. AGI works with other organizations within FAA to facilitate their relations with Congress. AGI consistently monitors and gauges the interest and needs of the Members and leadership on Capitol Hill. This relationship also extends to coordinating our legislative initiatives and responses with the Department of Transportation.

This vigorous outreach is not limited to Congress. AGI also serves as liaison with the aviation industry, from manufacturers to carriers, and with other aviation related organizations. Additionally, AGI serves as the principal point of contact for state and local governments. The following core activities represent the FY 2018 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 does this funding level support?

FAA needs to have one office whose mission it is to provide high quality, timely communications to Congress. When we communicate well, the FAA gets heard. It is essential that public policy gets debated on its merits so that the best outcomes can result. Without this office, too much of the debate would be consumed by process instead of policy.

AGI seeks the resources to continue to improve the quality, timeliness, and usefulness of our core business functions and to continue to perform the following:

- Serves as FAA's focal point to coordinate agency actions relating to Congressional oversight of FAA programs;
- Manages the Reports to Congress program within the FAA. Serves as the FAA Reports Control Officer and is responsible for providing the DOT Congressional Reports Officer all information to disseminate to Congress and interested parties; approximately 13 reports were submitted to Congress in FY 2012;
- Coordinates with Departmental officials to ensure consistency in furthering policies relating to Congressional and intergovernmental relations issues;
- Keeps FAA Associate Administrators and the offices and services informed of Congressional and public concerns which may influence their operational responsibility;
- Coordinates all incoming Congressional Correspondence; 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.).

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.

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.

Communications (AOC)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$6,299**	**34**	**1**	**34**
Adjustments to Base	**$118**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	87			
Annualization of FY 2017 Pay Raise 2.1%	31			
Other Changes	**-$206**	**-3**	**0**	**-1**
Workforce Reduction Through Attrition	-206	-3		-1
FY 2018 Request	**$6,211**	**31**	**1**	**33**

Detailed Justification for – Communications (AOC)

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

FY 2018 – Communications (AOC) – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	5,969	6,158	6,070	-88
Program Costs	342	141	141	-
Total	**$6,311**	**$6,299**	**$6,211**	**-$88**
FTE	**30**	**34**	**33**	**-1**

The FY 2018 budget request for $6,211,000 and 33 FTEs will support Office of Communications (AOC) programs to communicate with the news media, stakeholders, and FAA employees. It includes $87,000 in FY 2018 pay raises, $31,000 in annualization in FY 2017 pay raises, and -$206,000 from the Workforce Reduction Through Attrition initiative.

What Is This Program And Why Is It Necessary?

The Office of Communications (AOC) delivers critical safety information to the news media, stakeholders, and FAA employees worldwide to support the FAA's operations, programs and mission. AOC helps the FAA achieve its mission by providing timely and accurate information and performing robust outreach to an increasingly diverse set of stakeholders. Using a variety of communications tools, AOC delivers its services through two major programs: Public Affairs and Corporate Communications.

Public Affairs
Public Affairs work closely with other FAA offices to provide timely and accurate information to the media, the aviation community and the public about FAA initiatives and activities. Public Affairs develops and implements communication strategies and public outreach to alert and inform the traveling public and aviation stakeholders about urgent safety issues. It creates and manages agency messaging, speeches and media responses, leveraging AOC's entire creative, web, media and social media resources to help advance the FAA's safety mission.

Corporate Communications
Corporate Communications manages the FAA's digital communications, including FAA.gov, MyFAA and the agency's social media accounts, which generate more than 450 million impressions annually. Corporate Communications leads the FAA's creative and multimedia services, including video, audio and application development. The team coordinates with other FAA offices to provide more than 46,000 FAA employees with accurate and timely information on programs and activities. Corporate Communications also manages the DOT-wide IdeaHub platform, which enables employees to share ideas, promote efficiencies, and support the FAA's safety mission.

Function / Office	Anticipated FY 2017 Accomplishments
Public Affairs	• Increase awareness and understanding of FAA safety, NextGen initiatives, unmanned aircraft systems (UAS), commercial space entrants, runway safety, airport operations, General Aviation safety, child safety, laser awareness, weather, global leadership, and other issues through press conferences, media briefings, roundtables, direct outreach to reporters, press releases, websites, social media, and other communication channels. • Conduct public awareness campaigns about General Aviation safety and the authorized and unauthorized uses of UAS. • Expand the use of Social Media to support critical agency messaging. • Support open government initiatives to make data available, improve online services, and increase collaboration with citizens, stakeholders, and other government agencies.
Corporate Communications	• Expand the use of social media to support critical agency messaging and educate new 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. • Deliver more than 7 million FAA safety and regulatory documents online instead of distributing in print. • Maintain the FAA Frequently Asked Questions knowledge database on the FAA Website to better address user self-service inquiries. • Deploy FAA.gov to a Content Management System (CMS), improving web management, content quality, timeliness and search engine optimization.

What Does This Funding Level Support?

Demand for safety information continues to grow from all stakeholders, including employees, the public, the media, and the aviation community. All of these groups expect unfettered and 24/7 access to information the FAA provides, and interaction with that information through the Web, email, and social media. AOC must continue to provide accurate critical information about FAA operations, safety oversight, efficiency initiatives and other programs to all of these groups as quickly as possible.

For fiscal year 2016, FAA.gov generated more than 100 million views to our web content. Users downloaded more than 8 million documents from FAA.gov related to pre-flight safety procedures and planning, airmen/aircraft certification, aircraft mechanical records, airport safety regulations, and accident/incident data. The MyFAA Website, our internal site, generated 32 million views of our content and 6 million visits. Our social media's reach has grown to 125 million over the last year. As mobile devices continue to overtake desktops as the preferred choice for Internet access, the FAA has seen a persistent increase in demand for secure access to critical aviation safety information that operates seamlessly on mobile devices.

Function / Office	Anticipated FY 2018 Accomplishments
Public Affairs	• Increase awareness and understanding of FAA safety, NextGen initiatives, unmanned aircraft systems (UAS), commercial space entrants, runway safety, airport operations, General Aviation safety, child safety, laser awareness, global leadership, weather, and other issues through press conferences, media briefings, roundtables, direct outreach to reporters, press releases, websites, social media, and other communication channels. • Conduct public awareness campaigns about General Aviation safety and the authorized and unauthorized use of UAS. • Increase awareness of the FAA's role as a world leader on aviation issues. • Support open government initiatives to make data available, improve online services, and increase collaboration with citizens, stakeholders, and other government agencies.
Corporate Communications	• Expand the use of social media platforms to reach new audiences who are not familiar with aviation terminology such as drone hobbyists. • Use more interactive sessions such as live chats and webcasts to enhance awareness and customer service. • 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. • Achieve an average ACSI customer satisfaction score of 75 or better on the FAA public website. • Further optimize FAA.gov for a better user experience on mobile platforms. • Ensure external website exceeds 90% compliance with 508 requirements and all DOT compliance goals.

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

With more than 100 million page visits a year, www.faa.gov provides a wealth of resources to the American public. Pilots, mechanics, and other members of the flying public consistently read our news, directives, hazardous materials information, and airworthiness information every second of every day of the year. Due to our outreach, many passengers knew they could not bring dangerous cell phones on airplanes and more than 700,000 unmanned aircraft operators knew that they had to register their drones. The appetite for information has increased over the years, and now, more than one million subscribers opt to be auto-notified when our content is updated. Visits to the FAA's news content in 2016 increased by 30 percent over the previous year.

Readership and engagement have increased significantly through these communications channels. The reach of our social media channels grew exponentially, increasing followers by 86% over the last 11 months, reaching an organic audience of over 781,744 individuals across six unique platforms. Social media allows the FAA to connect with more members of the flying public and the aviation community on important safety issues, as well as communicating breaking news. Information for air traffic operations, General Aviation safety, NextGen, and UAS are delivered via text, video, and graphical formats that members of the public expect to find through social channels. Other offices within the FAA have come to expect social media as a communications service that AOC provides for them to help convey important information about the agency programs.

With more than 46,000 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 are able to access information about everything from HR benefits to changes in compensation programs that may directly affect them. Strong internal communications generate a more engaged, productive, and loyal workforce.

Chief Counsel (AGC)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$44,701**	**234**	**9**	**236**
Adjustments to Base	**$893**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	557			
Annualization of FY 2017 Pay Raise 2.1%	200			
Working Capital Fund	136			
Other Changes	**-$1,291**	**-17**	**0**	**-9**
Workforce Reduction Through Attrition	-1,291	-17		-9
FY 2018 Request	**$44,303**	**217**	**9**	**227**

Detailed Justification for – Chief Counsel (AGC)

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

FY 2018 – Chief Counsel (AGC) – Budget Request
($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	38,127	39,099	38,565	-534
Program Costs	6,659	5,602	5,738	136
Total	**$44,786**	**$44,701**	**$44,303**	**-$398**
FTE	**221**	**236**	**227**	**-9**

The Office of the Chief Counsel requests $44,303,000, 217 full-time permanent positions, and 227 full-time equivalents to enable AGC to provide necessary legal services to the FAA. The request includes $557,000 for the FY 2018 pay raise, $200,000 for the annualized cost of the FY 2017 pay raise, a reduction of -1,291,000 from the Workforce Reduction Through Attrition initiative, and $136,000 for the Working Capital Fund. Funding at the FY 2018 requested level will provide necessary legal services, including representation in support of significant FAA program responsibilities and functions.

This funding will contribute to ensuring the FAA meets its mission obligations consistent with our legal requirements. Additionally, the requested funding will ensure that the actions of the FAA and its employees are vigorously represented in administrative and judicial forums. The request will be deployed in a manner designed to best provide timely and responsive legal services in support of the FAA's most critical program responsibilities.

What is this Program and Why is it Necessary?

The Office of the Chief Counsel provides mission critical legal services for each of the Department of Transportation (DOT) goal areas. Within the 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 the agency's actions, and enhances risk management by proactively seeking to identify and mitigate risk. In addition, AGC is responsible for internal FAA adjudicative functions responsible for adjudicating bid protests and contract disputes, aviation civil penalties below a specified threshold, and challenges made to airport grant recipients compliance with their grants. This office also provides alternative dispute resolution services.

Anticipated FY 2017 Accomplishments:

Function / Office	FY 2017 Anticipated Accomplishments
▪ **Employment**	• Accomplish unification of the field and headquarters employment practices covering: o EEOC/MSPB cases o Including FOIA/Privacy Act o Ethics reviewed over 16,292 request o Debt Matters (heating waiver, appeals) o Torts/Part 9 o FACA- Federal Advisory Commission Act • Provide representational legal services on all phases of administrative employment litigation before the EEOC and MSPB. Provided representational legal services in the United States District Court, Court of Federal Claims and the Court of Appeals with the Department of Justice. • Provide advice and counsel to FAA managers including members of the Executive Service on personnel and disciplinary issues. • Provide legal advice in support of the Agency's ATC hiring initiatives, Barrier Analyses, potential shut down and furlough activities. • Provide legal advice in support and agency-wide training on the Agency's newly negotiated NATCA contract. • Provide legal review with a 5-day turn around for over 1,200 MOUs. • Provide training on reasonable accommodation and navigating the EEO process to major clients ATO and AVS. • Implemented comprehensive monthly training for Eagle attorneys.
▪ **Regulations**	• Send 85 percent of significant critical safety rules approved by the Rulemaking Council to DOT within 90 days of the planned date and issued 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 70 percent of requests for interpretation within 120 days of receipt and provided timely legal review of grants and denials of exemptions generally within 30 days of receipt for 80 percent of the exemptions submitted. • Complete 85 percent of critical safety rules within 90 days of the scheduled due date. • Over 70 percent of public requests for interpretations were provided within 120 days. • Within 30 days of receipt, provide legal concurrence or return the document to program office with a detailed explanation of why document is not legally sufficient, for 80% of the exemptions submitted to AGC for review.

▪ **Enforcement**	• Promote aviation safety by efficiently prosecuting enforcement actions for violations of the FAA's safety regulations and DOT's hazardous materials regulations in accordance with agency metrics, including by initiating 80% of all cases within 90 days of receipt. • Negotiate settlements of several violations of aviation safety regulations by a large air carrier and a UAS operator that included significant civil penalties and systemic changes to their systems to avoid future violations and to improve their safety operations. • Issue an emergency order to prevent a lithium battery manufacturer from transporting untested lithium batteries by air, and issued an emergency order to prevent a major cellular telephone manufacturer and the public from transporting cellular telephones with unsafe lithium batteries by air.
▪ **Litigations**	• Develop and implement a tailored enforcement process for revoking fraudulent US registration certificates for aircraft suspected of being used in trafficking of narcotics in Guatemala. • Issue a notice proposing extensive changes to 14 C.F.R. Part 13, the agency's investigative and enforcement procedures to reflect statutory changes and to streamline case processing.
▪ **Acquisitions & Fiscal Law**	• Provide legal counsel on Freedom of Information Act (FOIA), Privacy Act, Federal Advisory Committee Act (FACA), and other information related matters. Provided the legal advice needed to keep major acquisitions systems that support the safe and efficient air transportation system within 10 percent of their cost and schedule baselines. Improved the efficiency of the legal reviews of acquisition and fiscal matters submitted to the office by 100% (from 10 days to 5 days on average).

What does this funding level support?

There is a direct correlation between the level of service AGC can provide to the FAA and its organizational lines and its authorized staffing level. Funding at the FY 2018 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 and the safe but also timely integration of new entrants into the National Airspace System (NAS). In particular, AGC has had to devote a steadily increasing amount of resources to aiding in the safe integration of Unmanned Aerial Systems (UAS). Just one UAS rulemaking project, for example, involved the substantial time of nine attorneys. More than 10% of the personnel of AGC are engaged in UAS matters, and the workload is expected to continue to increase.
- 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.

FY 2018 Anticipated Accomplishments include:

Function/Office	FY 2018 Anticipated Accomplishments
▪ **Employment**	• Provide legal support on all White House initiatives that impact employment. • Provide legal support for labor negotiations. • Provide representational legal services on all phases of administrative employment litigation before the EEOC and MSPB. Provide representational legal services in the United States District Court, Court of Federal Claims and the Court of Appeals with the Department of Justice. • Provide advice and counsel to FAA managers and members of the Executive Service on personnel and disciplinary issues. • Provide legal advice in support of the Agency's ATC hiring initiatives, Barrier Analyses, potential shut down and furlough activities. • Provide legal review with a 5-day turn around for over 900 MOUs. • Provided training on reasonable accommodation and navigating the EEO process to all LOB and staff offices. ▪ Continue comprehensive training for Eagle attorneys.
▪ **Regulations**	▪ Support 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. ▪ Respond to 70 percent of public requests for interpretations of regulations within 120 days of receipt. ▪ Within 30 days of receipt, provide legal concurrence or return document to program office with detailed explanation of why document is not legally sufficient for 80% of the exemptions submitted to AGC for review.
▪ **Enforcement**	▪ Promote aviation safety by efficiently prosecuting enforcement actions for violations of the FAA's safety regulations and DOT's hazardous materials regulations in accordance with agency metrics. ▪ Provide litigation support to the Department of Justice on cases in federal district court, or handle those cases in district court by

	delegation from DOJ. ▪ Work with program offices on evaluation of implementation of the Compliance Philosophy and make necessary changes to meet the intent of the philosophy. ▪ Issue a final rule adopting extensive changes to 14 C.F.R. Part 13, the agency's investigative and enforcement procedures to reflect statutory changes and to streamline case processing.
▪ **Acquisition & Fiscal Law**	▪ Complete legal review of all acquisition and fiscal matters submitted to the office within 5 days and ensuring that key acquisitions remain within 10% of their original cost, schedule and performance baselines.
▪ **Litigation**	▪ Provide legal counsel on Freedom of Information Act (FOIA), Privacy Act, Federal Advisory Committee Act (FACA), and other information related matters-

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. Generally 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 NextGen air traffic control, and safety 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 attorneys have a significant role in addressing the staffing and labor implications of a system where air traffic is managed rather than controlled.

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 the increased safety and efficiency of a modern air transportation system. AGC is a key partner supporting the agency's success in all of our various program areas.

Policy, International Affairs, and Environment (APL)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$33,527**	**136**	**7**	**135**
Adjustments to Base	**$495**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	369			
Annualization of FY 2017 Pay Raise 2.1%	126			
Other Changes	**-$699**	**-9**	**0**	**-5**
Workforce Reduction Through Attrition	-699	-9		-5
Base Transfers	**$250**	**1**	**0**	**1**
Global Leadership Initiative	250	1		1
FY 2018 Request	**$33,573**	**128**	**7**	**131**

Detailed Justification for - Policy, International Affairs, and Environment (APL)

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

FY 2018 – Policy, International Affairs, and Environment (APL) – Budget Request ($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	24,200	25,899	25,945	46
Program Costs	9,391	7,628	7,628	-
Total	**$33,591**	**$33,527**	**$33,573**	**$46**
FTE	**133**	**135**	**131**	**-4**

The FY 2018 budget request of $33,573,000, 128 full-time permanent, and 131 full-time equivalents allows the FAA to identify, develop and implement the domestic and international policy and environmental goals of the agency. This includes increases of $126,000 for the annualized cost of the FY 2017 pay raise; $369,000 for the FY 2018 pay raise; and a reduction of -$699,000 from the Workforce Reduction Through Attrition initiative. The FY 2018 funding request also includes a $250,000 base transfer for 1 FTP/FTE position to continue the development of a data-informed prioritization process under the Global Leadership Initiative.

What is this Program and Why is it Necessary?

The Office of Policy, International Affairs, and Environment (APL) 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 collaborative engagement and cooperation 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.

APL coordinates the agency's reauthorization before Congress, and is responsible for national aviation policies and strategies including aviation activity forecasts, economic analyses, aircraft noise and emissions analyses and mitigation, environmental policy, and aviation insurance.

APL serves multiple international functions and is the principal advisor to the Administrator on international matters and management of the agency's international strategic outreach. The FAA is very active in working with ICAO and its member States, civil aviation authorities and air navigation service providers, U.S. and global aviation industry, and international partners and organizations to ensure the safety and security of the global aviation system, enhance global air traffic system efficiency, and increase environmental stability. The FAA also actively promotes the development of global standards (e.g., global aircraft noise and engine emissions standards) and recommended practices that are based on, or complementary, to U.S. Next Generation Air Transportation System (NextGen) systems, procedures and concepts.

FAA also participates in international standards setting and harmonization activities in transportation, and engages in implementing programs that provide technical assistance for transportation capacity building to developing countries. Outreach efforts include cooperation and technical/operational exchanges 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 ICAO; and technical assistance (over 1,500 cooperative agreements with 150 countries).

In the area of environment, APL is responsible for improving environmental performance and addressing 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 without constraining capacity growth, ensure energy availability, and enhance 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.

FY 2017 Anticipated Accomplishments:

Function/Office	FY 2017 Anticipated Accomplishments
Aviation Policy and Plans	• Support the introduction of an FAA reauthorization bill through the development of proposals, analysis, legislative text, and responses to inquiries from stakeholders. • Monitor implementation of legislation with FAA requirements, and analyze forecasts of the Aviation Trust Fund. • Develop a new UAS forecasting capability and support safety analysis by UAS data acquisition and analysis. • Identify and address cross-cutting NextGen and emerging manned and unmanned aviation and commercial space policy issues, which includes remote tower technologies, by working across the agency, with the Administration, Congress, and stakeholders. • Improve FAA's effectiveness and continue to support implementation of the FAA's strategic initiatives by leading a streamlined and responsive corporate planning and performance management process for the agency, and developing a new-generation digital enterprise performance visualization and reporting system. • Provide timely economic analysis to enable the agency to send critical safety rules, cost relieving regulation, and economically enabling rules such as unmanned aviation systems (UAS) operations to the Office of the Secretary of Transportation and the Office of Management and Budget. • Monitor congestion at US airports and, support congestion management efforts and operational initiatives such as in the New York metropolitan area. • 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 cost-benefit criteria and other governance processes for low activity towers such as Federal Contract Tower airports and future airport applicants to the Federal Contract Tower Program.

International Affairs	▪ 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 best practices on air traffic system operation and modernization with global air navigation service providers and organizations such as the Civil Air Navigation Services Organization (CANSO). ▪ 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. interests in ICAO global safety, efficiency, and environmental initiatives and programs. ▪ Coordinate the FAA's Global Leadership Initiative, including chairmanship of the International Advisory Board and International Steering Committee. ▪ 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. ▪ Complete key activities in the Caribbean to improve airport safety and airspace efficiency, and with the Association of South East Asian Nations (ASEAN) to influence regional system wide information management policy and practices.
Environment and Energy	▪ Provide implementation guidance on the use of the Aviation Environmental Design Tool (AEDT) for demonstrating compliance with the National Environmental Policy Act (NEPA). ▪ Conduct policy analysis of research outcomes and explore options for potential revisions in community noise threshold levels. ▪ Conduct analyses of options for establishing a performance threshold associated with the new particulate matter emissions standard. ▪ Develop the procedures for domestic implementation of the global market based measure adopted by ICAO, including recognition of the role of alternative fuels for energy security. ▪ Establish agreements with foreign civil aviation authorities and their respective research institutions to conduct collaborative environmental programs. ▪ Update 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 the noise and emissions requirements pertaining to the next generation of supersonic aircraft. ▪ Update and provide training and guidance to LOBs/SOs on FAA Order 1050.1F and the associated desk reference to improve our efficiency for meeting NEPA requirements and support NextGen implementation. ▪ Provide a community involvement toolkit for FAA specialists and practitioners to use for engagement with the public; consolidate

	FAA's best practices for community engagement and communicate across the agency for consistent application. ▪ Lead FAA's agency-wide sustainability program focused on identifying cost-effective measures and minimizing FAA's environmental footprint through sustainable buildings, energy and water efficiency, renewable energy use, vehicle fleet management, sustainable acquisition, and waste management. ▪ Coordinate the development of FAA's annual Strategic Sustainability Performance Plan; track, assess, and report FAA's sustainability performance. ▪ Complete demonstration testing of a web-based portal system to more effectively address noise complaints that are submitted to the FAA from across the NAS. ▪ Assess NAS-wide environmental performance for exposure to significant noise, reduction of fuel burn (carbon-dioxide emissions), and improved fuel efficiency. ▪ Identify innovative operational procedures that can reduce noise, fuel, and emissions; quantify their environmental benefits and feasibility for near term application at U.S. airports.

What does this funding level support?

To achieve the performance goals outlined in the FY 2018 budget we will maximize outcomes through the leveraging of partnerships, technology, and expertise. We will continue to achieve the goals of the Administration and the Department in connection with various domestic and international initiatives.

In addition, APL maintains three specific environmental targets that will be sustained at the requested funding levels. 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.
- Sustainable Jet Fuels: One billion gallons of sustainable jet fuel is used by aviation, by 2018.

Anticipated FY 2018 Accomplishments:

Function/Activity	FY 2018 Anticipated Accomplishments
Aviation Policy and Plans	▪ Support the introduction of an FAA reauthorization bill through the development of proposals, analysis, legislative text, and responses to inquiries from stakeholders. ▪ Monitor implementation of legislation with FAA requirements, and analyze forecasts of the Aviation Trust Fund. ▪ Enhance UAS forecasting capability, develop credible estimates of UAS activity, and support safety analysis by UAS data acquisition and analysis. ▪ Monitor congestion at US airports and, support congestion management efforts and operational initiatives such as in the New York metropolitan area. ▪ Identify and address cross-cutting NextGen and emerging manned and unmanned aviation and commercial space policy issues, which includes remote tower technologies, by working across the agency, with the Administration, Congress, and stakeholders. ▪ Provide timely economic analysis to enable the agency to send critical safety rules, cost relieving regulation, and economically enabling rules such as unmanned aerial systems (UAS) advanced operations to the Office of the Secretary of Transportation and the Office of Management and Budget.

Function/Activity	FY 2018 Anticipated Accomplishments
	▪ 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. ▪ Support the Administrator by staffing the Management Advisory Council and other similar advisory bodies as directed by Congress. ▪ Improve FAA's effectiveness by leading a streamlined and responsive corporate planning and performance management process for the agency, and implementing a new-generation digital enterprise planning and performance visualization and reporting system.
International Affairs	• With other U.S. Government agencies, 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 best practices on air traffic system operation and modernization with global air navigation service providers and organizations such as the Civil Air Navigation Services Organization (CANSO). • 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. interests in ICAO global safety, efficiency, and environmental initiatives and programs. • Serve as the Secretariat of the Interagency Group on International Aviation. • Coordinate the FAA's Global Leadership Initiative, including chairmanship of the International Advisory Board and International Steering Committee. • Finalize an updated FAA International Strategy that includes data-informed regional priorities and key initiatives that drive the agency's GLI strategic plan. • Finalize an updated FAA International Strategy that includes data-informed regional priorities and key initiatives that were developed through collaboration across the entire agency. • Finalize an FAA Order to institutionalize the GLI governance structure, its functions, and roles and responsibilities. • 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. • Complete key activities in the Caribbean to improve airport safety and airspace efficiency, and with the Association of South East Asian Nations (ASEAN) to influence regional system wide information management policy and practices.
Environment and Energy	▪ Support activities to reduce aviation's environmental impacts, including reducing the number of people exposed to significant aircraft noise, air quality impacts associated with aircraft engine and airport ground support vehicle emissions, and aviation's carbon

Function/Activity	FY 2018 Anticipated Accomplishments
	dioxide (CO_2) emissions. ▪ Finalize updated policies and guidance pertaining to the mitigation of significant aircraft noise, taking into consideration research outcomes related to annoyance, sleep disturbance, and impacts on children's learning. ▪ Support activities to improve aviation fuel efficiency and augment the development, deployment and use of sustainable aviation fuels. ▪ Implement an enhanced NAS-wide operational framework for assessing implications of proposed air traffic procedural changes on fuel burn and noise, taking into account geographic constraints and demographics, without detriment to safety. ▪ Implement FAA's revised National Environmental Policy Act (NEPA) implementation order 1050.1 to ensure more efficient and effective implementation of NEPA across the agency; revise the associated desk reference as necessary. ▪ Ensure global interoperability of NextGen technologies and procedures by shaping international standards for effectiveness and to enable new entrants (e.g. next generation supersonic, unmanned aircraft). ▪ Develop guidance materials for implementing the aircraft noise and exhaust emissions certification regulations and expanded delegation authority to the extent possible. ▪ Support US Government and International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP) activities to finalize the standards and recommended practices for the global market-based measure to reduce international aviation greenhouse gas emissions, begin to implement the plan for domestic application. ▪ Work with other federal agencies to continue implementing the National Alternative Jet Fuels R&D Strategy and Plan. ▪ Harmonize and promulgate aircraft noise and emissions regulations consistent with standards adopted by ICAO and the balanced approach to aircraft noise mitigation. ▪ Provide updated implementation guidance on the use of the Aviation Environmental Design Tool (AEDT) for demonstrating environmental compliance with the National Environmental Policy Act.

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 and operational efficiency due to FAA expertise and leadership in developing global regulations and standards. 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.

Human Resources Management (AHR)
($000)

	Dollars	FTP	OTFTP	FTE
FY 2017 Annualized CR	**$101,014**	**558**	**31**	**534**
Adjustments to Base	**$2,817**	**0**	**0**	**0**
FY 2018 Pay Raise 1.9%	1,034			
Annualization of FY 2017 Pay Raise 2.1%	391			
Working Capital Fund	1,392			
Other Changes	**-$3,650**	**-49**	**0**	**-24**
Workforce Reduction Through Attrition	-3,650	-49		-24
FY 2018 Request	**$100,181**	**509**	**31**	**510**

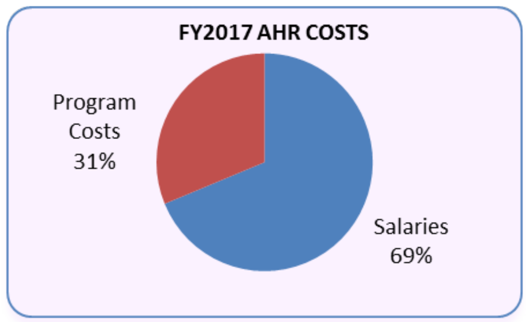
Detailed Justification for Human Resource Management (AHR)

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

FY 2018 – Human Resource Management (AHR) – Budget Request ($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	74,498	72,509	70,284	-2,225
Program Costs	26,708	28,505	29,897	1,392
Total	**$101,206**	**$101,014**	**$100,181**	**-$833**
FTE	**499**	**534**	**510**	**-24**

The FY 2018 budget request of $100,181,000 and 510 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 - our People.

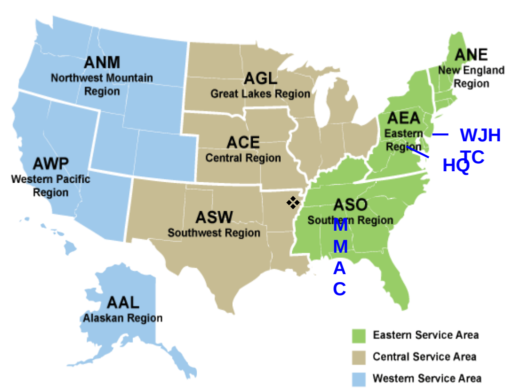


This includes increases of $2,817,000 for adjustments to base, an adjustment to the Working Capital Fund of $1,392,000, and a reduction of -$3,650,000 for the Workforce Reduction Through Attrition initiative.

What is the program and why is it necessary?

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 46,000 FAA employees. AHR plans to 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 2018 we will:

Headquarters / 11 Regional Offices



- Continue implementing agency-wide leadership development programs to build a new generation of leaders and employees to achieve the FAA mission
- 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 (DOT) to advance the multi-modal transportation system of the future
- Implement a corporate strategy that fosters effective, positive, and collaborative labor management relations

- As the FAA builds the foundation for the aerospace system of the future through the implementation of NextGen, the agency's workforce will play an increasingly critical role AHR is focused on improving the FAA's human capital by identifying, recruiting, and training our workforce with the leadership, technical, and functional skills to meet the challenges of the future while maintaining the world's safest and most efficient aerospace sector. This includes: Launching leadership development activities and tools grounded in FAA's strategic leadership capabilities, to support our current leaders while building a pipeline of future leaders

- Identifying the skills needed to help the FAA meet its current and future challenges

- Developing necessary skills in current and new employees

- Attracting and retaining talented, high-performing professionals at FAA

By FY 2018, AHR will strive to have inventoried the skills requirements of our mission critical workforce to address identified gaps, and identified agency needs aligned with proactive training of employees to enhance technical and functional skills. AHR will also sustain a formal leadership pipeline supporting traditional transformational leader movement and improved employee and stakeholder engagement culture to support constructive resolution of issues. Ultimately, the agency will be viewed as a premier "Workplace of Choice," able to efficiently hire and retain top talent.

AHR provides a variety of critical services to FAA employees and supports Management efforts in a number of areas.

FY 2017 Anticipated Accomplishments:

Function / Office	FY 2017 Anticipated Accomplishments
The Office of Human Resource Services (AHF) ▪ Hiring operations to recruit, assess, hire, and develop the FAA workforce ▪ HR management and development consultation ▪ Strategic advice, recruitment and referral of qualified applicants ▪ Personnel pay administration ▪ Corporate onboarding ▪ Oversight and processing of personnel actions including the development of systems to support processing ▪ Processes and procedures to support position management	▪ Position FAA as an attractive employer for prospective employees through a streamlined and easy to use process for applying to FAA jobs ▪ Recruit new talent and maintain existing talent pipelines and explore new talent pipelines ▪ Continue maturation of strategic HR services to forecast, recruit, and onboard the optimal number of FAA employees needed to execute the air traffic control and aviation safety missions, including full implementation of tools to align and integrate human resources with organizational goals and strategic priorities ▪ Completion of a systems requirement document to outline the steps required to integrate existing HR systems to improve performance and reduce costs of HR services ▪ Improvement in Executive staffing by strengthening the executive hiring, development, and performance systems

	▪ Position FAA as an attractive employer for prospective employees through a streamlined and easy to use process for applying to FAA jobs ▪ Improving FAA's classification systems to efficiently forecast the agency's talent needs, and ensure the agency's human resources are cost-effective and qualitative ▪ Improving efficiency of the FAA hiring process by migrating the legacy FAA hiring system to an integrated hiring system with enhanced technical capabilities that compliment operational resources; enables FAA to improve quality with less resources
Function / Office	**FY 2017 Anticipated Accomplishments**
The Office of Compensation, Benefits, and Worklife (AHB) ▪ Directs the FAA's employee benefits, retirement and worklife programs; oversees compensation across five pay plans; and manages workers' compensation activities for the entire Department of Transportation. Manage the FAA and DOT's Office of Worker's Compensation Program (OWCP) ▪ Processing benefits applications and providing counseling on survivor benefits, disability compensation, and changes to Federal Employees Health Benefits (FEHB), Open Season options, Federal Employees Group Life Insurance (FEGLI), and the Thrift Savings Plan (TSP) ▪ Pre and post retirement counseling including providing retirement estimates ▪ Deliver competitive, flexible WorkLife programs and benefits ▪ Provide compensation expertise in utilizing FAA's unique personnel authority and flexibility across five pay plans that attract and retain mission-critical talent ▪ Administer three distinct performance management systems; Valuing Performance (VP) for non-bargaining unit, core compensation employees; the Performance Management System (PMS) for bargaining unit employees; and executive performance and compensation	▪ Continue achievement of workers' compensation cost avoidance through facilitating return to duty and ensuring careful adjudication of claims of questionable veracity ▪ Containing FAA's annual workers' compensation chargeback bill at a greater rate than the rest of government ▪ Timely submission of claim forms to DOL via paperless transmission in ECOMP ▪ Completion of ECOMP deployment to remaining FAA workforce (NATCA members) and employees from all other Department of Transportation modal administrations ▪ Facilitate prompt payment of entitled benefits to injured employees ▪ Continued cost-savings from centralization and standardization of core services Introduce new retirement planning and Thrift Savings Plan seminars for FAA employees ▪ Creation of tools and resources for new and transferring employees related to benefits and work life resources ▪ Implement the FY 17 Total Rewards program design and communications plans and continue enhancement of FAA benefits programs and communications ▪ Expand Agency readiness and use of telework flexibilities and alternative work arrangements ▪ Agency-wide deployment of an automated process for concurrence and tracking of

	telework agreements ▪ Realization of continued cost savings from the first full fiscal year of Child Care Center compliance with the Trible Amendment ▪ Implementation of regional and virtual Worklife Fairs ▪ Continued best practices delivery of EAP services that support agency objectives and promote program utilization ▪ Analysis of labor-market and proposal to address any inequities in pay bands and technical series and to address compression issues in the upper bands ▪ Implement FY 17 customer recommendations in the VP program to further enhance meaningful pay-for-performance recognition and increases ▪ Management Performance Incentive Program (MPIP) and complete payments based on FY 17 final ratings ▪ Expand core compensation and performance management training offerings for managers
Function / Office	**FY 2017 Anticipated Accomplishments**
The Office of Labor and Employee Relations (AHL) ▪ Manages the relationships between FAA and the unions that represent its employees. Manages Labor relations with the eight unions (with a total of 33 bargaining units) which represent 35,100 (76%) of the approximately 46,000 employees working at the FAA ▪ Represents the agency in all national and headquarters negotiations, and most regional negotiations ▪ Handles third party matters, such as unfair labor practices proceedings and arbitrations, at both the national and regional levels of recognition. Provides labor and employee relations training and guidance to management ▪ Provides advice and guidance on conduct and discipline; leave; drug and alcohol misuse; the medical inability to perform work; and unacceptable performance and performance improvement	▪ Provide day-to-day operational support and services to FAA managers on labor and employee relations ▪ Implement a labor and employee relations (LER) strategy and prepare for upcoming major term negotiations with FAA unions ▪ Manage oversight and compliance of all bargaining with FAA unions ▪ Supporting employee engagement through continued collaboration with the unions ▪ Developing knowledge and skills of LER employees and FAA management through training
Function / Office	**FY 2017 Anticipated Accomplishments**

The Office of Talent Development (AHD)	
▪ Manages the development of talent and leadership bench strength o FAA Leadership & Learning Institute (FLLI) o Electronic Learning Management System (eLMS) o Executive Development (EXD) o Organizational Effectiveness (OE) o Human Capital Planning (HCP)	▪ Identify and implement innovative approaches to the development of eight Strategic Leadership Capabilities with an emphasis on leaders developing leaders ▪ Continue to change the learning and delivery methodology of all FLLI course material to support performance management and FAA succession planning. ▪ Continue to evolve the design development, and delivery of management and executive workshops and rotational development opportunities ▪ Deliver leadership and management training courses to at least 1,400 FAA managers ▪ Facilitate strategic team development meetings with Executives and their leadership teams ▪ Provide learning services to all FAA employees through the Electronic Learning Management System (eLMS) ▪ Conduct the annual Federal Employee Viewpoint (FedView) Survey ▪ Analyze, interpret, and report FedView and Best Places to Work results and metrics to agency stakeholders ▪ Conduct workshops on FedView results and action planning to improve capability of FAA organizations to address survey results ▪ Update the FAA Human Capital Plan to improve strategic management of the agency workforce ▪ Coordinate OMB human capital benchmarking data collection and results reporting

Function / Office	FY 2017 Anticipated Accomplishments
The Office of the Accountability Board (AHA) ▪ Provides oversight, and ensures that management is held accountable for responding to allegations, incidents of verbal, written, graphic, or physical harassment and other misconduct that creates or that may, reasonably be expected to create an intimidating, hostile, or offensive work environment based on race, color, religion, gender, sexual orientation, sexual harassment, national origin, age, or disability ▪ Provides the agency with an assessment of the processing of allegations covered, independent of the officials responsible for such processing. The Accountability Board reviews actions taken for timeliness, consistency and appropriateness ▪ Develops and delivers initial and continuing training for managers and supervisors and awareness by employees in issues and procedures related to the Accountability Board are essential to its success ▪ Ensures that all allegations and incidents of misconduct within the scope of the Accountability Board are handled properly	▪ Foster a workplace free of harassment and inappropriate behavior through investigation and adjudicating allegations of employee misconduct ▪ Ensure 96% of allegations are addressed by management timely ▪ Develop multi-media training, corporate communications and education platforms to address improper workplace behavior. ▪ Demonstrate the agency's commitment to eliminating harassment or misconduct within the scope of the order from the workplace ▪ Review, analyze, interpret, and report AB allegations, dispositions and LOB/Region specific metrics to applicable agency stakeholders ▪ Ensure a uniform and consistent approach to address and track all such allegations and create and maintain a model work environment to enhance mission accomplishment ▪ Conduct internal review on allegations and dispositions and develop action plan to improve capability of the Accountability Board and support FAA organizations to address areas of allegations and need for specific training.

What does this funding level support?

Funding at the requested level is critical to continue providing personnel services to all FAA employees. The non-pay costs within AHR's budget include systems like CASTLE for time and attendance and other systems. AHR also supports the FAA's learning management system, the Employee Assistance Program (EAP), the FAA's Accountability Board, and the Agency's worker's and unemployment compensation program, all of which are necessary for FAA's lines of business to be successful.

Most of the FAA's hiring efforts are for our safety organizations, with ATO and AVS being the most active. At the requested level, AHR will be able to support multiple recruiting events (e.g. virtual career fairs). This will maintain the FAA's ability to reach qualified candidates. As more federal employees become eligible to retire in FY 2017 and beyond, the competition for talent will increase.

With an increasingly retirement eligible workforce, acquiring new talent and managing the talent pipeline from entry-level to senior management is a priority for the FAA. Due to projected attrition and air traffic requirements, the agency expects an unprecedented level of hiring for air traffic controllers over the next five fiscal years. In FY 2015, the agency hired approximately 1,400 air traffic controllers, including over 1,000 air traffic controller trainees. In FY 2016, FAA hired 1,680 air traffic controllers, exceeding the FY 2016 target by 4%. In FY 2017, FAA is projected to hire 1,781 controllers. The pace of air traffic controller hiring will level out to approximately 1,200 in FY 2019 and maintain a steady state of approximately 900 – 1,000 thereafter to meet the demands of an aging workforce and increased operational requirements.

The Human Resource Services Office is required to recruit, assess, and hire a diverse workforce necessary to accomplish the FAA mission. In FY 2016, the HR Services Office posted 4,908 vacancy announcements, 7,800 referral certificates, facilitated 3,070 hiring selections, and over 10,000 job offers, including hiring over 1,680 air traffic controllers. The HR Services office is also responsible for ensuring the approximately 46,000 current FAA employees and new hires are paid correctly and personnel records are updated and maintained in accordance with federal HR regulations. In FY 2016, with 178,475 personnel actions processed HR Services surpassed the number of FY 2015 personnel actions (122,000), including pay actions, and maintained the 99 percent accuracy rate. The current landscape calls for recruiting and hiring processes that are efficient, effective and strengthen the ability of the FAA to compete with other agencies and the private sector in attracting and hiring candidates for our positions. The HR Services Office continues to improve hiring efficiency in FY 2016 by maintaining the 25 percent reduction seen in FY 2015. In FY 2017 and beyond, HR Services will continue to build and modify recruiting and hiring processes to meet agency staffing goals using the most efficient and effective practices.

The Office of Compensation, Benefits, and WorkLife processed thousands of retirements and retirement annuity estimates in 2016 (approximately 2,000 retirement applications and over 5,300 annuity estimates), processed over 8,900 benefit actions, and responded to over 14,500 inquiries and 33,000 phone calls. During the first Federal Employees Group Life Insurance (FEGLI) Open Season in 12 years, over 4,300 elections were processed.

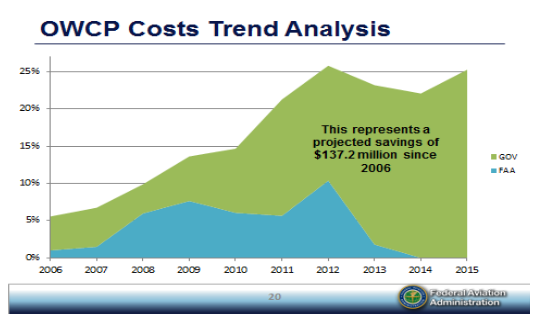
The Telework Program realized a 22% increase in overall participation in FY 2016. At the end of the second quarter FY 2017, the telework participation rate increased nine percentage points to 66% of the telework eligible population.

The Office also processed thousands of promotions, in-position and reassignments increases. The table below outlines the actual results of increases processed in FY 2016.

Promotions, Reassignment, and In-Position Increases							
FY 2016 Actual Results							
Type of Increase	Total Core Comp Headcount or Eligible Counts for Reassignments	Number of Headcounts Received Increases	Amount	Aggregate Restrictions	Number of Increases to Core Population (%)	Increase Limitations per Policy	Actual Increase (%)
Promotion	22,228	1,859	$10,532,976	None	8.40%	15.00%	8.60%
In-Position	22,228	431	$1,744,355	2.00%	1.90%	7.00%	5.20%
Reassignment	1,170	130	$506,736	20.00%	11.10%	7.00%	4.80%

Since the FAA consolidated the Workers' Compensation Program (OWCP) into one program office, and subsequently provided servicing to the entire Department, AHR consistently contained our bill at a greater rate than the rest of government.

Despite built-in cost of living increases, AHR decreased the overall DOT workers' compensation bill by almost $550,000 in Chargeback Year (CY) 2015. This constitutes a 0.6% reduction. During the same time period, the government-wide bill increased by 3.2%. Since CY 2011, when we began managing the program for the entire Department, we have decreased our bill by 8.6% compared to a 10.6% increase government-wide.



Looking back further, we have consistently contained the FAA bill at a significantly greater rate than the rest of government. Since we began centrally managing the program for the entire FAA in CY 2006, we have reduced the FAA bill by 4.5% while the rest of government has seen a 25% increase. Had our bill increased at a comparable rate to the rest of government during this timeframe, we would have paid an additional $137 million in workers' compensation costs since CY 2006.

Funding at the requested level will enable AHR to provide the level of service expected by our injured workers and agency management, and that we are able to comply with all regulatory requirements. We maintain an active caseload of over 3,100 long term disability claims and received over 1,400 new cases during 2015 for a total of 4,500 cases Department wide.

The Office of Labor and Employee Relations programs are necessary in order to comply with The Federal Service Labor-Management Relations Statute. The FAA has a large union presence on property. Nearly 35,100 (76%) of the approximately 46,000 employees working at the FAA are represented by unions. A total of eight different unions represent these various employees who are in 33 different bargaining units (i.e., groups of employees with an identifiable community of interests). Several of these units bargain together with the FAA and as a result there are 16 separate collective bargaining agreements (CBAs) in place. Labor costs associated with CBAs are a large component of the FAA's funding. For example, the personnel compensation and benefits (PC&B) costs for FY 16 for the air traffic controllers CBA was $2.942 billion. For all employees covered by a CBA, the PC&B costs were $5.687 billion.

In FY 2016, 8,072 logged cases related to LER matters were worked by LER practitioners. This did not include potential cases and issues that were resolved through LER guidance and consultation to management. Additionally, management training was delivered throughout the year on various subjects including: Accountability Board training, grievance processing, conduct and discipline, and other subjects.

The Accountability Board, in FY 2016, processed 950 reported incidents of harassment. At a historic rate of growth averaging 12% (average since 2011) per year, it is estimated that the number of reported incidents will be 1,182 in FY 2017 and 1,323 by FY 2018. However, the number of reported incidents has leveled off and the number dipped slightly in FY 2016 from FY 2015. This drop in cases is attributed to the increased training efforts of the Board. In FY 2016, the Board developed training platforms that resulted in over 9,000 FAA employees, contractors and managers receiving Accountability Board anti-harassment training. This training enables the Board to emphasize the agency's anti-harassment message and that strong leadership is the key to eliminating all forms of harassment and misconduct. Since the Board must conduct anti-harassment training on a yearly basis, training is projected to increase incrementally in FY 2017 and FY 2018 consistent with the projected number of reported allegations.

Anticipated FY 2018 Accomplishments:

Function / Office	Anticipated FY 2018 Accomplishments
The Office of Human Resource Services (AHF)	▪ Workforce Planning ▪ Job Analysis and Position Descriptions ▪ Skills Identification and Assessments ▪ Staffing Advisory and Consultation ▪ Recruitment, Qualifications, and Placement (Staffing) ▪ Executive Staffing/Personnel Administration ▪ Diversity, Veterans, and Student Recruitment Programs ▪ Process Personnel and Payroll Transactions ▪ Personnel System Administration ▪ Corporate Onboarding ▪ Organizational Design Support
The Office of Compensation, Benefits and Worklife (AHB)	▪ Efficiencies of workers' compensation program through cost avoidance, containment of chargeback bills, and second full year of paperless claims ▪ Implementation of a Pharmacy Benefits ▪ Introduction of new educational seminars and resources to help employees maximize benefits ▪ Expansion of retirement planning seminar offerings ▪ Utilization of Total Rewards recommendations

	▪ Expanded Agency readiness and use of telework flexibilities and deployment of an automated telework agreements ▪ Enhanced standardization of operating procedures across facilities ▪ Improved maintenance and administration of the National Child Care Program and an increase in participating facilities ▪ Introduction of Regional and virtual WorkLife Fairs to increase program awareness and participation ▪ Market-based adjustments to ensure pay competitiveness ▪ Establishment of a plan to further strengthen the link between performance and pay throughout Agency programs ▪ Implement FY 17 customer recommendations on MPIP enhancements
The Office of Labor and Employee Relations (AHL)	▪ Administer labor/employee relations services across HQ and 11 Regional offices with eight unions (33 bargaining units, 16 contracts) Represent the agency in all national and headquarters negotiations, and most regional negotiations ▪ Handle third party matters, such as unfair labor practice proceedings and arbitrations, at both the national and regional levels of recognition. Provide labor and employee relations training and guidance to management ▪ Provide management guidance for all FAA employees on conduct and discipline; leave; drug and alcohol misuse; medical incapacitation; and unacceptable performance/performance improvement
The Office of Talent Development (AHD)	▪ Leadership Development (Executives / Managers) ▪ Mission Critical Succession Planning and Execution ▪ Human Capital Research / Data and Trend Analysis ▪ Executive and Organizational Effectiveness ▪ Enhancing Learning Management and Support Systems ▪ Corporate Coaching and Facilitation ▪ Course / Curriculum Analysis and Development ▪ Public Outreach ▪ Talent Development Policy Administration
The Office of the Accountability Board (AHA)	▪ Ensures that management is held accountable for responding to and addressing allegations within the designated timeframes ▪ Develop multi-media training, corporate communications and education platforms to address allegations involving incidents of verbal, written, graphic, or physical harassment and other misconduct that creates or that may, reasonably be expected to create an intimidating, hostile, or offensive work environment based on race, color, religion, gender, sexual orientation, sexual harassment, national origin, age, or disability ▪ Review, analyze, interpret, and report AB allegations, dispositions and LOB/Region specific metrics to applicable agency stakeholders ▪ Demonstrate the agency's commitment to eliminating harassment or misconduct within the scope of the order from the workplace.

What benefits will be provided to the American public through this request?

Over the next several years, the FAA will be laying the foundation for the aerospace system of the future through the implementation of Next Generation Air Transportation System (NextGen). Meeting this challenge is going to take the collective strength of its employees.

The FAA's greatest asset is its workforce. The dedication, professionalism, skill, and expertise of our past and present workforce have created this world-renowned agency. The FAA is poised to adapt to the changing aviation industry and empower the current and future workforce with the proper tools, knowledge, and leadership skills to be successful.

Staff Offices Explanation of Funding Changes

	Dollars ($000)	FTE
Staff Offices	**-$1,490**	**-43**
Overview: For FY 2018, the Staff Offices Assistant Administrators request $204,868,000 and 1,030 FTEs to meet their respective missions. The FY 2018 request level reflects adjustments to base, other changes and base transfers. This represents a decrease of $1,490,000 from the FY 2017 annualized CR level.		
Adjustments to Base	**$4,675**	**-**
FY 2018 Pay Raises: 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 1.9 percent.	2,304	
Annualization of FY 2017 Pay Raises: This increase is required to provide for the remaining quarter of the FY 2016 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 1.0 percent.	843	
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.	1,528	
Other Changes	**-$6,672**	**-45**
Workforce Reduction Through Attrition: Restricted hiring to achieve savings through attrition.	-6,672	-45
Base Transfers	**$507**	**2**
FY 2017 Civil Rights Staffing (ATO to ACR): This request transfers $257,000 and 1FTP/1FTE from the Air Traffic Organization, Technical Operations Services (ATO/AJW) to the Office of Civil Rights (ACR).	257	1
Global Leadership Initiative (ANG to APL): This request transfers $250K and 1FTP/1FTE from NextGen, ANG to Policy, International Affairs & Environment, APL.	250	1

INSERT TAB HERE:

3B. FACILITIES & EQUIPMENT

FACILITIES AND EQUIPMENT

(AIRPORT AND AIRWAY TRUST FUND)

(CANCELLATION)

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, $2,766,200,000, of which $483,800,000 shall remain available until September 30, 2018 and $2,282,400,000 shall remain available until September 30, 2020: 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 no later than 60 days after the submission of the President's budget request, the Secretary of Transportation shall transmit to the Congress an investment plan for the Federal Aviation Administration which includes funding for each budget line item for fiscal years 2019 through 2023, 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.

Of the unobligated balances from prior year appropriations available under this heading, $31,200,000 is hereby permanently cancelled.

Note.—A full-year 2017 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Further Continuing Appropriations Act, 2017 (P.L. 114–254). The amounts included for 2017 reflect the annualized level provided by the continuing resolution.

Program and Financing
(in millions of dollars)

Identification code: 69-8107-0-7-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Obligations by program activity:			
	Direct program:			
0001	Engineering, development, test and evaluation	200	141	153
0002	Procurement and modernization of (ATC) facilities and equipment	1,819	1,762	1,716
0003	Procurement and modernization of non-ATC facilities and equipment	159	175	181
0004	Mission support	240	224	219
0005	Personnel and related expenses	470	479	484
0006	Hurricane Sandy	2	2	.....
0100	Subtotal, direct program	2,890	2,783	2,753
0799	Total Direct obligations	2,890	2,783	2,753
0801	Reimbursable program	78	79	79
0900	Total new obligations	2,968	2,862	2,832
	Budgetary resources available for obligation:			
1000	Unobligated balance brought forward, Oct 1	1,233	1,227	1,338
1021	Recoveries of prior year unpaid obligations	43	.....	.....
1033	Recoveries of prior year paid obligations	1	.....	.....
1050	Unobligated balance	1,277	1,227	1,338
	Budget authority (gross), detail:			
	Appropriations discretionary:			
1101	Appropriation (special or trust fund)	2,855	2,850	2,766
	Spending authority from offsetting collections, discretionary:			
1133	Unobligated balance of appropriations temporarily reduced	-5	.....	-31
1160	Appropriation, discretionary (total)	2,850	2,850	2,735
1700	Collected	62	103	103
1701	Change in uncollected payment, Federal sources	12	.....	.....
1750	Spending auth from offsetting collections, disc (total)	74	103	103
1800	Collected	.....	20	.....
1900	Budget authority (total)	2,924	2,973	2,838
1930	Total budgetary resources available	4,201	4,200	4,176
	Memorandum (non –add) entries:			
1940	Unobligated balance expiring	-6	.....	.....
	Special and non-revolving trust funds:			
1941	Unexpired Unobligated balance, end of year	1,277	1,338	1,344
1950	Other balances withdrawn and returned to unappropriated receipts	20	.....	.....
1951	Unobligated balance expiring	6	.....	.....
1952	Expired Unobligated balance, start of year	58	76	76
1953	Expired Unobligated balance, end of year	50	76	76
1954	Unobligated balance canceling	20	.....	.....
	Change in obligated balances:			
3000	Unpaid obligations, brought forward, Oct 1	1,528	1,770	1,677
3010	Obligations incurred, unexpired accounts	2,968	2,862	2,832
3011	Obligations incurred, expired accounts	7	.....	.....
3020	Outlays (gross)	-2,670	-2,955	-2,932
3040	Recoveries of prior year unpaid obligations, unexpired	-43	.....	.....
3041	Recoveries of prior year unpaid obligations, expired	-20	.....	.....
3050	Unpaid obligations, end of year	1,770	1,677	1,577
	Uncollected payments:			
3060	Uncollected pymts, Fed sources, brought forward, Oct 1	-63	-59	-59
3070	Change in uncollected pymts, Fed sources, unexpired	-12	.....	.....
3071	Change in uncollected pymts, Fed sources, expired	16	.....	.....

Identification code: 69-8107-0-7-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
3090	Uncollected pymts, Fed sources, end of year	-59	-59	-59
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	1,465	1,711	1,618
3200	Obligated balance, end of year	1,711	1,618	1,518
	Budget Authority and outlays, net:			
4000	Budget authority, gross	2,924	2,953	2,838
4010	Outlays from new discretionary authority	987	1,284	1,228
4011	Outlays from discretionary balances	1,683	1,661	1,694
4020	Outlays, gross (total)	2,670	2,945	2,922
	Offsets:			
	Against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-37	-52	-52
4033	Non-Federal sources	-42	-51	-51
4040	Offsets against gross budget authority and outlays (total)	-79	-103	-103
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pymts, Fed sources, unexpired	-12	. . . . .	. . . . .
4052	Offsetting collections credited to expired accounts	16	. . . . .	. . . . .
4053	Recoveries of prior year paid obligations, unexpired accounts	1	. . . . .	. . . . .
4060	Additional offsets against budget authority only (total)	5	. . . . .	. . . . .
4070	Budget authority, net (discretionary)	2,850	2,850	2,735
4080	Outlay, net (discretionary)	2,591	2,842	2,818
4090	Budget authority, gross	. . . . .	20	. . . . .
4100	Outlays from new mandatory authority	. . . . .	10	. . . . .
4101	Outlays from mandatory balances	. . . . .	. . . . .	10
4110	Outlays, gross	. . . . .	10	10
4120	Federal sources	. . . . .	-20	. . . . .
4180	Budget authority, net (total)	2,850	2,850	2,735
4190	Outlay, net (total)	2,591	2,832	2,829

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 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Direct obligations:			
	Personnel compensation:			
11.1	Full-time permanent	304	311	319
11.3	Other than full-time permanent	1	2	1
11.5	Other personnel compensation	7	8	7
11.9	Total personnel compensation	312	321	327
12.1	Civilian personnel benefits	97	100	101
21.0	Travel and transportation of persons	42	42	40
22.0	Transportation of things	3	2	2
23.2	Rental payments to others	55	52	51
23.3	Communications, utilities, and miscellaneous charges	36	46	32
25.1	Advisory and assistance services	1,725	1,575	1,594
25.2	Other services from non-federal sources	98	113	114
25.3	Other goods and services from federal sources	33	29	26
25.4	Operation and maintenance of facilities	65	76	72
25.7	Operation and maintenance of equipment	60	58	60
25.8	Subsistence and support of persons	1	2	1
26.0	Supplies and materials	27	30	27
31.0	Equipment	169	174	154
32.0	Land and structures	164	163	152
43.0	Interest and dividends	3	.....	.....
99.0	Direct obligations	2,890	2,783	2,753
99.0	Reimbursable obligations	78	79	79
99.9	Total new obligations	2,968	2,862	2,832

Employment Summary

Identification code: 69-8107-0-7-402	FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
1001 Direct civilian full-time equivalent employment	2,594	2,639	2,616
2001 Reimbursable civilian full-time equivalent employment	64	68	68

EXHIBIT III-1

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

	FY 2016 ACTUAL	FY 2017 ANNUALIZED CR	FY 2018 REQUEST	CHANGE FY 2017-2018
Engineering, Development, Test and Evaluation	156,050	150,032	145,600	-4,432
Air Traffic Control Facilities and Equipment	1,832,201	1,800,710	1,718,800	-81,910
Non-Air Traffic Control Facilities and Equipment	171,000	182,930	193,000	10,070
Facilities and Equipment Mission Support	225,700	237,400	225,000	-12,400
Personnel and Related Expenses	470,049	478,501	483,800	5,299
Total	**2,855,000**	**2,849,573**	**2,766,200**	**-83,373**
FTEs				
Direct	2,594	2,639	2,616	-23
Reimbursable	64	68	68	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

Activity 5: Personnel and Related Expenses

EXHIBIT III-1a

FACILITIES and EQUIPMENT
SUMMARY ANALYSIS OF CHANGE FROM FY 2017 TO FY 2018
Appropriations, Obligations Limitations, and Exempt Obligations
($000)

Item	Change from FY 2017 to FY 2018 ($000)	Change from FY 2017 to FY 2018 (FTE)
FY 2017 ANNUALIZED CR	**$2,849,573**	**2,639**
Administrative Adjustments to Base:	8,263	
Annualization of FY 2017 FTE		
Annualization of FY 2017 Pay Raise	2,225	
FY 2018 Pay Raise	6,038	
Change in Compensable Day		
GSA Rent		
Working Capital Fund		
Non-Pay Inflation	24,258	
Subtotal, Adjustments to Base	**$32,521**	**0**
PROGRAM REDUCTIONS		
Engineering, Development, Test and Evaluation	-5,932	
Air Traffic Control Facilities and Equipment	-99,917	
Non-Air Traffic Control Facilities and Equipment		
Facilities and Equipment Mission Support	-14,774	
Personnel and Related Expenses	-3,511	-23
Subtotal, Program Reductions	**$-124,134**	**-23**
NEW OR EXPANDED PROGRAMS		
Engineering, Development, Test and Evaluation		
Air Traffic Control Facilities and Equipment		
Non-Air Traffic Control Facilities and Equipment	8,240	
Facilities and Equipment Mission Support		
Personnel and Related Expenses		
Subtotal, New or Expanded Programs	**$8,240**	**0**
FY 2018 REQUEST	**$2,766,200**	**2,616**

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

a. Support Programs

Executive Summary – Facilities and Equipment (F&E) Budget Summary

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

Aviation is a major driver of our nation's economy, impacting all sectors of business and directly contributing $1.5 trillion and 11.8 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.

The President's Budget requests $2.766 billion to enable FAA to meet the challenge of both maintaining the capacity and safety of the current National Airspace while continuing its comprehensive system modernization. Within these funds, the FY 2018 President's Budget requests $868 million for NextGen capital related investments, a decrease of $9 million below the FY 2017 annualized CR level. The remainder of the investment, $1.898 billion, will be in legacy areas to sustain current systems, including maintaining aging infrastructure, power systems, information technology, navigational aids, communications, surveillance, and weather systems.

The F&E budget is structured around 5 activities that group programs according to a common purpose. NextGen and Legacy Programs are found across all 5 activities and are specifically identified as such further in this overview.

Activity 1 - Engineering, Development, Test and Evaluation:

$145,600,000 is requested for FY 2018 to develop new air navigation systems from initial research, to production, and facilities to support those activities. This represents a $4.4 million decrease from the FY 2017 annualized CR levels. 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 and completing system engineering.

Activity 1 projects include NextGen and Advanced Technology Development and Prototyping (ATDP) Pre-implementation programs which represent the developmental pipeline for advancing the NAS. Individual Activity 1 projects are moved into other activities as they mature and achieve a Final Investment Decision (FID). Additionally, this funding is requested to sustain the facility and infrastructure at the William J. Hughes Technical Center (WJHTC).

Activity 2 - Procurement and Modernization of Air Traffic Control Facilities and Equipment:

$1,718,800,000 is requested for FY 2018 to perform modernization of air traffic control facilities, systems, and equipment. This represents an $81.9 million decrease from the FY 2017 annualized CR levels for the support of infrastructure upgrades, system replacements, and technology refresh at manned and unmanned facilities.

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.

Activity 2 funding will support the following work:

- 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

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

$193,000,000 is requested for FY 2018 to support modernization of non-air traffic control facilities, business systems, and equipment and is an increase of $10.1 million from the FY 2017 annualized CR level. The programs under Activity 3 support safety, regulation, security, information technology security, and regional and service center building infrastructure and support. Training equipment replacement, all materials courseware for computer based instruction and related facility improvements at the Aeronautical Center are requested in this Activity. A key outcome expected to be achieved with the requested resources includes increasing functionality enhancements of existing systems to allow FAA to be proactive in analyzing safety data.

Activity 4 – Facilities and Equipment Mission:

$225,000,000 is requested for FY 2018 to provide system wide integration, transition engineering, and technical contractual support in direct support of system acquisition or installation. The amount requested represents a $12.4 million decrease from the FY 2017 annualized CR level and will provide for the following:

- System engineering, transition engineering, integration, and support
- National airspace integrated logistics support
- Technical support services for implementation
- Program Support and Aeronautical Center Leases

Activity 5 - Personnel, Compensation, Benefits, and Travel (PCB&T):

$483,800,000 is requested for FY 2018 to provide for the direct cost of federal salaries, benefits, travel, related personnel costs of FAA employees supporting all capital projects under the F&E account. This amount represents an increase of $5.3 million from the FY 2017 annualized CR level.

What Is This Program And Why Is It Necessary?

This budget request includes funding for critical system and facility infrastructure and takes into account the near term priorities identified by the NextGen Advisory Committee. In recent years, sequestration, government shutdowns, short-term reauthorization extensions, and declining budget levels have forced FAA to reduce or defer capital investment. The Agency had to choose between sustaining current infrastructure and keeping NextGen progress on track. As we work with our industry partners to take aviation into the future, it is critical that FAA carefully balance the need for sustaining the current infrastructure with the need to advance NextGen and to continue achieving ongoing benefits to users.

NextGen

NextGen is not a single program but rather a portfolio of many programs, systems, and procedures at different levels of maturity that will provide enhanced capabilities for the movement and management of Air Traffic. The work in the portfolio is being deployed in stages. Some enhancements are currently in deployment, some are nearing implementation, and some of the capabilities of NextGen are being defined and matured as the technology to support them becomes available (Pre-Implementation).

Pre-Implementation - $90.8 million is requested to continue multiple basic and applied research efforts in support of future Next Generation Air Transportation System (NextGen) technologies and concepts.

Implementation - $777.1 million is requested to continue the implementation of NextGen programs that have achieved or are near a FID. As NextGen has progressed over the last several years, more programs have transitioned into the implementation phase. FAA is focusing these FY 2018 portfolio resources in a manner consistent with NextGen Advisory Committee (NAC) recommendations for prioritizing NextGen activities.

- **En Route Automation Modernization Technology Refresh**: $76.6 million is requested to perform critical component replacements as necessary in order to ensure En Route's continued supportability and security. Improvements in the efficiency and effectiveness of air traffic management and reduction in operational errors are the expected outcomes of this investment. FY 2018 work will focus on software development for a new operating system and critical hardware refresh at operational sites.
- **System-Wide Information Management (SWIM)**: $50.1 million is requested to continue the implementation of an information management and data sharing system for improved data sharing for FAA's internal and external stakeholders. This program will provide policies and standards to support data management, secure its integrity, and control its access and use.
- **Automatic Dependent Surveillance Broadcast (ADS-B)**: $139.2 million is requested for the continued implementation of satellite-based surveillance capabilities in the Continental U.S., Gulf of Mexico, and Alaska. This will provide a more complete picture of airspace conditions and more accurate position data that will result in increased capacity, fewer delays, and more optimal routing for aircraft. ADS-B will continue implementation of baseline applications and allow for the continued execution of ATC Separation Services, In Trail Procedures, Airport Surface Surveillance Capability (ASSC), and NAS-wide deployment of Ground Interval Management (GIM).
- **Collaborative Air Traffic Management (CATM) Technologies**: $9.0 million is requested to provide a series of software enhancements designed to deliver improvements on existing capabilities and new modeling functions for the Traffic Flow Management System (TFMS). FY 2018 will mature Work Package 4 capabilities like Improving Demand Predictions (IDP) capability and Integrated Departure Route Planner (IDRP) capability. These improvements will produce upgraded situational awareness for Traffic Managers and predict areas that may experience congestion so that the aircraft flight plans can be altered to avoid those areas.
- **Time Based Flow Management**: $40.5 million is requested to maximize traffic flow and airport usage by improving flow management into and out of the busy metropolitan airspaces and corresponding airports. Operations will achieve maximum throughput while facilitating efficient arrival and departure. Completing Terminal Sequencing and Spacing (TSAS) software and Integrated Departure/Arrival Capability (IDAC) hardware procurement will be the emphasis for FY 2018.
- **NextGen Weather Processor (NWP)**: $35.5 million is requested to establish a common weather processing platform that will functionally replace the legacy FAA weather processor systems and host new capabilities in all FAA Towers, Terminal Radar Approach Control Facilities, and Air Route Traffic Control Centers. NWP will focus on software development, testing, logistics support planning, and site surveys and preparation.
- **Data Communications**: $154.1 million is requested for data communications, to deploy a text-based data communication system in both the Terminal and En Route domains. This program will enable air traffic controller productivity improvements, and will permit capacity growth without requisite cost growth associated with equipment, maintenance, and labor. The Data Communications (Data Comm) program funding will support the development of Segment 1 Phase 2 (S1P2) Initial and Full En Route Services work.
- **Reduced Oceanic Separation**: $4.4 million is requested to evaluate and mature concepts and capabilities that focus on the enhancement of surveillance services in U.S. managed oceanic airspace, supported by ground-based automation and aircraft technology enhancements.
- **National Airspace system Voice System (NVS)**: $68.8 million is requested to advance voice communications services to Air Traffic Controllers in support of continuous air traffic operations in the Terminal and En Route environments of the National Airspace System (NAS). Voice communication connectivity will be provided to aircraft flight crews, Unmanned Aircraft System (UAS) operators, and communication connectivity between Air Traffic Controllers. Hardware and spare procurement for the

NVS Technical Operations training systems and Enterprise Management Systems will occur with the requested funding.

- **Terminal Flight Data Management (TFDM)**: $90.4 million is requested to provide an integrated approach to maximize the efficient collection, distribution, and update of data supporting flight information in the terminal area (airspace around an airport and airport surface data). FAA will begin software development and hardware engineering activities for the Terminal 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.
- **Performance Based Navigation**: $20.0 million is requested to support Optimization of Airspace and Procedures in the Metroplex (OAPM) implementation at five locations and install distance measuring equipment to fill in coverage gaps and provide resilient Area Navigation (RNAV) operations during GPS outages.
- **System Safety Management Portfolio**: $16.2 million will support improvements to Safety Management Systems as a result of safety information discovered and shared through this portfolio. Work under this portfolio provides a national resource for use in discovering common, systemic safety problems that span multiple airlines, fleets and regions of the global air transportation system. The information is shared between government and industry to proactively discover safety concerns before accidents or incidents occur, leading to timely mitigation and prevention.
- **Aeronautical Information Management Program (AIM)**: $4.7 million will support delivery of digital aeronautical information that conforms to international standards and supports NextGen objectives. Digital aeronautical data enables the processing of data to improve mapping, flight planning, and the timeliness and accuracy of air traffic control instructions.

NAS Infrastructure

This funding will assure modernization of air traffic control facilities, systems, and equipment that provide direct automation, communication, surveillance, and navigation functions within the NAS. FAA must sustain the current facilities, systems, and functions that NextGen is built upon. Key work components include infrastructure upgrades, system replacements, and technology refresh at manned and unmanned facilities. Infrastructure sustainment is also completed on systems that are repositories for safety and certification data, training infrastructure, and support aeromedical research and records.

NAS Facility Infrastructure Sustainment:

FAA has a multi-billion maintenance backlog for programs areas included in the Air Traffic Control (ATC) Facilities Sustainment Strategic Plan. $478.6 million is requested to advance the state of good repair for FAA infrastructure facilities. This infrastructure funding will improve and maintain the Facility Condition Index (FCI) ratings at FAA facilities that provide the backbone for the National Airspace Systems (NAS) and NextGen functionality. While the request represents a shift to re-invest resources in critical infrastructure, the deferred maintenance backlog is so large that additional incremental increases for these facilities are necessary in order to reduce FAA operational risk. This undertaking targets the following projects:

- **Air Route Traffic Control Centers (ARTCCs) and Combined Center Radar Approach Control Facility (CERAP) Building Improvements/Plant Improvements** - Projects will replace obsolete plant equipment and provide improved work areas at selected ARTCCs (21). Projects include asbestos abatement, replacement of mechanical/electrical systems, installation of fire detection and protection upgrades and interior architectural construction.
- **Air Traffic Control En Route Radar Facilities Improvements** - 157 Long Range Radar (LRR) surveillance facilities provide aircraft position information to FAA, to the Department of Defense, and Homeland Security for security monitoring of the NAS. Eighty percent of the LRR inventory is older than 30 years. Sixty-six LRRs were established in the early 1950's and have reached the end of their useful life.
- **Terminal Air Traffic Control Facilities Improve** - Initiates modifications, improvements, and repairs to Tower/TRACON facilities. System engineering, configuration management, facility planning, and facility condition assessment activities determine the projects to be accomplished and scheduling.
- **National Airspace Systems (NAS) Facilities Occupational Health and Safety Administration (OSHA) and Environmental Standards Compliance** – Funds initiatives that safeguard FAA personnel from occupational hazards and minimize the impact of FAA activities on the environment.

- **Fuel Storage Tanks** - Is requested to fund 153 tank unit replacements, modernization, and upgrades at approximately 63 locations across the US in support of electrical power systems.
- **Unstaffed Infrastructure Sustainment** - Program is responsible for sustaining more than 12,000 Communications, Surveillance, Navigation, Weather, and support sites across the country.
- **Facilities Decommissioning** – Program is responsible for final disposition of decommissioned infrastructures and associated property restorations.
- **Electrical Power Systems – Sustain/Support** - Is an infrastructure sustainment and renewal program that replaces and refurbishes components of the emergency power system and cable infrastructure to maintain and improve the overall electrical power quality, reliability, and availability.
- **Energy Management Compliance** – Program saves operational costs by installing advanced electric meters, monitoring energy and water consumption, developing cost-effective recommendations to reduce energy and water use, and implementing energy and water efficiency projects.
- **Hazardous Materials Management (HAZMAT)** - Will remediate the most serious FAA owned or leased sites that have experienced environmental contamination.
- **Facility Security Risk Management (FSRM)** - Implements standardized facility access and protective measures at all FAA staffed facilities.
- **Mobile Assets 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.
- **Terminal Air Traffic Control Facilities Replace** – Program evaluates which of the more than 500 Tower and Terminal Radar Approach Control (TRACON) Facilities need to be replaced because of condition or operation needs. For FY 2018 Design funding is needed for Baltimore, MD and Charleston, SC; Equipment and utilities funding is requested to complete Charlotte, NC Tower and TRACON.

NAS Foundational System Sustainment:

FAA's Terminal Automation System (STARS) provides a bridge for traditional air traffic control functions and improved capabilities and systems that are currently being implemented under the NextGen Program. These programs provide a common and standardized system and software infrastructure across the National Airspace System. $152.8 million is requested to further the implementation and to refresh the technology to ensure continued operation and reliability of these foundational systems. The replacement of ARTS IIIEs with STARS, at FAA's largest terminal facilities, was completed in FY 2017. During FY 2018, the replacement of ARTS IIEs with STARS and the technology refresh of STARS at remaining facilities will continue.

NAS System Sustainment:

Funding in FY 2018 is requested for Automation, 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. Funding is requested to replace unsupportable components and systems for this NAS System Infrastructure. As FAA progresses to satellite based services and technology, a number of these systems will continue to provide required support for advanced NextGen capabilities or to provide redundant and safety backup capabilities in the event of satellite service outages and interference. Included among these programs are:

- **Next Generation Very High Frequency (VHF) Air/Ground Communications System (NEXCOM)** – This program will modernize the existing Air/Ground voice communication system using the limited available radio frequency spectrum more efficiently. The project will install 3,000 VHF and Ultra High Frequency (UHF) radios (receivers and transmitters) at 160 terminal and flight services facilities.
- **Voice Switch and Control System (VSCS)** – Controls the switching mechanisms that allow Air Traffic Controllers in the En Route environment to communicate with pilots, other controllers, other air traffic facilities, and commercial telephone contacts. This is the existing legacy En Route voice switch

and it will have to remain operational until the full deployment of the NextGen NAS Voice System (NVS), which is currently planned for 2025.

- **Wide Area Augmentation System for GPS (WAAS)** - Major focus of the WAAS program will be on the 5th GEO satellite integration and payload development, test and launch of the 6th GEO, upgrading the WAAS Telecommunications Subsystem (TCS) and operationally deploying the equipment. Procedure feasibility studies, procedure design, procedure development, flight inspection, and surveys for 25 WAAS procedures are planned in FY 2018.
- **Runway Safety Area (RSA)** - The funding being requested will allow the procurement of NavAids systems and the completion of the remaining RSA improvements that are identified for completion prior to December 31, 2018. 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.
- **FAA Telecommunications Infrastructure 2 (FTI-2)** – Will replace the existing services provided by the current FTI program and will address the aging owned infrastructure obsolescence.
- **TDM-to-IP Migration –** FAA currently depends on Time Division Multiplexing (TDM)-based services that major U.S. telecommunications carriers have stated their intention to discontinue as soon as 2020. FAA has developed a migration strategy to address the phase-out of these services. This project will modernize NAS systems to support Internet Protocol (IP) communications.
- **The VHF Omni-Directional Range (VOR) Minimum Operational Network (MON) Implementation Program -** Will conduct activities that will transition the legacy network of approximately 957 VORs to a MON of approximately 650 VORs with a target date of 2025. Downsizing provides an opportunity for cost avoidance and would allow aircraft to navigate and land safely under Instrument Flight Rules (IFR) in the event of disruption in a Global Navigation Satellite System (GNSS) signal.
- **Surveillance Service Life Extension Programs** – These projects procure and manufacture replacement parts for radar components that are no longer supportable for primary radars such as Airport Surveillance Radars (ASR) and secondary radars like Mode S. These systems must remain operational through the next decade.

What Does This Funding Level Support?

Funding requested in this budget has undergone investment analysis review and management scrutiny at all levels of FAA. Each individual project was subject to an extensive review of the technical requirements of the proposed projects, the interdependencies of those projects, and the projected costs and schedules of those programs. This proposed budget request represents a balanced approach to funding the traditional FAA facility and system infrastructure while promoting new capabilities and systems, through the NextGen Portfolio of programs. This funding will allow the FAA to continue the on-going development and implementation of operational improvements to safely and efficiently operate the NAS, 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.

The requested funding will maintain important program milestones that have been baselined through FAA's Acquisition Management System (AMS) and ensure that program schedules and costs are maintained within the expected margin and do not incur delays or cost variances. FAA will be able to sustain the current infrastructure of facilities and systems that allows aircraft to fly across the US in a dependable and safe manner and will protect the flying public and ensure consistent and efficient operations for the airlines.

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 met most of the cost and schedule goals for the programs within F&E. Lessons that were learned during the deployment of the En Route Automation Modernization (ERAM) program were applied to Terminal Automation Modernization/Replacement (TAMR) Phase 3 and prompted FAA adjustments in the areas of schedule formulation, testing processes, and user expectation management. F&E programs contribute to the success of metrics that show a safe and efficient Airspace System and include runway incursion reduction, Air Traffic Control (ATC) system operational availability, and NAS on-time arrivals.

Detailed Justification for - 1A01 Advanced Technology Development and Prototyping

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

FY 2018 – Advanced Technology Development and Prototyping (ATDP)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Advanced Technology Development and Prototyping	$21,300	$27,872	$26,800	-$1,072

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Runway Incursion Reduction Program (RIRP)	---	$2,000.0
B. System Capacity Planning and Improvements	---	1,000.0
C. Operations Concept Validation and Infrastructure Evolution	---	5,000.0
D. Major Airspace Redesign	---	4,000.0
E. Strategy and Evaluation	---	1,000.0
F. Dynamic Capital Planning	---	2,500.0
G. Operational Analysis and Reporting System (OARS)	---	3,000.0
H. Operations Network (OPSNET) Replacement	---	3,000.0
I. Enterprise, Management, Integration, Planning and Performance	---	3,900.0
J. In Service Engineering	---	1,400.0
Total	Various	$26,800.0

The FAA's mission is to provide the safest and most efficient aerospace system in the world. To accomplish this mission, FAA's Advanced Technology Development and Prototyping (ATDP) program develops and validates technology and systems that support air traffic services. For FY 2018, a total of $26,800,000 is requested to 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 enables the FAA to continue to meet its Strategic Priority to "Make Aviation Safer and Smarter" by reducing the risk to people and property caused by collisions in the runway environment. The RIRP's objective is to continually discover, research, implement, maintain and innovate technologies that will detect the incorrect presence of an object in the Runway Safety Area at every airport, and deliver a directive cue to the individual who can take corrective action.

Consistent with standing National Transportation Safety Board recommendations, RIRP research emphasis will remain on testing the application of technology for pilot, controller, and vehicle operator situational awareness tools. Current initiatives include Runway Safety Assessment (RSA) studies such as Runway Incursion Prevention Shortfall Analysis (RIPSA) to identify candidate small-to-medium sized airports with historically high rates of Runway Incursions. The RIRP is pursuing a "right site, right size" approach using the RIPSA initiative to identify candidate technologies that are best suited to a variety of airports. These technologies will address the specific types of RI causal factors encountered at that site (e.g. converging runways, ground vehicle operations, taxiway/runway hotspots, etc.).

The RIRP is prototyping and evaluating the Small Airport Surveillance Sensor (SASS) at Hanscom Field, Massachusetts, with additional field testing to follow at other airport locations in the next three years. SASS provides lower-cost secondary surveillance capability to either augment, or provide standalone, cooperative airport surface and terminal area airborne surveillance; at small to medium sized airports that do not meet the cost/benefit criteria for the current generation of surface surveillance capabilities. SASS could also be a potential solution alternative to address surveillance requirements at candidate airports with Class D airspace towers or at non-towered airports.

The RIRP also intends to commence development of the initial Project Plan and Research Management Plan for Surface Taxi Conformance Monitoring (STCM) in FY 2018. STCM research will focus on the development and demonstration of prototype tower-based and/or cockpit-based taxi conformance monitoring systems to reduce Runway Incursions at controlled airports.

B. System Capacity, Planning, and Improvements

The System Capacity, Planning, and Improvements program provides data and analyses on National Air Space (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. System Capacity, Planning and Improvements support the FAA metric "<u>Maintain an average daily airport capacity for Core airports of 57,975 or higher, arrivals and departures."</u>

This work includes:

- Airport modeling and analysis using actual data collected from Air Traffic Control (ATC) systems in the field to determine the value of potential improvements in airspace or airfield modifications
- Development of new agency level metrics to enhance management awareness of, and response to, system performance
- Airport capacity studies that provide assessment of procedural, technology, or infrastructure improvements

C. Operations Concept Validation and Infrastructure Evolution

This program develops and validates operational concepts that are the underpinnings of the FAA Air Traffic Management (ATM) modernization programs. Through structured analysis, it identifies the functional changes necessary for the FAA that increase productivity, enhance throughput, improve flight efficiency, increase access to airspace/airports, and reduce net cost. This information helps the aviation community anticipate what changes are needed in aircraft equipment and procedures in order to operate with the new technology being implemented in the NAS.

The ATDP Operational Concept Validation program conducts research for advanced operational concepts to ensure they are well understood and are based on valid assumptions. This project assesses the interaction of changing roles and responsibilities of NAS service providers and pilots, airspace changes, procedural changes and new automation systems for distributing weather, traffic and other flight related information. Specifically, concept development includes developing and validating shortfalls, exploring, developing, and validating concepts, and ensuring any new concept can be effectively integrated with other emerging concepts.

This program is necessary because for the following:

- Conducts analyses to support assessments of new air traffic control operational concepts
- Develops concepts to describe the operational use of new communication, navigation, automation, surveillance and flight deck capabilities
- Produces reports on concept development and validation findings including 2nd-level concepts, fast-time analyses, and human-in-the-loop real time studies

- Develops operational, information and performance requirements

It also supports the development of international standards to assure global harmonization across the aviation industry and ATM enterprise through collaboration with RTCA.

D. Major Airspace Redesign

This program supports increased efficiency and enhanced safety by funding the physical changes in facilities necessary to accommodate airspace redesign. Airspace redesign efforts seek to optimize Terminal, En-Route, and Oceanic airspace. Redesign projects have taken 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 a radio site to the control facility, controller-to-controller connectivity; surveillance infrastructure modifications to ensure proper radar coverage; automation modifications to the En-Route Automation Modernization (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.

Demand/capacity imbalances in in Miami (ZMA) Oceanic and San Juan (ZSU) airspace have resulted in numerous Traffic Flow management initiatives that are needed to manage volume until more permanent airspace solutions can be implemented. A Tactical Operations Committee (TOC) was formed to study and identify infrastructure and airspace issues that need to be addressed to improve the safety, capacity and efficiency of operations in the Caribbean. FY 2018 funding will address many of the unique concerns addressed in the TOC report.

A few primary issues from the report are listed below:

- Make Caribbean radars available to New York (ZNY) Air Route Traffic Control Center (ARTCC)
- Ocean Caribbean sectors are the primary concern for traffic flow redesign
- No Electronic Terrain and Obstacle Data (ETOD) available or the data is outdated
- Non-radar procedures with adjacent New York Oceanic and other Air Navigational Service Providers (Hatti, Santo Domingo, Providenciales, Havana, Bahamas), require frequent and time consuming manual coordination

E. Strategy and Evaluation

The Strategy and Evaluation Program will continue the development and maintenance of the System Wide Analysis Capability (SWAC) and Airfield Delay Simulation Model (ADSIM+), which are fast-time simulation models of the NAS. These tools will support FAA cost-benefit analyses and trade-off studies promoting informed decisions regarding investments, resource allocation, and rulemaking. Information from these models will provide justification of decisions to internal and external stakeholders.

At the enterprise-level (representing the entire air transportation system), a system-wide model is being developed to replace an existing 1980s-era model. This new system-wide model is required to analyze advanced air traffic management concepts and aid with NextGen program trade-off studies, investment analyses, and NAS performance analyses. SWAC will continue to support benefits analyses of various NextGen Programs. For example, the model was used for business case analysis for the Data Communication program for the En-Route domain and it continues to be used in support of the Satellite and Broadcast Services (SBS) Program Office to perform various financial and operational incentive studies.

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 air traffic management technology insertions. 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.

Initial versions of the functioning software have been delivered to the FAA; the capabilities and functionality continue 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.

F. Dynamic Capital Planning

The Dynamic Capital Planning tools and support will allow FAA to make optimum decisions based on best business practices. These tools and support will provide verification that disciplined management of capital programs continues to be carried out.

Initial procurement of financial analysis tools and support will 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, schedule modeling, and performance measurement
- Auditing and trend analysis
- Earned Value Management (EVM) and monitoring through program life cycle
- Field implementation planning and support for capital portfolio management
- Post implementation analysis for corporate lessons learned results

This project 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 project 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) and productivity continues to improve under standardized project management operating procedures.

G. Operational Analysis and Reporting System (OARS)

The FAA collects and analyzes safety data to make data-driven decisions in order to assess safety risk, determine repeatability, implement mitigation plans, and provide performance monitoring with minimal impact to operations. 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. Daily safety information (e.g., reports, dashboards and analytics) based on current data is not available to safety practitioners and operational personnel in a manner easily accessed and manipulated, resulting in increased time to identify operational trends, validate safety risks, refine mitigation strategies, and provide meaningful safety assurance.

Operational Analysis and Reporting System (OARS) Phase 1 (of 3) is an enterprise portal that provides a single access point to data and applications for safety analysis. OARS will provide a wide range of authorized users via role-based access with unified, consistent, and efficient safety data and improve the efficiency of the safety analysis process. OARS will integrate safety data and streamline risk analysis processes. This will 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. OARS will provide an integrated analytical "work space" facilitating continued improvements to the safety of the NAS.

H. Operations Network (OPSNET) Replacement

An accurate understanding of system performance is critical to identifying areas for service improvement for the flying public. Operations Network (OPSNET) is the official reporting system for NAS operations traffic counts and flight delays. OPSNET Replacement will correct deficiencies with the legacy OPSNET reporting system while also providing capability enhancements.

The OPSNET data collection consists of an automation component collecting data from multiple systems, and a manual component requiring data entry from personnel at each facility. The OPSNET reporting components generate and distribute delay and traffic activity reports to DOT and FAA Executive leadership, Air Traffic Management decision makers, and the Aviation Community. Primary uses of OPSNET include NAS performance monitoring, post-operational assessments of traffic management initiatives, measurement of NextGen improvements, financial benchmarking, facility reviews and classifications, and investment planning.

However, the legacy system is constrained by obsolete data definitions, inconsistent data entries, and difficulties in correlating data from multiple sources to resolve flight delay issues. The analysis and resolution of flight delay issues is problematic because the reported flight delays are limited to specific events and the causal code assignments lack needed granularity. The delay definitions and standard codes that govern reports by the FAA and commercial airlines to DOT are different, and similarly the FAA codes differ from those employed by other ANSPs, like Eurocontrol. Additionally, manual data entry by operators may be incomplete because the operator's workload is focused on higher priority operations.

The OPSNET Replacement will provide a comprehensive count of activity at all FAA facilities, and a full accounting of delays with appropriate attribution of causes. OPSNET Replacement will replace manual data entry with automated system data feeds, will improve the timeliness and quality of information used to review and plan operations, define a standardized data model for comparative analysis, provide metrics that benchmark performance levels, and will support evaluation of new programs and enhancements and quantify their success. Project benefits include improvements in measuring NAS performance which will result in improved flight planning and efficiency, reduced operational costs to the airlines, and improvements in productivity.

I. Operational Modeling Analysis and Data

The Operational Modeling Analysis and Data program provides support for operational modeling and analysis activities within the Air Traffic Organization (ATO). The ATO manages the extraordinarily complex National Airspace System (NAS), and uses a variety of datasets and models of both the entire NAS and its component parts, such as individual airports, to understand NAS performance. Many operational units within the ATO model and analyze NAS data to plan future improvements. This program will provide support to those units by funding the development of an analytics database that provides standardized operational events data on a per-flight basis. The initial analytics database will be based on currently available operational data. As new operational data becomes available, this program will evaluate and integrate the new data.

This program previously funded a study that reviewed FAA wide operational databases and operational analyses. The study identified a shortfall in analytical products available to FAA operations analysts. The study recommended that the FAA create a database to capture operational events associated with individual flights. The database will improve timeliness and reduce costs of operational analysis as well as eliminate duplication by other databases and analyses. The products of this project will also be used to quantify flight efficiency/delay reduction efforts.

J. Enterprise, Management, Integration, Planning and Evaluation for NAS/NextGen

The Enterprise Management, Integration, Planning and Evaluation for NAS NextGen program will support human capital management, enterprise management, technical support, and outreach functions required to deliver the NextGen enterprise. Transforming the NAS into a flexible, scalable, and time-based management system is the fundamental objective driving work needed to complete the NextGen research, infrastructure development and operational integration. The successful, ongoing rollout of NextGen is the result of rigorous portfolio, program and acquisition management partnered with stakeholder commitment and engagement. This program supports the integration of management requirements across the NextGen enterprise to monitor and report key performance metrics.

K. In Service Engineering

In-service engineering allows for immediate response and tactical distribution of resources to emerging technology solutions. Funding is requested for ongoing engineering support of all prototyping efforts.

What Does This Funding Level Support?

$26,800,000 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 by the responsible program offices in order to implement innovations and to study technical outcomes of those innovations. Those milestones and objectives are incorporated into the FAA Business Plan Goals annually and are tracked by the FAA Performance Committee that meets monthly and reports to the FAA's Executive Committee.

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

The projects that are funded under this program will ensure that the essential hardware and software components are in place and operational in order to accurately collect and report operational and safety data associated with air traffic operations. These projects will support management and oversight of implementation for new programs, assess metrics and operational parameters of new programs, and allow for alterations of programs based upon that data. These efforts will ensure the NAS remains the safest and most efficient ATC system in the world.

Detailed Justification for - 1A02 William J. Hughes Technical Center Laboratories Improvements

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

FY 2018 – William J. Hughes Technical Center Laboratories Improvement ($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
William J. Hughes Technical Center Laboratories Improvement	$1,000	$1,000	$1,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Lifecycle Replacement of Infrastructure Items	1	$1,000.0

For FY 2018, $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 prior to and subsequent 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.

What Is This Program And Why Is It Necessary?

This program provides for the enhancement of the Technical Center Laboratories utilizing a Master Plan. The Laboratory Master Plan identifies the lifecycle replacement of infrastructure items that should be performed over a 20-year period. The Laboratory Services Division reevaluates the 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, such as, transient voltage surge suppression (TVSS) upgrades, raised floor replacements, electrical distribution panel life-cycle replacements, power monitoring in electrical distribution panels, computer air conditioning (CAC) unit replacements, replacement of main lighting panels, and the computer room air conditioning (CRAC) monitoring system. 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 congestion.

What Does This Funding Level Support?

$1,000,000 is required to continue improvements to the laboratory infrastructure that supports NAS programs. This requested funding level was validated by the Laboratory Master Plan and an annual re-evaluation by the Laboratory Services Division projects to determine the priority list that will ensure completion 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 2018 – William J. Hughes Technical Center Laboratories Sustainment
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
William J. Hughes Technical Center Laboratories Sustainment	$19,050	$19,000	$18,000	-$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
WJHTC Laboratories Sustainment	1	$18,000.0

For FY 2018, $18,000,000 is requested to sustain the FAA's centralized set of laboratories located at the William J. Hughes Technical Center. The laboratories support the Acquisition Management System (AMS) lifecycle from Concepts and Requirement Definition to In-service Decision.

- **Laboratory Support Services $9,500,00:** Services include Infrastructure Engineering services that updates lab areas meeting electrical and HVAC needs; provision and maintenance of a network infrastructure; and system scheduling and maintenance services
- **Hardware/Software Licenses and Maintenance Agreements $360,000:** Over 79 hardware and software licenses and maintenance agreements are required for the Laboratory equipment each year. Examples include Cisco maintenance, Lutron lighting maintenance, AutoCAD License and annual subscription services, Linux, Red Hat, etc.
- **Laboratory Space and Infrastructure Consolidation $4,400,000:** A laboratory consolidation effort will improve the overall function of the facility and provide continuity of operations for essential Priority 1 systems. Completion is expected in FY 2020. This reconfiguration of space will free up room for new programs in the labs, such as expansion of the Unmanned Aircraft Systems (UAS) labs, and NAS Voice System, etc.
- **Laboratory Equipment Refresh $400,000:** Equipment refresh addresses life-cycle replacement of NAS supporting equipment so that equipment utilized in the laboratories is available for use and in proper operating order.
- **Flight Program Operations (legacy Flight Program Branch) $2,950,000:** Services provided support projects with flight and ground testing, mission planning, safety analysis, aircraft modification; as well as design, certification, fabrication and installation. Flight test support includes in-flight testing of systems (e.g., Surveillance Broadcast System (SBS), System Wide Information Management (SWIM), and Aircraft Collision Avoidance System (ACAS)). Partial funding to provide crewmember training and aircraft maintenance in support of mission requirements is also provided.
- **Miscellaneous $390,000:** Items include land leases for three radar sites, and aircraft equipment calibrations, laboratory communications, laboratory cabling, general supplies, pilot recertification and training, and diagnostic equipment.

What Is This Program And Why Is It Necessary?

These laboratories are the only location where it is possible to realistically simulate the NAS and it is necessary to maintain the laboratory systems with capabilities that match field sites that currently exist or are planned for the future. These test beds can be altered to replicate desired field configurations and traffic scenarios providing stakeholders with an understanding of how upgraded systems will perform prior to operational deployment.

Equally important, these test beds provide direct field support for Operational NAS systems. Problems identified at various field locations are quickly transmitted to the appropriate laboratory where solutions are developed and tested. The test beds are used by acquisition programs and partner agencies for development, test, evaluation, integration, transition testing, and first and second level support to the field.

This program sustains the FAA's centralized set of laboratories located at the William J. Hughes Technical Center where it is necessary to maintain these laboratory systems in configurations and capabilities that match field sites that currently exist or are planned for the future.

What Does This Funding Level Support?

$18,000,000 is required to sustain FAA's laboratory test beds and provide the funding to implement the laboratory space and infrastructure consolidation plan. A stable funding source to sustain the laboratories eliminates the need for each acquisition program to establish and sustain separate laboratory facilities to support their programs and fielded systems and minimizes FAA costs.

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

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 2018 – William J. Hughes Technical Center Infrastructure Sustainment
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
William J. Hughes Technical Center Infrastructure Sustainment	$12,200	$12,200	$10,000	-$2,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
William J. Hughes Technical Center (WJHTC) Infrastructure Sustainment	1	$10,000.0

For FY 2018, $10,000,000 is requested to accomplish the following projects that promote sustainment of the FAA's infrastructure at the William J. Hughes Technical Center (WJHTC):

- **Building 300 Mechanical Equipment Replacements (Construction Phase 3 of 4)** $2,900,000 is requested to replace Heating, Ventilation and Air Conditioning (HVAC) equipment in Mechanical Equipment Room #3 of Building 300, specifically three air handling (AC) units, AC-6, AC-7 and AC-8. These AC units are more than 35 years of age and have exceeded the industry lifecycle standard. The new units will be environmentally friendly, reduce utility costs through the use of modern, energy efficient equipment, and reduce maintenance expenses.
- **Central Utilities Plant (CUP) Chiller Replacements (Construction No. 2 of 3)** $2,000,000 is requested to replace the second of three 1,000 ton centrifugal refrigeration machines (chillers) in the CUP (Building 303). These machines provide chilled water for air conditioning to Buildings 300, 301 and 303, including the Building 300 laboratory area, which serves as the National Air Space (NAS) test bed. These machines have exceeded their useful lives, require excessive maintenance and do not save energy. The new machines will tolerate a lower incoming condenser water temperature, enabling use of an energy saving, free-cooling option.
- **CUP Electrical Switchgear Replacement (Construction)** $3,000,000 is requested to replace the electrical switchgear in the CUP (Building 303). The project consists of the replacement of the medium voltage switchgear that supports the equipment for heating and cooling Building 300. Building 300 houses over 500,000 square feet of administrative office space and laboratories that support NAS Level 1, 2, and 3 systems. The switchgear was installed in 1965 and is comprised of parts that are no longer manufactured or supported.
- **Life Safety Improvements to Five Facilities (Construction Phase 2 of 2)** $400,000 is requested for the installation of fire alarm system upgrades to three facilities, Building 33 (Water Treatment Plant), Building 56 (Hazardous Material Storage) and Building 270 (Office and Training). The fire alarm systems in these facilities were installed over 20 years ago and have been discontinued. If any component of the current systems fails, there are no readily available replacement parts.
- **Refurbishment of Elevators in Five Buildings (Construction Phase 2 of 3)** $800,000 is requested to refurbish two passenger elevators in Building 316 (Advanced Automation Systems Laboratory). These elevators have exceeded their useful lives and are exhibiting numerous points of failure, including door mechanisms failing to open or close, cab shaking, and passenger entrapments. Maintenance is difficult because the elevator control systems are antiquated. This project will update the elevators, including cabs, machine rooms, hoist ways and controls for conformance to all current building, electrical, fire and elevator codes and standards.

- **Prepare 20 Year Plan for Site Infrastructure Sustainment** $500,000 is requested to prepare a 20 year Master Plan for the replacement of WJHTC site utility distribution systems and site improvements. The plan will include replacement strategies for site infrastructure systems and components based upon consideration of life safety issues, code compliance issues, equipment/component age, life expectancy, replacement part availability, and general condition for each system. The WJHTC occupies over 5,000 acres of land adjacent to the Atlantic City International Airport in New Jersey. In addition to encompassing over 1.6 million square feet of test and evaluation, research and development and administrative buildings, the WJHTC owns, operates and maintains:

  - Over 56 miles of overhead and underground electric distribution lines including four campus electrical substations
  - Over 28 miles of water distribution lines including two water treatment plants with reservoirs and water storage tanks
  - Over 26 miles of sanitary and storm sewer distribution lines
  - Approximately 1.4 million square feet of airfield ramp and 76 miles of roadway
  - Approximately 2.8 million square feet of paved and unpaved parking areas encompassing over 3,500 parking spaces, approximately 93,000 linear feet of curbing and sidewalk
  - Over 54,000 linear feet of perimeter security fencing

Architectural, Electrical and Mechanical System Improvements to 20 Research and Development (R&D) Buildings (Design) $400,000 is requested for the design of architectural, structural, plumbing, HVAC, fire protection and electrical improvements to 20 buildings in the R&D area of the WJHTC. These facilities house laboratories and administrative space supporting certain NextGen R&D programs, including the Fire Research and Safety Program, the Aircraft R&D Program, the Propulsion/Fuel Systems Program and the Flight Safety Program. These facilities are of varying scale and purpose, with the majority having been built in the 1960s.

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 $600 million. Infrastructure providing and sustaining a reliable environment (i.e. power, cooling, etc.) for the WJHTC's 24x7x365 operations is necessary to support mission crucial systems hosted there. 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.

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. Infrastructure sustainment at the WJHTC reduces expenses associated with ongoing operation and maintenance activities as well as the frequency of expenses associated with system replacement.

What Does This Funding Level Support?

$10,000,000 is required to decrease maintenance costs associated with the need to upkeep aging infrastructure components, decrease operating costs associated with the need to utilize existing energy inefficient systems and construction, provide safer and more reliable operation of infrastructure systems, and significantly decrease the risk of infrastructure failures occurring, thereby supporting continual operations of the mission crucial systems hosted at the WJHTC.

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

Infrastructure sustainment at the WJHTC reduces expenses associated with ongoing operation and maintenance activities as well as the frequency of expenses associated with system replacement. System updates reduce energy consumption, and cost, on a per-square-foot basis, thus supporting current Federal Energy Management requirements for sustainability and energy consumption. This program incorporates best business practices and industry standards so that the taxpayer is assured that infrastructure improvements designed and constructed under this program are implemented in an efficient and consistent manner.

Detailed Justification for - 1A05 NextGen - Separation Management Portfolio

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

FY 2018 – Separation Management Portfolio
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Separation Management Portfolio	$14,500*	$24,100*	$13,500	-$10,600

*indicates a comparability adjustment to prior budget structure as Capital Investment Plan (CIP) projects for Reduced Oceanic Separation and UAS moved to their own BLIs. In addition, closely spaced parallel runways moved into the Separation Management from the old Improved Runway Operations Portfolio and Integrated National Airspace Design and Procedures Planning moved into Separation Management from the old Precision Based Navigation Portfolio.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ADS-B In Applications – Flight Deck Interval Management	---	$3,000.0
B. Modern Procedures	---	2,000.0
C. Wake Turbulence Re-Categorization	---	2,000.0
D. Separation Automation System Engineering	---	4,000.0
E. Closely Spaced Parallel Runway Operations	---	1,000.0
F. Integrated National Airspace Design and Procedures Planning (INDP)	---	1,500.0
Total	Various	$13,500.0

The Separation Management portfolio conducts pre-implementation activities to reduce risk, and implementation activities supporting the safe and efficient separation of aircraft and other vehicles in the National Airspace System (NAS). This portfolio evaluates and matures concepts and capabilities that focus on the enhancement of separation assurance through the use of both ground based automation and aircraft technology enhancements. Separation Management will provide recommendations to improve the tools, orders and procedures that air traffic controllers use to separate aircraft with different kinds of navigation equipment and wake performance capabilities. This portfolio will identify improvements to 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.

What Is This Program And Why Is It Necessary?

A. ADS-B In Applications – Flight Deck Interval Management: ADS-B In Applications Interval Management consists of a set of ground and flight-deck capabilities and procedures that are used in combination by air traffic controllers and flight crews to more efficiently and precisely manage spacing between aircraft. An air traffic controller can issue an Interval Management (IM) clearance that allows flight crews to manage spacing through speed adjustments generated by onboard IM avionics until reaching a planned termination point. For FY 2018, $3,000,000 is requested to continue the five-year avionics standards development effort and prepare for a Human-in-the-Loop (HITL) simulation. These activities will support an Initial Investment Decision (IID) for Advanced Interval Management (A-IM) planned to occur September 2019.

- Major Deliverable is to complete the initial draft of the Flight-deck based Interval Management Minimum Operational Performance Standards version 2 (FIM MOPS v2). FIM MOPS v2 provides the avionics equipment specifications for A-IM operations.

B. Modern Procedures: The Modern Procedures program will evaluate controller decision support prototypes for the En Route Automation Modernization (ERAM) system. $2,000,000 is requested for activities that aim to enhance Separation Management automation and provide usable decision support tools (DSTs). This will allow En Route controllers to more efficiently use available airspace by identifying potential conflicts or other complications on an aircraft's planned flight path and facilitate trajectory changes if needed.

- Major Deliverable is to conduct operational evaluations for Intra-ERAM Automation-Assisted Controller-to-Controller Coordination Tool and Probe Menu/Trial Planning extensions to Controller Conflict Detection.

C. Wake Turbulence Re-Categorization (RECAT): The Wake RECAT program is focused on achieving increases in airport throughput capacity through the reduction of required wake turbulence separation standards. For FY 2018, $2,000,000 is requested to establish wake separation standards that dynamically change based on real-time wind and other environmental factors and to develop associated system elements that will allow ATC to provide increased airport runway throughput. The dynamic RECAT wake separation minimums developed for individual pairings of aircraft can be applied to aircraft categories that are tailored to the fleet mix operating at a specific airport. Airport specific categories of aircraft types utilizing dynamic wake separations will allow the optimal increase in runway throughput. Additionally, the requested funding will develop requirements for modifying FAA automation systems to enable controllers to use dynamic RECAT wake separations in the terminal area.

- Complete safety assessment of dynamic aircraft-to-aircraft wake mitigation separations to optimize RECAT operation.

D. Separation Automation System Engineering (SASE): The continuous growth of aircraft movement both in the air and on the ground is projected to exceed the capacity of the current system and necessitate improved technologies within the existing framework to prevent delays and gridlock. New air traffic control (ATC) concepts and automation capabilities in the En Route, Terminal, Surface, and Oceanic domains will assist controllers in maintaining safe aircraft separation while optimizing the use of available system capacity. Separation Automation System Engineering will reduce the risks inherent with introducing new technology and operational procedures using system engineering techniques such as analysis, simulation and modeling, and human-in-the-loop (HITL) simulations that will identify, assess, and validate the impact of new technology and operational procedures on the NAS infrastructure.

This program will dramatically increase the effectiveness across automation platforms, and reduce the resources necessary to mature separation management capabilities for implementation handoff. For FY 2018, $4,000,000 is requested to provide the following:

- Investigation and modeling of enhanced trajectory modeling capabilities: For example, exploit and prototype flight- specific aircraft performance/intent data using Flight Management System (FMS) Extended Projected Profile (EPP) data downlinked via Automatic Dependent Surveillance – Contract (ADS-C); focus on impact to ground automation platforms (En Route, Terminal and Oceanic) and required System Engineering efforts
- Develop the following products in support of concept and requirements definition readiness decision (CRDRD) for ERAM Enhancements 3

E. Closely Spaced Parallel Runway Operations (CSPO): This program supports the simultaneous approach and departure procedure development for aircraft pairs at airports with parallel closely spaced runways (runways that are less than 4,300 feet apart). CSPO utilizes existing and emerging technology to increase arrival and departure rates to reduce traffic delays, and increase capacity during periods of instrument metrological conditions (IMC). For FY 2018, $1,000,000 is requested to execute modelling and simulation activities that support CSPO departure procedures using course deviation analysis, fast time simulations, hazard assessments, and the application of emerging NextGen technologies to regain runway throughput and increase predictability in the NAS.

- Complete safety analysis for CSPO Dependent Departure Procedure to reduce separation requirements based on parallel runway centerline spacing.

F. Integrated National Airspace Design and Procedures (INDP): Supports multiple NextGen initiatives, as well as, NextGen Advisory Committee (NAC) and NextGen Integration Work Group (NIWG) Commitments, and integrates industry and agency efforts to maximize utility of aircraft capabilities. The primary focus of the program is to create new separation standards by working with airspace procedure design, safety analysis, and implementation of various airspace procedures in an effort to provide shorter, repeatable and stabilized paths to the runway. This program's success will enable rule change criteria to the current Air Traffic Controllers (ATC) separation standards and will require changes to the controller handbook FAA JO 7110.65. The initial focus is on established Required Navigation Performance (EoR) Instrument Approach Procedures (IAPs). EoR will increase efficiency by allowing more opportunities for aircraft to fly a specific path between two 3D-defined points in space. Other PBN initiatives will be included to align with the Agency PBN Strategy. Efficiency benefits include reduced track length, fuel burn, environmental footprint, more stabilized approaches, and reduced noise exposure.

- For FY 2018, $1,500,000 is requested to initiate EoR Modeling and Simulation (M&S) Safety Analysis Plans, produce safety analysis reports, begin concept validation activities at key EoR Launch Sites, develop and new or use existing procedures, fly the EoR procedures and document operational lessons learned.

What Does This Funding Level Support?

$13,500,000 is required to evaluate and mature concepts and capabilities that focus on the enhancement of separation assurance and improved runway operations through the use of both ground based automation, satellite navigation, and aircraft technology enhancements. Separation Management improvements will provide air traffic controllers with tools, new or revised orders and procedures to separate aircraft with different kinds of navigation equipment and wake performance capabilities. The program will enhance system capacity, efficiency, and ensure safe aircraft separation while reducing workload for controllers and flight crews.

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

Separation Management Portfolio enhancements 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, procedures, orders and automation support capabilities will be enhanced, thus improving safety, increasing operational efficiency, and expanding current capabilities throughout the NAS. 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.

Detailed Justification for - 1A06 NextGen – Traffic Flow Management (TFM) Portfolio

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

FY 2018 – Traffic Flow Management (TFM) Portfolio
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Traffic Flow Management Portfolio	$5,000*	$7,820*	$10,800	+$2,980

*indicates a comparability adjustment to prior budget structure as four new Capital Investment Plan (CIP) projects moved into this Portfolio. TBFM WP4 was moved from the Time Based Flow Management BLI, Strategic Flow Management Integration and Strategic Flow Management Engineering Enhancement projects were moved from the CATM BLI, and Advanced Methods was regrouped under TFM from the On Demand Portfolio.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Surface Tactical Flow	---	2,000.0
B. Time Based Flow Management Work Package 4	---	3,000.0
C. Strategic Flow Management Application	---	3,000.0
D. Strategic Flow Management Engineering Enhancements	---	1,800.0
E. Advanced Methods	---	1,000.0
Total	Various	$10,800.0

The Traffic Flow Management (TFM) portfolio involves National Airspace System (NAS) operators and FAA traffic managers, along with advanced automation, in managing daily flight and flow decision-making.

This portfolio focuses on gaining efficient flow and management of aircraft on the surface at selected Metroplex airports, in the complex terminal airspaces within the NAS, and efficient traffic flow across the United States. 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.

What Is This Program And Why Is It Necessary?

The capabilities being researched and implemented in this portfolio are expected to improve both the efficiency of individual flights while optimizing throughput. This work will make travel safer for the traveling public, help reduce passenger delays leading to a better traveling experience, and contribute to less pollution as the result of improved prediction performance for TFM decision support systems and flexible TFM around weather constraints.

A. Surface Tactical Flow (STF): In collaboration with National Aeronautics and Space Administration (NASA's) Advance Technology Demonstration-2 (ATD-2), these efforts will produce new improvements that will increase Terminal Flight Data Manager (TFDM), Traffic Flow Management System (TFMS), and Time Based Flow Management (TBFM) connectivity and integration. For FY 2018, $2,000,000 is requested 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. This project 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.

- A Major deliverable for FY 2018 is a prototype for departure metering capability including Surface-Collaborative Decision Making with flight operators, airport operators, and Air Traffic Control which addresses the NIWG's specific recommendations in the Surface Focus Area.

B. Time Based Flow Management Work Package 4 (TBFM WP4): This project will build off of previous TBFM work packages to deploy existing capabilities to additional locations in the NAS, and provide new capabilities to enable/support the Performance Based Navigation (PBN) NAS Navigational Strategy 2016. This work package will incrementally improve metering to further advance the use of PBN operations and capture associated benefits such as increasing throughput and efficiency, particularly during periods of high traffic demand. Existing capabilities include the Integrated Departure/Arrival Capability (IDAC) and the Terminal Sequencing and Spacing (TSAS). New candidate capabilities include: Path Stretch, TBFM Dashboard and Planning Tool, Fleet Prioritization, Improved TBFM-TFMS Data Integration, and Weather Source Migration. TBFM WP4 is targeting a Final Investment Decision (FID) in FY 2019.

- For FY 2018, $3,000,000 is requested to: Complete the required Acquisition Management System (AMS) documentation to achieve an Investment Analysis Readiness Decision (IARD), and initiate Market Survey activities.

C. Strategic Flow Management Application (SFMA): This program will analyze and identify remaining operational shortfalls and gaps for rerouting of flights after the implementation of Airborne Reroute Automation (ABRR), Collaborative Trajectory Options Program (CTOP), and Data Communications (Data Comm) in the timeframe between 2018 and 2020. SFMA will provide traffic managers and controllers with automated capabilities and integrated tools for flight-specific trajectory modifications and will address a wide range of input factors, including weather impact, sector capacity, special activity airspace (SAA), NAS equipment outage, operator preference, and metering time assignment. In addition, SFMA will mitigate TFM shortfalls in monitoring and alerting areas and develop the following capabilities: Enhanced Sector Alert Metric, Single Source for Issued Traffic Management Initiatives (TMI), Integrate User Interface Components, Furthermore, SFMA will leverage the technologies of NASA's ATD-3. For FY 2018, $3,000,000 is requested to provide operational improvements to more effectively manage En Route resources and provide solutions for the airborne and pre-departure flights under constraints develop artifacts for the monitoring and alerting capabilities, and assess and incorporate technologies from NASA's ATD-3.

- SFMA will develop the above capabilities and generate the capability artifacts for Collaborative Air Traffic Management – Technologies (CATM-T) Work Package 5 (WP5), of which IARD is in the fourth quarter of FY 2018.
- Assess capabilities of Technology Transfer developed under NASA's ATD-3 and incorporate the capabilities to SFMA

D. Strategic Flow Management Engineering Enhancements (SFMEE): Is a multi-year project that will support future work packages for Traffic Flow Management (TFM) enhancements. The concept engineering work for the individual capabilities that comprise these future work packages will be conducted primarily through the Strategic Flow Management Application (SFMA) and Advanced Methods (AM) programs. This project will be responsible for using the capability-level concept engineering artifacts developed in SFMA and AM to develop the full suite of future CATM work package Acquisition Management System (AMS) artifacts that will ultimately support a Final Investment Decision (FID).

- For FY 2018, $1,800,000 is requested to support and achieve (IARD) for CATM-T WP5 investment through production of a finalized Functional Analysis and Concept of Operations, Enterprise Architecture products, a Safety Assessment, Preliminary Program Requirements, a Range of Alternatives, Rough-Order of Magnitude (ROM) lifecycle costs, and an Initial Investment Analysis Plan.

E. Advanced Methods (AM): Advanced Methods for Traffic Flow Management will explore technologies, analyze current methods, and propose procedural changes to meet Traffic Management needs. This program will support improvements to increase predictability, route flexibility, and efficiency by providing NAS users and Air Traffic Management with an in depth understanding of the constraints surrounding Traffic

Management Initiatives. Advanced Methods will explore the use of advanced coordination and data storage solutions to drive post operational analysis of Traffic Management coordination. The investigated capabilities include Traffic Flow Management Advanced Coordination Analysis Capability and Advanced Coordination Capability for TFM Recording and Logging.

- For FY 2018, $1,000,000 is requested to further investigate the solution including the development of requirements for prototyping.

What Does This Funding Level Support?

$10,800,000 is required to further develop the management of air traffic flow in the NAS using the capacity and demand as the basis. This funding will focus on support operations by researching efforts which evaluate the benefits and viability of new tools, operational demonstrations, and cognitive engineering to better comprehend and mitigate impact to humans. This portfolio will support the advancement from pre-implementation to implementation activities regarding the TBFM decision-support tool.

Funding for this portfolio will promote efficient coordination between flight planners and FAA traffic managers.

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

Benefits of this work include:

- Optimization of runway throughput to 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, and reduce emission due to less engine run time on the airport surface and to/from the arrival/departure fix.
- Increased arrivals and departures in areas where demand for runway capacity is high as well as close proximity airports with potential interference to airspace/approach.
- Developing automation enhancements for future capabilities allowing for improved efficiency of NAS capacity and efficiency of airborne and pre-departure flights, reducing flight delays.

Detailed Justification for - 1A07 NextGen – On Demand NAS Portfolio

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

FY 2018 – On Demand NAS Portfolio
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
On Demand NAS Portfolio	$11,000*	$7,500*	$12,000	+$4,500

*indicates a comparability adjustment to prior budget structure as Advanced Methods was moved under the Traffic Flow Management Portfolio.

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	---	3,000.0
C. Flight Objects Exchange Services	---	5,000.0
D. Dynamic Airspace	---	1,500.0
Total	Various	$12,000.0

The On Demand NAS Information (ODNI) portfolio conducts pre-implementation to reduce risk activities supporting the exchange of information between FAA and other National Air Space (NAS) users. The 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 ODNI portfolio examines concepts and matures capabilities through validation activities, demonstrations conducted with stakeholders, and human systems engineering to mitigate adverse impacts and to exchange information efficiently and securely between FAA and NAS users. Current tools in the NAS 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 standardized information to plan and coordinate flights to the maximum extent possible.

What Is This Program And Why Is It Necessary?

A. Flight Object

The Flight Object program is developing an international data standard, "FIXM" (Flight Information Exchange Model) and supports system implementation of this data standard. FIXM is the standard format of a Flight Object data sent between systems, allowing more users to share flight information and coordinate on the various activities concerning a flight. For FY 2018, $2,500,000 is requested to provide engineering development of draft FIXM 5.0 artifacts and for continuation of work that identifies data elements critical to describing a flight in a standard format for Air Traffic Management (ATM) system information exchange. The development will include U.S. specific extensions and the core standard which is used internationally. International guidance is derived from International Civil Aviation Organization (ICAO) standards such as Flight and Flow-Integrated Collaborative Environment (FF-ICE). The Flight Object program additionally assists new users in adopting FIXM and recommends new FIXM data elements and changes based on user experience. The objective is to develop an international exchange standard while promoting NAS implementation.

The FY 2018 requested funding will be used to:

- Assess the impacts of an International Civil Aviation Organization (ICAO) Reference Model on the FIXM Standards
- Assess the impact of the ICAO Flight and Flow Information for a Collaborative Environment (FF-ICE/1) Implementation Manual on FIXM
- Develop draft FIXM Core v5.0 artifacts. This release may include UAS or Commercial Space Operations, and/or FF-ICE step 2 supports
- Develop draft FIXM US extension v5.0 artifacts
- Develop Operational Scenarios to support FIXM Core and US Extension v5.0
- Develop a FIXM Global Implementation Strategy to provide a projected overview on implementing FIXM for global data exchanges
- Conduct the assessment for the Global FIXM messaging guideline for constructing and exchanging FIXM compliant messages in the global data exchanges
- Identify and prioritize changes to FIXM in support of FAA and non-FAA systems migrating to FIXM standard
- Support data mediation for NAS systems converting to FIXM format

B. Common Status and Structure Data

The Common Status and Structure Data (CSSD) program will establish the requirements and information flows for the collection, management, and maintenance of aeronautical information in a digital format for machine to machine exchange. The common data and information services and integration activities enable improved flight planning and pilot briefing services, increased on-demand NAS operational performance information, and better airspace management using timely schedule information and a common awareness of Special Activity Airspace (SAA) status across the NAS. This program enables the FAA to improve situational awareness through improved access to aeronautical information. A common language is used so that external users (DOD, Airline Operations Centers, Flight Operation Centers, pilots) and Air Navigation Service Providers (ANSPs) can make more informed decisions and plans based on the most current information available with regard to planned airspace constraints (e.g., SAA), airport configuration, static airspace constraints, and Notices to Airmen (NOTAMs) affecting the NAS.

For FY 2018, $3,000,000 is requested to fund work that focuses on the development of requirements for machine to machine information exchange using standard formats for aeronautical information. This program will work toward maturing the Aeronautical Information eXchange Model (AIXM), which is the internationally accepted standard for describing aeronautical information. FY 2018 requested funding will be used for:

- Development of AMS artifacts for the Aeronautical Information Management Modernization (AIMM) Segment 3
- Development of the concept, policy, and procedures for digital distribution and exchange of Letters of Agreement (LOA) and Standard Operating Procedures (SOP)
- Development of the method and mechanism for migrating legacy LOA/SOP data to a digital framework
- Identification and development of additional data elements to AIXM
- Coordination and Collaboration on the use of AIXM with internal and external stakeholders

C. Flight Object Exchange Services

Flight Object Exchange Service (FOXS)/Common Support Services – Flight Data (CSS-FD) is a new investment to leverage the FAA's previous investments in System-Wide Information Management (SWIM) to significantly advance Flight Information Management across the Air traffic management (ATM) enterprise and actors. FOXS/CSS-FD provides mechanisms for making the exchange of pre-departure flight planning information between the Airspace Users (AUs) and the core NAS systems that process this data more efficient and less error-prone. It will also improve the sharing of flight data for the entire lifecycle of a flight to support non-Control and Command (C2) operational and analytical functions, and maintain the FAA as a global aviation leader by enabling the ICAO-endorsed FF-ICE concept and executing the FIXM standard. FOXS/CSS-FD received a Concept and Requirement Definition Readiness Decision (CRD RD) approval in January 2017. The Investment Analysis Readiness Decision (IARD) is planned for the first quarter of FY 2018.

For FY 2018, $5,000,000 is requested to support the FOXS/CSS-FD AMS activities as follows:

- Complete development of FAA Acquisition Management System (AMS) artifacts required for IARD:

  - Shortfall Analysis/Quantification
  - Solution Concept of Operations
  - Functional Analysis
  - Enterprise Architecture Products
  - Preliminary Program Requirements
  - Safety Risk Management Guidance for System Acquisitions (SRMGSA) required documents
  - Initial Business Case
  - Initial Implementation Strategy and Planning Document (ISPD)

- Start working on CSS-FD Initial Investment Decision (IID) artifacts such as Initial Business Case Analysis, Initial Program Requirements (IPR), Initial Implementation Strategy and Planning Document (ISPD) and associated deployment planning documents, and preliminary Test and Evaluation Master Plan (TEMP).

- Perform Engineering studies to support FOXS/CSS-FD AMS activities:
  - Consolidate program requirements
  - Analysis of metrics to measure the program quality or performance
  - NAS system analysis and data collection to support the development of business case

D. Dynamic Airspace

The Dynamic Airspace program will support contingency and business continuity operations by enabling the dynamic management of resources during these events, leveraging and interacting with other resiliency initiatives that provide enterprise-level flexibility that can support dynamic resource management, such as the NAS Voice Switch, Surveillance Interface Modernization, and Flight and Interfacility ATC Data Interface Modernization. The program will develop the operational requirements and AMS artifacts necessary to enable air traffic managers to reconfigure airspace to better "match" projected demand and available capacity within and across facility boundaries. Today, the FAA lacks an automated means to enable the seamless and efficient reallocation of resources to manage these demand/capacity imbalances, (for example, during a weather-related congestion scenario), resulting in the sub-optimal use of existing resources while unnecessarily delaying aircraft in the NAS. This airspace reconfiguration capability 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 will provide the requirements for automated tools to enable dynamic management of resources. These tools will enable air traffic managers to mitigate constraints such as unexpected outages, weather and Special Use Airspace (SUA), thereby maintaining a robust aviation capability and ensuring a continuous NAS flow strategy.

For FY 2018, $1,500,000 is requested to accomplish the following performance output goals:

- Complete Functional Analysis Document
- Complete Alternatives Analysis Document
- Complete Interdependencies Document
- Plan for Investment Approach
- Achieve Concepts and Requirements Definition Readiness Decision (CRDRD)

What Does This Funding Level Support?

$12,000,000 is required to conduct pre-implementation activities that strive to reduce risk in the exchange of information between FAA and other NAS users. The portfolio will provide 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 portfolio will continue to examine and mature concepts for the exchange of information efficiently and securely between FAA and NAS users as well as to remain compliant with international standards.

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

This portfolio will improve efficiency, minimize delays, and will provide benefits to the American Public in the areas of safety, capacity and efficiency, and cost avoidance.

Detailed Justification for - 1A08 NextGen – NAS Infrastructure Portfolio

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

FY 2018 – NAS Infrastructure Portfolio
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
NAS Infrastructure Portfolio	$11,000*	$12,660*	$17,500	+$4,840

*indicates a comparability adjustment to prior budget structure as the NextGen DME Support for PBN Strategy project was moved into the new standalone Precision Based Navigation BLI.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Weather Observation Improvements	---	$1,500.0
B. Weather Forecast Improvements	---	4,000.0
C. NextGen Navigation Engineering	---	1,000.0
D. New Air Traffic Management (ATM) Requirements	---	9,000.0
E. Information Management	---	2,000.0
Total	Various	$17,500.0

The National Airspace System (NAS) Infrastructure portfolio conducts pre-implementation activities to reduce risk for aviation weather-related and cross-cutting engineering issues. This portfolio provides the research, development, and analysis of portfolio capabilities such as validation activities, human system engineering, and demonstrations. Work with this portfolio addresses aviation weather-related issues by supporting the improvement of (1) air traffic management (ATM) decision-making during adverse weather conditions, (2) weather forecasting in the transformed NAS, and (3) existing weather infrastructure.

NextGen Navigation Engineering, New ATM Requirements, and Information Management conduct analysis to develop solutions that can apply across the NAS domain.

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. For FY 2018, $1,500,000 is requested to continue system engineering activities aimed at economically mitigating wind observation shortfalls at major airports. Areas of work include:

- Completing the documentation of the physical and environmental conditions that are negatively impacting effective wind observations at the subject airports
- Continuing engineering studies to determine the optimal locations and enabling technologies to affordably relocate wind sensors within existing network infrastructures
- Conducting demonstrations of how decision-making during adverse wind conditions will improve as a result of mitigating existing wind sensing shortfalls
- Performing technical maturity studies of new wind observing technologies that can potentially provide economic benefits including, but not limited to, equipment consolidation, improved situational awareness, and improved weather forecast initialization (specifically in areas of runway orientation management)

B. Weather Forecast Improvements

This program addresses both the need to improve weather predictions and how to make best use of that information. For FY 2018, $4,000,000 is requested and includes the following work:

- ATM Weather Integration:
  - Complete concept evaluation report for integrating weather products into NextGen Weather Processor (NWP) and Common Support Services – Weather (CSS-Wx) Work Package 2 (WP2) including, but not limited to:
    - Turbulence: Graphical Turbulence Guidance (GTG) 3.X
    - Numerical Model: Report on Rapid Refresh and High Resolution Rapid Refresh (HRRR)
    - Icing: Current Icing Product/Forecast Icing Product
    - Ceiling and Visibility: CONUS Ceiling and Visibility (C&V) grids
    - Wind predictions
    - Microburst
- International:
  - Complete Standards and Recommended Practices (SARPs) for Amendment 79 to Annex 3 for Space Weather (SWx), Volcanic Ash (VA), and World Area Forecast System (WAFS), information under the ICAO Meteorology Panel (METP) for approval by the ICAO Air Navigation Commission (ANC).
  - Complete draft guidance material for SWx information.
  - Complete US response to adopt final version of Amendment 78 to ICAO Annex 3.
  - Complete report on U.S. differences with Amendment 78 to ICAO Annex 3.
  - Complete action 4.2.4 in the National Space Weather Action Plan to develop requirements for a real-time reporting system that increases operator situational awareness of the radiation environment.
  - Complete United States Transition plan for ICAO Meteorological Information Exchange Model (IWXXM) weather messages.
  - Complete routine exchange of weather products in IWXXM format internationally.
  - Complete SARPs for Amendment 79 to Annex 3 for IWXXM.
- NWP and CSS-Wx Future Work Package Analysis:
  - Develop products in support of the Investment Analysis Readiness Decision (IARD) for NWP WP2/CSS-Wx WP2.

C. NextGen Navigation Engineering

This program supports the NextGen goal to increase NAS efficiency and capacity, and increase access to airports through innovation. For FY 2018, $1,000,000 is requested to provide the following in support of the Enhance Low-Visibility Operations (ELVO) Phase 3:

- Complete operational concept validation for diverse airports to determine requirements
- Develop the following draft products in support of Investment Analysis Readiness Decision (IARD):
  - Shortfall Analysis/Quantification
  - Solution Concept of Operation
  - Enterprise Architecture Products
  - Program Requirements
  - Safety Assessment

D. New Air Traffic Management (ATM) Requirements

This program identifies new opportunities to improve the efficiency and effectiveness of air traffic management operations. For FY 2018, $9,000,000 is requested to provide the following:

- Enterprise Information Protocol and Exchange Standards
  - Assess Weather Information Exchange Model (WXXM) compliance with ICAO Reference Model and develop transition plan for WXXM
  - Complete enterprise information exchange governance artifacts in compliance with the ICAO standards
  - Conduct analyses to support the development of governance for the use of information services based on best practices

  - Complete documentation of information services governance charter/FAA Order
- Future Collision Avoidance System (Future CAS)
  - Develop interoperability requirement of collision avoidance systems
  - Develop ACAS Xp system requirements specifications
- Weather Transition
  - Analyze current wind information support capabilities in operations to determine unmet FAA needs and develop report
  - Conduct studies surrounding the operational usage of wind information support capabilities and determine the performance level of current weather products and develop report
  - Analyze service shortfalls and perform service analysis for wind information support capabilities and develop report
  - Develop and mature the wind Concept of Operations
  - Develop, validate, and allocate preliminary wind information support requirements
  - Create, test and evaluate wind information support prototypes and conduct operational demonstrations to display pre-service functionality
- Synchronization of Air/Ground Procedures
  - Develop air/ground trajectory Synchronization simulation plan
  - Complete air/ground trajectory Synchronization simulation system architecture integration
  - Initiate air/ground trajectory Synchronization simulation execution
  - Document lessons learned and recommendations for operational demonstration and flight trials
- Advanced Air/Ground Communications
  - Conduct Internet Protocol Suite (IPS) prototype measurements to support the development of Minimum Operational Performance Specifications and International Civil Aviation Organization Standards and Recommended Practices (SARPS)
- Command and Control in a Cloud Environment
  - Develop engineering study evaluating the command and control capability for NAS Systems in a cloud environment and complete draft report on this evaluation
  - Complete draft update of technical assumptions documentation based on safety and mission criticality, and ability of cloud architecture to provide command and control services
- Common Displays/Commercial Off-the-Shelf (COTS)
  - Complete draft report evaluating performance requirements for NAS information systems displays
  - Complete draft report conducting assessment of strategic decision displays data requirements

E. Information Management

This program addresses issues that arise when an agency moves from managing and sharing information in a legacy environment, which is controlled through a physical connection, into a network environment.

For FY 2018, $2,000,000 is requested to provide the following:

- Complete transfer of initial NAS Enterprise Repository to AIT's cloud services.
- Develop Enterprise capabilities that support National Offload Program messages.
- Assess Operational Analysis and Reporting System (OARS) use cases and determine if there are data sources that can be used at Enterprise level. If so, provide Enterprise level data sources that support OARS.
- Develop capability to produce integrated flight data and metrics across multiple datasets.
- Perform gap analysis of current Service Oriented Architecture (SOA) capabilities to aid development of future SWIM segment.

What Is This Program And Why Is It Necessary?

A. Weather Observation Improvements

This program will manage 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.

In 2018, the program will continue to focus on mitigating terminal wind observation shortfalls. Terminal winds are surface and boundary level winds in the runway, approach and departure areas that affect the efficiency and safety of aircraft operations during the takeoff and landing phases of flight. Decisions on when to "turn" (a complex and costly undertaking) an airport due to a shift in the prevailing winds are affected by the anticipation and accurate observation of current conditions. From a safety standpoint, the National Transportation Safety Board (NTSB) has established that adverse wind conditions are a factor in over 50 percent of all weather related incidents (with adverse wind being defined as gusts, crosswinds or tailwinds). In addition to the "generic" effect of winds across the NAS, some locations have wind measurements disproportionately impacted by nearby mountains or bodies of water or due to obstructions related to airport design/layout (e.g. older, space restricted facilities have less flexibility to address shifting wind conditions).

B. Weather Forecast Improvements

The Weather Forecast Improvements (WFI) program seeks to improve weather predictions and determine how to improve the use of that information. The overall complexity of high demand NAS operations makes many weather-constrained traffic management problems difficult to define and even harder to resolve. Even the most seasoned professionals are challenged by the many variables impacting the decision-making process during a weather-constrained event.

Specifically, in today's NAS, both traffic managers and users must mentally interpret weather conditions and determine the potential impact of weather on ATC decision-making. Currently, there is minimal automation available to assist with identifying, analyzing, and developing mitigation strategies for weather-constrained airports and airspace. This program will improve the decision process and the accuracy of aviation weather information to include an automated translation of weather information into constraints placed on the NAS. It will enable the integration of aviation weather information into collaborative and dynamic decision-making processes by implementing advanced aviation weather forecasting models to determine and reduce weather's effects on traffic forecasts. Additionally, metrics will be developed and applied to evaluate how effective weather forecast improvements can increase NAS capacity.

The program will also develop the necessary policies and guidance in the provision of aeronautical meteorological services under U.S. commitments to the International Civil Aviation Organization (ICAO).

C. NextGen Navigation Engineering

This program focuses on systems engineering support for new and advanced NextGen navigational concepts. Current focus is to increase NAS capacity and efficiency during low visibility through the work of ELVO Phase 3 sponsored by Flight Standards. Results of this work decreases delays, diverts, and cancellations during low visibility events. ELVO concentrates on working issues associated with fully integrating advanced avionics into low visibility operations and addressing the changes this may have on other requirements for ground-based navigational aids and lighting. As required, efforts will be aligned with the Acquisition Management System (AMS). ELVO Phase 3 focuses on the advancements and changes in cockpit and other essential systems, specifically Head-Up Displays (HUDs), that pilots will use in takeoff operations. As Flight Standards makes determinations on issuing the appropriate level of operational credit to exploit these advancements, the changes will rely upon the ground-based navigational aids programs, just as they did during ELVO Phase 2. As these new flight operations and advanced avionics go operational, they will lead to changes in NAS flight operations and increase access to airports during low visibility conditions. Pilots will also have increased situational awareness resulting in safer surface operations once on the ground.

D. New Air Traffic Management (ATM) Requirements

The New ATM Requirements activities include the research and development of procedures, tools, and systems in support of operational improvements that will increase the number of arrivals and departures at major airports. Activities under this project include:

- Enterprise Information Protocol and Exchange Standards - This research will identify the shortfalls in moving from direct data sharing to a network environment

- Future Collision Avoidance System (Future CAS) - This activity will conduct research to develop requirements for these new classes of users to ensure future collision avoidance systems are interoperable within the NAS
- Weather Transition - The Weather Transition program identifies research concepts and capabilities that have appropriately matured, and transitions them from Research, Engineering, & Development (RE&D) to Facilities and Equipment (F&E) funding
- Synchronization of Air/Ground Procedures - This activity will evaluate methods for ground systems to communicate procedures to the aircraft and will reduce the need to load the FMS with variations of the same procedure for different flight conditions
- Advanced Air/Ground Communications - This project will evaluate advanced communications standards such as next generation satellite-based communication for operational usage in domestic airspace
- Command and Control in a Cloud Environment - This activity will evaluate technical assumptions based on safety, mission criticality, and the ability of current and future cloud architecture to provide command and control services in the future
- Common Displays/COTS - As part of this effort, requirements definition for displaying strategic decision data will be completed and development of a transition strategy for the possible use of COTS displays as Common Displays in the NAS will be initiated

E. Information Management

The Information Management program addresses issues that arise when an agency moves from managing and sharing information in a legacy environment, which is controlled through a physical connection, into a network environment, which only requires a simple subscription. The Information Management program is required to seek out sources of duplication of data storage and find ways to reduce or eliminate them; look for ways to share common data enhancement by sharing algorithms, actual code and whenever possible reusable components; and to align data and information management with the FAA's strategic goal of risk based decision making.

What Does This Funding Level Support?

Funding of $17,500,000 is required to conduct pre-implementation activities that will reduce risk for aviation weather-related and cross-cutting engineering issues. The required funding will support the development of the AMS artifacts in support of the ELVO Phase 3 program. New ATM Requirements will continue activities in support of Enterprise Information Protocol and Exchange Standards, Future CAS, Weather Transition, Synchronization of Air/Ground Procedures, Advanced Air/Ground Procedures, Command and Control in a Cloud Environment, and Command Displays/COTS. In addition, the requested funding will complete the governance and transition planning for both the Information Management System and its data. The funding will leverage FAA Cloud Services and will ensure the efficient use of the Federal Telecommunications Infrastructure (FTI) and System Wide Information Management (SWIM) as conduits of information for NextGen.

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

This portfolio enhances capacity by making fuller use of aviation weather information for operational decision-making, and supports more efficient transfer of flight information. Adverse terminal winds have been identified by the NTSB as a condition that factors in over 50 percent of all weather related incidents and this portfolio addresses those issues by promoting improvements in weather predictions and making the best use of that information. Modern wind observing technologies may yield several economic benefits included, but not limited to, equipment consolidation, improved situational awareness, and improved weather forecast initialization (specifically in areas of runway orientation management).

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 and sharing of data enables the capability to provide individual trajectory-based profiles, which optimize the usage of available airspace, reduce excess flying miles and associated delays, and reduce the impact to the environment through reduced noise and emissions.

This portfolio will make correlated data available for a broader group of analysts, so that taxpayer dollars will be spent more effectively in exploring safety and efficiency related concerns.

Detailed Justification for - 1A09 NextGen Support Portfolio

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

FY 2018 – NextGen Support Portfolio
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
NextGen Support Portfolio	$10,000	$12,000	$12,000	$0

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
c. Operational Assessments	---	2,000.0
Total	Various	$12,000.0

a. NextGen Integration and Evaluation Capability (NIEC):

For FY 2018, $3,500,000 is requested to provide the following:

- Provide engineering support for the infrastructure and NextGen research
- Provide for services to ensure the operational capabilities of the laboratory
- Provide the necessary licenses, maintenance agreements, and equipment of the laboratory
- Modify the laboratory infrastructure to support NextGen research projects and simulation requirements; customers require a simulation environment which provides capabilities representative of the future NAS to conduct their simulations and the laboratory infrastructure must therefore constantly evolve in order to ensure that its environment can support future customers and simulations
  - Provide a near real time data analysis capability to better support sponsor simulations and demonstrations; this program will evaluate potential data analysis solutions and/or develop custom software which will accomplish this task and benefit future customers

b. Florida NextGen Test Bed (FTB):

For FY 2018, $6,500,000 is requested to provide the following:

- Provide engineering support for the infrastructure and NextGen demonstrations
- Provide for services to ensure the operational capabilities of the laboratory
- Provide the necessary licenses, maintenance agreements, and equipment of the laboratory
- Provide for the facility operations of the laboratory
- Modify the laboratory infrastructure to support a NextGen integration platform which will meet project demonstration requirements; customers require an integrated environment which is representative of the future NAS to conduct their demonstrations; the laboratory infrastructure must therefore constantly evolve in order to ensure that its environment is in a position to support future customers and demonstrations
  - Add new scenario development and analysis tools; currently demonstration activities ingest live traffic into the NAS systems and merge simulated traffic specific to the demonstration activity

- As future demonstrations focus more on advanced aircraft performance profiles and automation, new capabilities must be acquired and/or developed that allow for enhanced scenario development and analytic capabilities that do not currently exist to benefit all future customers of the facility
- Develop Trajectory Based Operations (TBO) capabilities into the automation system infrastructure for testing and demonstrations; the TBO capability will continue to evolve and mature as new TBO capabilities are developed.

c. Operational Assessments:

For FY 2018, $2,000,000 is being requested to provide for the following:

- Systems Analysis - Evaluate operational performance impacts of NextGen technologies and procedures, including NAC requested analyses of NextGen priorities conducted jointly with the industry
  - In the Multiple Runway Focus Area, candidate assessments include Wake RECAT; Dependent Parallel Operations with Runways between 2,500 and 3,600 ft apart and Runways more than 4,300 ft apart; Triple Independent Parallel Operations; and Dual Independent Parallel Operations with Offsets
  - In the Performance Based Navigation Focus Area, candidate assessments include Atlanta and Charlotte Metroplexes
- NextGen Performance Snapshots (NPS) - Update metrics and success stories that measure progress made by NextGen capabilities that have been implemented at the Core 30 airports, metroplexes, and NextGen Advisory Committee's recommended key city pairs
- NextGen Segment Implementation Plan (NSIP) - Complete annual NSIP update to include information on: operational capabilities planned for implementation, projected qualitative benefits, system dependencies, success criteria, identify integration challenges for implementation, and deployment progress reporting

What Is This Program And Why Is It Necessary?

The NextGen Support Portfolio focuses on evaluating future concepts and technologies to support tech transfer to the implementing organizations, promote industry involvement and adoption, and identify implementation challenges and research areas. This work entails the infrastructure needed to complete those demonstrations and studies, analyzing anticipated operational benefits, measuring performance based on key variables of NextGen capabilities, as well as updating the NSIP.

a. NextGen Integration and Evaluation Capability (NIEC) Laboratory:

The NIEC is a NextGen integration and evaluation facility located at the William J. Hughes Technical Center (WJHTC) in Atlantic City, New Jersey. The NIEC provides a real-time, NextGen-capable environment that allows for concept development and validation, integration and operations analysis capabilities through Human-in-the Loop simulation testing and data analysis capability. NextGen systems and procedures will be developed and integrated into the NIEC to support studies that measure and validate concept feasibility, human performance, usability, changes in workload, and safety. The program will include the development and validation of prototypes and analysis capabilities to support the definition of NextGen requirements while researching possible solutions to challenges posed by the integration of NextGen technologies.

b. Florida NextGen Test Bed (FTB):

The Florida NextGen 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. One of the main purposes of the Florida NextGen Test Bed is to provide an open-access location for industry, users, and vendors to demonstrate new capabilities and harness NAS architecture solutions. These demonstrations cultivate government, academia, and industry partnerships and facilitate decision making requiring community buy-in.

c. Operational Assessments:

The Operational Assessments will support NextGen implementation by performing work in three areas: Systems Analysis, NextGen Performance Snapshots (NPS), and NextGen Segment Implementation Plan (NSIP). The System Analysis component will focus on analyzing the operational impacts of fielded NextGen capabilities, including NextGen Advisory Committee (NAC) requested analyses conducted jointly with the industry. The NPS website will track and report performance progress at specific locations where NextGen programs have been implemented as well as reporting the NextGen priorities. This project will also ensure the NSIP is updated annually to identify and manage incremental improvements necessary to develop, integrate, and implement NextGen capabilities and NAS current operations.

What Does This Funding Level Support?

$12,000,000 is required to continue execution of work within the NextGen 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, resulting in cost avoidance to the FAA and accelerated 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 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 NextGen demonstrations to be conducted at an early stage without affecting the 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 - 1A10 NextGen – Unmanned Aircraft Systems (UAS)

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

FY 2018 – Unmanned Aircraft Systems (UAS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Unmanned Aircraft Systems (UAS)	$7,000*	$9,000*	$15,000	+$6,000

*indicates a comparability adjustment to prior budget structure as UAS project work has been moved from the Separation Management Portfolio to this standalone BLI.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. UAS Concept Validation and Requirements Development	---	$9,000.0
B. UAS Flight Information Management System	---	6,000.0
Total	Various	$15,000.0

The Facilities and Equipment UAS projects play a critical role in enabling UAS operations in the National Airspace (NAS). These projects will allow integration of UAS without impact to manned aircraft operations or creating disruptions or delays and will ensure NAS operations will be as safe as they are today. Government costs to support UAS operations will decrease because the systems put in place by these UAS projects will reduce "exception handling" of UAS flights. Improvements to NAS capabilities and operations through these projects will: increase UAS operations in the NAS while maintaining safety and efficiency; improve situational awareness for UAS operators and air traffic control; and will reduce the number of Certificates of Waiver or Authorization (COAs) and exemptions that need to be processed by FAA. The UAS operators will be allowed more operations that cost less, are better for the environment, and have the ability to operate in extreme conditions, lowering risk to human life.

What Is This Program And Why Is It Necessary?

A. UAS Concept Validation and Requirements Development

The UAS Concept Validation and Requirements Development Program will continue identifying and maturing UAS needs as they relate to air traffic systems and services, and refining operational requirements associated with Air Traffic Management (ATM) automation, airspace management, policies, and procedures. Work under this project will primarily enable non-segregated UAS operations, and will support aspects of expanded UAS operations expected in the mid-term timeframe. The work will be conducted in accordance with the UAS Concept Maturation Plan, which focuses on activities to address existing FAA shortfalls associated with the provision of air traffic services to UAS airspace users in the mid-term and beyond. Work under this project will ensure operational implications of UAS are well understood and necessary infrastructure changes are implemented in a timely manner to support ATM automation enhancements, and to successfully achieve UAS integration.

For FY 2018 $9,000,000 is requested for the following activities:

- Define UAS requirements—to support UAS flight planning and trajectory modeling, UAS Pilot-in-Command (PIC) voice communications with Air Traffic Control (ATC), and UAS contingency operations—based on results of FY 2017 technical assessments and validation efforts
- Execute concept maturation priorities in support of non-segregated UAS operations (example products: FAA guidelines to support UAS operators in developing UAS contingency plans, automation and procedural requirements to support unique UAS flight profiles, requirements to enable advanced UAS flight planning and processing [e.g., using four-dimensional trajectories], recommendations regarding data communications services for UAS)

B. UAS Flight Information Management System

The Flight Information Management System (FIMS) program provides a means to address the surge in demand for UAS operations in the NAS as an essential component of the proposed Unmanned Traffic Management (UTM) system, which is a separate, but complementary system to the Air Traffic Management (ATM) system. The program establishes the concepts, use cases, and requirements associated with UTM/FIMS to safely manage UAS operations primarily through operator-operator sharing of flight intent and operator-FAA sharing of flight intent and airspace constraints. Without FIMS, the pace of increasing UAS access to this airspace will be limited to waivered operations considered on a case-by-case basis. The FIMS capability will support the necessary information exchange for UTM concepts, including Expanded Operations, Heterogeneous Traffic, Urban Operations, and High Altitude Operations. This program will also establish the necessary infrastructure, requirements, and implementation plan to support the integration of UAS operations in a UTM environment. Additionally, work supporting an initial delivery of prototype with refined requirements and subsequent enhancements of a Low Altitude Authorization and Notification Capability (LAANC) will provide an automated near real-time solution for small UAS operators and FAA ATC to comply with the Part 107 Small UAS Rule.

For FY 2018, $6,000,000 is requested to:

- Develop Concept of Operations for UAS Flight Information Management of Heterogeneous Operations
- Identify UTM data exchange and architectural requirements to support Expanded Operations
- Enhancements to LAANC prototype and integration planning for UTM

What Does This Funding Level Support?

The UAS Concept Validation and Requirements Development Program—which primarily supports non-segregated UAS operations—will require $9,000,000 in FY 2018 to execute concept maturation work, continue to assess impact of UAS integration on NAS systems and services, and maintain a centralized ATO program management function. FY 2018 efforts will inform the identification of impacted systems and allocation of UAS requirements to ensure that necessary automation changes/enhancements are identified for implementation. The results of FY 2018 work will be used to develop AMS artifacts in FY 2019 to FY 2022 in support of system changes required to enable UAS integration into the NAS.

The UAS Flight Information Management Program will require $6,000,000 in FY 2018 to allow for FIMS concept development, identification and operational evaluation of data exchange requirements, and phased development and implementation planning for LAANC. This work is foundational to the implementation of a UTM system. FIMS is essential for ensuring safe integration of UAS into the NAS operating in a UTM environment by providing a capability where UAS flight intent can be submitted, stored, and shared with those with a need to know. Until FIMS is implemented, it will be difficult to keep track of and manage UAS operations, preventing the efficient collection and dissemination of information to all impacted stakeholders—and will ultimately prevent expanded UAS access to the NAS.

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

Both UAS projects play a critical role in enabling UAS operations in the NAS—without impacting manned aircraft 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.

Specific benefits include:

- Increased UAS operations in the NAS while maintaining safety and efficiency (FAA Benefit)
- Increased access to NAS for UAS users (User Benefit)
- Improved situational awareness (User and FAA Benefit)
- Reduced cost of operations compared to manned flights (User Benefit)
- Reduced number of Certificates of Waiver or Authorization (COAs) and exemptions that need to be processed (FAA Benefit)
- Ability to operate in dangerous or extreme conditions, lowering risk to human life compared to manned flights (User Benefit)
- Reduced environmental effects compared to manned flights (User Benefit)

Detailed Justification for - 1A11 NextGen – Enterprise, Concept Development, Human Factors, and Demonstrations Portfolio

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

FY 2018 – Enterprise, Concept Development, Human Factors, and Demonstrations Portfolio ($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Enterprise, Concept Development, Human Factors, and Demonstrations Portfolio	$0	$0	$9,000	+$9,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Enterprise Concept Development	---	$1,500.0
B. Enterprise Human Factor Development	---	1,500.0
C. Stakeholder Demonstrations	---	6,000.0
Total	Various	$9,000.0

For FY 2018, $9,000,000 is requested to conduct three enterprise level activities: 1) Concept Development and Validation of potential NextGen capabilities (e.g., Vertical Conformance Verification (VCV) - examining the hypothesis of a more precise vertically designed/assigned trajectory matrix in Metroplex transition airspace; Pre-Departure and Post Departure Trajectory Information Sharing and Negotiation (PD2) with AC Downlink (PPTN) - providing airborne trajectory management for the Air Navigation Service Provider (ANSP) and flight operators) 2) Human Factors - Assessing the interaction of proposed NextGen tools and procedures and evaluating human performance in the operational environment. 3) Stakeholder Demonstrations - providing practical application and analysis of proposed NextGen system improvements to validate the benefits of system improvements and to determine which research and development (R&D) initiatives might be accelerated.

A. Enterprise Concept Development

For FY 2018, $1,500,000 is requested to conduct development and validation activities of NextGen concepts (e.g., Vertical Conformance Verification (VCV); Pre-Departure and Post Departure Trajectory Information Sharing and Negotiation (PD2) with AC Downlink (PPTN) shortfall analysis)

B. Enterprise Human Factors Development

For FY 2018, $1,500,000 is requested to provide human factors considerations of NextGen concepts (e.g., Time, Speed, and Spacing; Managing Automation Trust).

C. Stakeholder Demonstrations

Conducting demonstration of NextGen concepts has multiple the benefits to include: 1) promoting industry partnership and attaining community buy in, 2) linking organizational needs and decisions related to implementations/investments, 3) collecting data to support business cases and investment decisions, 4) supporting global harmonization across NextGen, 5) proving concept feasibility, and 6) supporting both validation and fast-time modeling.

For FY 2018, $6,000,000 is requested to develop and conduct demonstration activities related to NextGen concepts such as:

- 4D Trajectory (4DT) Flight Trials Demonstration
  - Conduct safety risk assessment and complete SRMD
  - Conduct flight trial activities
  - Conduct flight trial and prepare the report
  - Capture lessons learned and recommendations
- Paired Approach (PA) Demonstration
  - Complete demonstration of Paired Approach for Category 1 CAT I capability
  - Complete demonstration evaluation report and benefits assessment
- FF-ICE Block 2 Integration of Flight Validation
  - Complete initial plan of FF-ICE Block 2 Integration and develop the initial validation plan
  - Assess NAS impacts due to future mixed equipage operating environment and prepare report

What Is This Program And Why Is It Necessary?

A. Enterprise Concept Development

The Enterprise Concept Development program assesses the feasibility of proposed NextGen capabilities during the early phases of the Acquisition Management System lifecycle (the "Service Analysis and Strategic Planning" and "Concept and Requirements Definition" phases). The program develops and conducts studies that prove NAS concepts to ensure feasibility and viability within the NAS. The program executes research, engineering analysis, and evaluation in support of mission analysis and investment analysis. A couple prospective assessments during this timeframe are:

- <u>Vertical Conformance Verification (VCV) Concept:</u> The objective for this capability is to deliver vertical rate information to controllers with the expected result of improving airspace optimization and procedures with the objective of increasing capacity and efficiency. The VCV concept is for radar controllers to obtain and monitor real-time vertical rate for flights spanning from top of descent to touchdown and from departure to top of climb. The addition of vertical rate information improves the air traffic controllers' ability to monitor aircraft confirmation, thereby providing opportunities to increase efficiency and capacity in transition airspace. The FAA Safety Office identified "Misjudgment – Use of proper judgment of aircraft rate of climb, descent or closure associated with Opposite Direction Operations" among the top five risks to the NAS identified. The VCV concept is expected to address this safety risk.
- <u>Concept of Pre-Departure and Post Departure Trajectory Information Sharing and Negotiation (PD2) with AC Downlink (PPTN):</u> The Concept of Pre-Departure and Post Departure Trajectory Information Sharing and Negotiation will enable the Air Navigation Service Provider (ANSP) and flight operators to negotiate trajectories (other pre-departure and airborne) that meet NAS constraints and flight operator objectives. The ANSP includes Air Traffic Controllers (ATC), Traffic Management Coordinators (TMC), and the Air Traffic Control System Command Center (ATCSCC). The flight operators include the flight crew and Flight Operations Centers (FOC). The role of the FOC and the TMC in trajectory negotiation are expanded, allowing actors with systemic perspectives to actively participate in timely coordination.

B. Enterprise Human Factor Development

This program provides proactive guidance on human performance considerations to concept development and validation teams. The identification of potential human performance issues at the concept development and validation stages is essential to the usability, acceptability, and safety of NextGen concepts and systems. This work will be conducted in close collaboration with concept development and validation teams to ensure any human factors risks and issues are documented and mitigated early in the concept design and validation process.

Research efforts to identify and mitigate human factors considerations during concept design and validation may yield the following benefits for each of the proposed projects (i.e., Time, Speed, and Spacing) Managing Automation Trust:

- Increasing the utilization rate of concepts and systems among controllers
- Ensuring controller acceptance of concepts and systems
- Increasing safety through the mitigation of known human factors risks
- Decreasing controller workload through improved tools and techniques

Without identifying and mitigating human factors risks at the concept development and validation stages, concepts will mature without appropriate human performance guidance resulting in fielded capabilities that may be underutilized or rejected by controllers. Specific impacts of not funding this program include:

- Underutilization of procedures leading to losses in efficiency
- Untested controller "work-arounds" to utilize the concept or system leading to unidentified safety risks
- Increased controller cognitive workload due to poor alignment of information needs

C. Stakeholders Demonstration

This program is a development effort which supports the transformation of the NAS to 4-Dimentional (4D) trajectory management and a performance-based system. The program provides integration and demonstration of alternate technologies and concepts, while supporting procedures and standards development, integration of mid-term emerging technologies, and airspace customers' initiatives with on-going scheduled demonstrations.

This program provides a vehicle to test concepts and leverage individual transformational program and project technology to create multi-domain cohesive demonstrations to capture the synergies needed to transform the NAS in an expedited manner. The evaluation of technology and the collaboration between public/private industry partners, Air Navigation Service Providers, customers, and owners will continue.

- <u>4D Trajectory Flight Trials Demonstration</u>: This demonstration will include live flight trials to demonstrate the feasibility of utilizing ATN-B2 capabilities with multiple aircraft flying in the NAS exhibiting advanced TBO concepts. These capabilities will include elements of Advanced Interval Management (A-IM) and Dynamic Required Navigation Performance (DRNP).
- <u>Paired Approach Demonstration:</u> This demonstration will include live testing of an Advanced Flight Deck Interval Management avionics prototype to demonstrate the capability of the Paired Approach concept that leverages the ADS-B Out 2020 rule to safely conduct dependent-like instrument approaches in all weather conditions to very closely spaced parallel runways.
- <u>Flight and Flow Information for a Collaborative Environment (FF-ICE) Block 2 Integration of Flight Validation:</u> The International Civil Aviation Organization update of the Procedures for Air Navigation Services ATM and associated annexes in support of the Aviation System Block Upgrades 1 and 2 will encourage Air Navigation Service Providers (ANSPs) to provide new capabilities supporting pre-flight (Block 1) and in flight (Block 2) operations. The FF-ICE validation will investigate the impacts the future mixed mode (ANSPs) and mixed equipage operating environment.

What Does This Funding Level Support?

$9,000,000 is required to conduct enterprise level activities, including the development of concepts across the NAS, human factors analysis of a NextGen operational environment, and demonstrations of proposed NextGen system improvements to ensure operational feasibility and viability within the NAS. These concept development efforts lead to improvements that will provide air traffic controllers with tools and procedures to separate aircraft with technologically advanced navigation equipment and wake performance capabilities to enhance system capacity, efficiency, and ensure safe aircraft separation while reducing workload for controllers and flight crews. Human factors activities are needed to evaluate concepts for human factors implications, and inform the maturation of these concepts into successful capabilities. The portfolio develops, conducts studies, and demonstrates NAS capabilities and improvements to ensure feasibility and viability within the NAS.

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

Through this request, concepts will be researched and assessed to identify research issues, evaluate benefits, reduce risk, and develop preliminary operational requirements and procedures to enhance safety, increase operational efficiency, increase airspace capacity, and expand current capabilities throughout the NAS.

The human factors effort will assess the intersection of tools and procedures' influence on the end users (e.g. the controllers, maintainers, and traffic flow managers) and the end users ability to perform their job. The program will evaluate human performance in the operational environment in order to ensure the delivery of benefits for the overall integrated system, and provide insight across domains and programs to avoid implementation and integration issues.

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.

Detailed Justification for - 2A01 En Route Automation Modernization (ERAM) System Enhancements and Technology Refresh

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

FY 2018 – En Route Automation Modernization (ERAM) - System Enhancements and Technology Refresh
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
ERAM System Enhancements and Technology Refresh	$79,400	$78,000	$76,650	-$1,350

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ERAM Technology Refresh 2	---	$72,000.0
B. ERAM Enhancements 2	---	4,300.0
C. Independent Operational Assessment (IOA)	---	350.0
Total	Various	$76,650.0

A. ERAM Technology Refresh 2

ERAM Technology Refresh 2 is the second step in the planned updates to the ERAM program. This step in the ERAM Refresh will focus on the following: refreshing existing analog R-Side display with a 42" Ultra High Definition (UHD) digital display, refreshing R position keyboard/video/mouse (KVM) switch, refreshing the IBM Power PC/RISC based processor with x86 based processor for both the R and D positions, Deployment of Linux Open Source operation system (O/S) on the x86 based processors, refreshing the display graphics adaptor for displays, refreshing the display capture, recording, and playback technology, and adding servers to existing backroom server farm to handle emerging increased demand for capacity. The FY 2018 is requested to complete the development of the planned critical hardware updates for ERAM and initiate the deployment of the solution to the 20 ARTCCs.

For FY 2018, $72,000,000 is requested for ERAM Technology Refresh 2. This funding will be used for the continuation/completion of the development contractor activities:

- Critical hardware development
- Software development for new hardware operating system
- Hardware upgrade in ERAM test labs to support technology refresh testing and validation activities
- Prime Contractor System Development, Testing, and Deployment

B. ERAM Enhancements 2

ERAM Enhancements 2 includes improvements in separation management, trajectory prediction, and human interface capabilities to improve the delivery of air traffic services today and continue the evolution of NextGen trajectory-based operations. The FID for ERAM Sector Enhancements was completed in December 2016 and engineering of the first set of capabilities is ongoing. The FY 2018 funding will continue to work the engineering design and requirements for capabilities that the FAA has identified as high priorities, such as Unmanned Aircraft System (UAS) enhancements and Automated Handoffs to Canada.

For FY 2018, $4,300,000 is requested for ERAM Enhancements 2. This funding will be used for the continuation and completion of the development contractor activities:

- Complete development, test, and deployment of the ERAM Adaptation Refinement capabilities
- Continue engineering and design of the ERAM Enhancements to Support UAS capability
- Continue engineering and design of the Automated Radar Handoff to NavCanada capability

C. Independent Operational Assessment (ERAM Sector Enhancements) (IOA)

For FY 2018 $350,000 is request to support IOA activities.

What Is This Program And Why Is It Necessary?

A. ERAM Technology Refresh 2

ERAM Technology Refresh 2 is the second and largest segment of a series of ERAM technology refresh projects to replace obsolete ERAM equipment. The technology refresh is based on an analysis of En Route's software and hardware potential obsolescence. Technology refresh is critically necessary because much of ERAM's infrastructure hardware was procured during 2006-2008, and critical components are no longer in production and support/repair services are no longer viable. Without the Tech Refresh spare component levels are projected to fall below levels needed to maintain ERAM continuity of operations as well as system redundancy and availability requirements.

B. ERAM Enhancements 2

The FAA approved a Final Investment Decision (FID) for ERAM Enhancements 2 in December 2016. ERAM Enhancements 2 provides software enhancements for the En Route Sector Controller team. It is a multi-year effort to improve the efficiency and effectiveness of en route sector operations through enhanced trajectory management and improved collaboration between the tactical (R-Side) and strategic (D-Side) controllers, and also involves upgrades to flight data management and system support functions. It includes the following enhancements which will be deployed as a series of ERAM releases throughout the program lifecycle:

- Improve the accuracy of Aircraft (AC) Trajectory Modeling
- Improve Conflict Probe through better representation of the adherence bound to minimize false alerts and to apply a 3 nautical mile (NM) separation standard
- Provide Conflict Probe at the Radar Controller's display (R-Side) to facilitate the use of Conflict Probe information, especially when the sector is staffed with one controller
- Improve controller access to modern aircraft flight data and equipage information that is available in the International Civil Aviation Organization (ICAO) flight plan
- Improve the processing of Unmanned Aircraft System (UAS) flight information, including routes, aircraft types, and performance characteristics
- Expand the automated coordination of flight data and aircraft control with the Canadian Air Navigation Service Provider (ANSP)
- Improve the ability of Air Route Traffic Control Center (ARTCC) support personnel to efficiently and dynamically change adaptation data
- Provide maintenance support at the Monitor and Control (M&C)

What Does This Funding Level Support?

The core ERAM system became operational at all 20 Continental United States (CONUS) Air Route Traffic Control Centers (ARTCCs) at the end of the second quarter of FY 2015. The ERAM Technology Refresh 2 Segment is needed to sustain the system. The equipment is in critical need of technology refresh for reliability, maintainability, and availability (RMA) of the ERAM system.

ERAM Enhancements 2 will build upon the deployed ERAM system to harness full potential for operational effectiveness. Some 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.

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

A. ERAM Technology Refresh 2

The primary objective of this project is to sustain the ERAM system as specified by refreshing equipment that is approaching end-of-life and hardware discontinued by the manufacturer. The Sustainment of safety critical Air Traffic operations (reliability, maintainability and availability (RMA)) as well as a much lower system life cycle costs are expected outcomes of this investment.

B. ERAM Enhancements 2

The ERAM Enhancements 2 program will improve trajectory management by improving air traffic management efficiency and effectiveness and reducing the potential for operational errors. 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 releases and site operational releases.

Detailed Justification for - 2A02 En Route Communications Gateway (ECG)

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

FY 2018 – En Route Communications Gateway (ECG)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
En Route Communications Gateway (ECG)	$2,650	$2,650	$2,650	$0

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 2018, $2,650,000 is requested for equipment replacement, engineering services, and program support services for the ECG. In addition, the request will support in-service engineering work that provides an immediate response to emerging technology solutions.

What Is This Program And Why Is It Necessary?

The ECG system is a computer system that formats and conveys critical air traffic data to the En Route Automation Modernization (ERAM) System and the Enhanced Backup Surveillance (EBUS) System at the Air Route Traffic Control Centers (ARTCC's). ECG increases the capacity and expandability of the National Airspace System (NAS) by enabling the current automation systems to use new surveillance technology. ECG introduces new interface standards and data formats which are required for compatibility with International Civil Aviation Organization (ICAO) standards and adds capacity necessary to process data from additional remote equipment such as radars. The ECG provides the automation system capacity and expandability to support anticipated increases in air traffic and changes in the operational environment. The ECG was a prerequisite to deploying the ERAM software and hardware.

What Does This Funding Level Support?

The required funding will provide technology refresh and maintain the ECG systems to support continued provision of critical surveillance data to ERAM. ECG is a baselined program and is currently engaged in requirements validation, software development, and testing as part of a technology refresh effort.

The ECG Operational Analysis (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, 2017. This represents 89,044 days 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 2018 – Next Generation Weather Radar (NEXRAD)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Next Generation Weather Radar (NEXRAD)	$6,500	$6,300	$5,500	-$800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. NEXRAD Product Improvement (NPI)	---	$901.9
b. Procure Technology Refresh Hardware	---	206.1
c. Contract Support	---	650.0
d. Equipment Service Life Extension Program (SLEP)	---	2,642.0
e. Massachusetts Institute of Technology (MIT)/Lincoln Labs (LL) NEXRAD Algorithms	---	1,100.0
Total	Various	$5,500.0

For FY 2018, $5,500,000 is requested to support National Weather Service's (NWS) Next Generation Weather Radar (NEXRAD) technology refresh planning and procurement efforts. The FAA funding share for NPI is an annual requirement as established in the Memorandum of Agreement (MOA) between the Department of Transportation (FAA), and the Department of Commerce (NWS). This funding will be used for the following activities and tasks associated with SLEP sustainment projects:

- Perform NPI
- Procure Technology Refresh Hardware
- Contract Support - HQ Program Office Support
- Equipment SLEP - Transmitter Electronics replacement and Signal Processor replacement
- MIT/LL NEXRAD Algorithms - Deliver icing algorithm upgrade to NEXRAD Radar Operations Center (ROC)

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. The DOD has recently dropped out of the program.

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. In FY 2015 the average age of NEXRAD 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. 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.

The NEXRAD SLEP has four main purposes:

- Along with its partner, 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 (SA) (Western SA with 11 sites and Eastern SA 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).

What Does This Funding Level Support?

$5,500,000 is required to fund the FAA's continuing commitment to NEXRAD sustainment and product improvement, in accordance with the 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, was signed by the FAA's Vice President of Technical Operations.

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 was only recently 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 Traffic Control Center (ARTCC) and Combined Control Facility (CCF) Building Improvements**

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

FY 2018 – Air Route Traffic Control Center (ARTCC) and Combined Control Facility (CCF) Building Improvements
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
ARTCC/CCF Building Improvements	$74,200	$77,870	$100,400	+$22,530

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ARTCC Facility Modernization and Sustainment	23	$76,600.0
B. San Juan CERAP (ZSU) Administrative Building Seismic Upgrade/Renovation	1	10,000.0
C. Atlanta NAS Enterprise Management Center (NEMC) Building Expansion	1	11,000.0
D. In-Service Engineering	---	2,800.0
Total	Various	$100,400.0

For FY 2018, $76,600,000 is requested for ongoing ARTCC modernization and sustainment projects. The Air Route Traffic Control Center (ARTCC) and Combined Control Facility (CCF) Building Improvements program is one of the 14 programs that belong to the portfolio supporting the Air Traffic Control Facilities/Engineering Services (ATCF/ES) Sustainment Strategic Plan. 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 building automation control systems, and the installation of fire detection and protection upgrades as well as interior architectural construction. Also requested, is $2,800,000 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. Major Modernization projects planned for FY 2018 include:

Construction
- Control Wing Basement (CWB)/Major Mechanical Systems (MMS) – Kansas City, Denver ARTCCs
- Building Automation Controls System Replacement – Oakland, Cleveland, Washington, Los Angeles, Atlanta, Salt Lake City, and Seattle ARTCCs

Design
- Building Automation Controls System Replacement – Salt Lake City, Seattle and Denver ARTCC
- Fire Detection and Alarm System Replacement – Los Angeles, Jacksonville, Memphis, Indianapolis, Seattle and Salt Lake City.

The following is a brief description of the major modernization projects:

- **Control Wing Basement**–This project 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. The FAA will install architectural and building finishes to modernize space that has not been renovated in 50 years to support NAS operations and mission support functions. Structural and architectural upgrades will be provided in order 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 monitor and control 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 American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), specifically for building automation and control networks. This project will provide standardization of Building Automation Control Systems at all FAA En Route Facilities.

For FY 2018, $10,000,000 is requested to establish the San Juan (ZSU) Combined Control Facility (CCF) Administration Building Seismic Upgrade and Renovation project. The project will provide the safe and modern space needed by Air Traffic and Technical Operations Mission Support personnel. To achieve this goal, structural deficiencies associated with potential seismic events will be mitigated, and building systems infrastructure will be upgraded to comply with current building codes in accordance with Executive Order 12941 and Department of Transportation SS-98-01. This facility was constructed over 50 years ago. A recent structural evaluation identified significant seismic deficiencies with several of the on-site buildings. The decision was made to renovate the Administration Building while demolishing other obsolete buildings on the site. Space is needed to move technical operations personnel out of the Technical Support Building (TSB) and temporary modular/garage buildings and for training and administration. In addition, the Administration Building is considered historically significant and is eligible for inclusion in the National Register. The proposed solution allows for the preservation of the Administration Building, the demolition of the unsafe TSB. The requested funding will allow the project construction to take place in FY 2018 through FY 2020.

In addition, $11,000,000 is requested for the design and expansion of the Atlanta NEMC building, which hosts FAA national Air Traffic enterprise capabilities (e.g., Weather Processing and Dissemination, Flight Plan Processing and Delivery, Network Security Gateways). Currently the NEMC facility has significant space, cooling, and environmental deficiencies that if left unresolved can result in catastrophic NAS failures. This facility is one of only two that host these capabilities in the NAS.

What Is This Program And Why Is It Necessary?

The Air Route Traffic Control Center (ARTCC) and Combined Control Facility (CCF) Building Improvements Program was established to addresses physical plant requirements for the FAA's 21 ARTCCs as well as the CCFs at San Juan and Guam. These facilities were originally constructed approximately 50 years ago and have been expanded in phases since then. Much of the plant equipment within these buildings has exceeded its life expectancy and must be replaced. This program replaces obsolete equipment and provides an efficient, reliable, and safe work environment for En Route air traffic control operations.

The NEMC facility cannot accommodate future systems because of the space, cooling and environmental constraints that presently exist in the facility. The expansion of the facility will resolve these issues and protect the current systems housed within. Leaving the space, cooling, and environmental deficiencies identified at the NEMC unresolved may result in significant NAS disruptions, lead to prolonged flight delays, and hamper NAS modernization efforts. A cooling study of the NEMC equipment room conducted in 2015 confirmed that the existing access floor plenum of the NEMC Room is not capable of distributing air to cool all the equipment due to air flow restrictions beneath the raised floor. The study also concluded that increasing the air distribution efficiency and flow in the NEMC Room was not feasible due to height limitations in the existing building, and therefore a replacement building is needed.

What Does This Funding Level Support?

$100,400,000 is required to continue efforts to ensure that critical NAS En Route facilities are brought into and maintained in a state of good repair. This will prevent catastrophic outages and promote the health and safety of the Air Traffic and Technical Operations work force.

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

This program sustains 23 ARTCC and CCF facilities which are critical and vital to facilitate FAA's mission to serve the flying public. The mission of the En Route Facilities Planning and Modernization program is to support En Route Air Traffic operations and service level availability through facility life cycle program management of the 21 ARTCCs and the CCFs at San Juan and Guam. There are no viable programs or alternatives for achieving the same results.

The ZSU Administration Building Seismic Upgrade and Renovation project will perform sustainment projects that could impact Air Traffic Control (ATC) Operations at the ZSU facility, which handled 309,799 aircraft in FY 2015. Sustainment of this site will help ensure air traffic control capacity meets the current needs of the flying public and the military. This project will provide safe and modern space for Air Traffic and Technical Operations Mission Support personnel and functions. In addition, the rehabilitation of the Administration Building will restore and preserve a historically significant building.

The NEMC expansion will provide housing for planned equipment upgrades and will ensure equipment availability and resiliency for NAS operations.

Detailed Justification for - 2A05 Air Traffic Management (ATM)

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

FY 2018 – Air Traffic Management (ATM)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Air Traffic Management (ATM)	$11,700	$18,000	$4,900	-$13,100

*Commercial Space has been moved to a standalone BLI 2A22 and the amount 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. TFM Infrastructure Field/Remote Site Technology Refresh	---	$1,200.0
B. TFM Improvements	---	2,000.0
C. In-Service Engineering	---	1,700.0
Total	Various	$4,900.0

The Traffic Flow Management System (TFMS) supports the Federal Aviation Administration's (FAA) Traffic Management personnel in providing efficiency-critical National Airspace System (NAS) services. Throughout each day, Traffic Managers use the TFMS to maintain near real-time situational awareness and predict areas which may experience congestion due to capacity reductions or unusual demand increase. The TFMS is used to facilitate planning teleconferences every two hours to proactively plan impact mitigation strategies between the Air Traffic Control System Command Center (ATCSCC), Traffic Management Units (TMU) at all major Air Traffic Control (ATC) facilities, and flight operators. TFMS remote sites are also located at other FAA and Government offices.

For FY 2018, $4,900,000 is requested to support the following activities:

A. TFM Infrastructure Field/Remote Site Technology Refresh: $1,200,000 is requested to complete the remote site hardware replacement activity.
B. TFM Service Enhancements: $2,000,000 is requested to conduct operational analysis, engineering analysis, solution development and solution implementation activities.
C. In-Service Engineering: $1,700,000 is requested to advance activities to allow for immediate response to emerging technology solutions.

What Is This Program And Why Is It Necessary?

The TFMS becomes especially important when external factors, such as adverse weather, reduce NAS capacity and necessitate proactive planning, coordination and adjustments to mitigate impacts, e.g., missed connections, canceled flights, increased fuel consumption, etc. The ATCSCC uses the TFMS to model and implement NAS-wide Traffic Management Initiatives (TMI) to make the most efficient use of available capacity to avoid gridlock and minimize delays. When delays are necessary, TFMS assigns departure times equitably and gives flight operators flexibility though submission of trajectory options and departure slot substitutions.

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 manufactured and has not been supported by the hardware vendor since 2014. The TFM system exceeds the current hardware specifications and thus, is experiencing performance degradation. Performance degradation forecasts have not considered 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 further 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

TFM Service Enhancements respond to stakeholder-identified inefficiencies in current traffic flow management systems. 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, or 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. This program will support operational analysis, engineering analysis, solution development, and solution implementation activities designed to improve the delivery of TFM services.

One major task is to complete five additional improvements to the Route Management Tool (RMT) which will provide more consistent route generation and coordination across the system. These improvements will provide better route development, editing and submission capabilities along with mechanisms to provide a more user-friendly experience.

What Does This Funding Level Support?

A. TFM Field/Remote Site Technology Refresh

Funding is required to complete the remote sites technology refresh. TFMS is the platform for the NextGen CATMT enhancements. Please note that the subsequent activities are not a part of the technical program titled Traffic Flow Management System (TFMS).

B. TFM Service Enhancements

TFM-SE supports identification, prioritization, analysis and solution development to multiple issues on multiple TFM tools and systems. Additional problems and/or recommendations are routinely submitted throughout the year, creating a backlog of field-identified enhancements for the care and feeding of the NAS. TFM-SE responds to the continued pressure to support operational needs which otherwise lack an effective solution path thus avoiding potential compromise of existing baselines and/or services. $2,000,000 is requested to meet these operational needs and provide a more efficient TFM system.

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 TFMS 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 TFMS 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

TFM-SE supports a more efficient traffic flow management system, potentially providing better and more efficient solutions to air traffic demand/capacity mismatches in the NAS. These solutions can reduce delay on the ground and in the air, as well as increasing system reliability and reducing workload for system operators and airspace users.

Detailed Justification for - 2A06 Air/Ground Communications Infrastructure

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

FY 2018 – Air/Ground Communications Infrastructure
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Air/Ground Communications Infrastructure	$11,750	$8,750	$9,750	+$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Communications Facilities Enhancement (CFE) Expansion	16	$7,000.0
B. Radio Control Equipment (RCE) - Sustain	---	2,000.0
C. In-Service Engineering	---	750.0
Total	Various	$9,750.0

For FY 2018, $7,000,000 is requested to initiate 16 new CFE expansion/relocation sites, procure replacement radios, equipment racks, antennas, towers, and site preparation. The 16 FY 2018 sites are:

- Yakutat, AK Add Remote Center Air Ground (RCAG) Channel to Existing Site
- Greenville, SC Relocate Remote Transmitter Receiver (RTR) Site
- Chignik, AK Establish Remote Communications Outlet (RCO)
- South Lake Tahoe, CA Relocate RCAG
- Fairbanks, AK Modernize RTR
- Miami, FL Relocate RTR
- Indianapolis, IN Install Transmitter and Receiver for Air Traffic Control Tower (ATCT)
- West Palm Beach, FL Establish VHF frequency at remote location for ATCT
- Wilmington, NC Establish Clearance Delivery Frequency
- Jacksonville, NC Relocate RTR
- McCarthy, AK Establish RCO
- St. Charles, MO Relocate RCO
- Raton, NM Establish Back Up Emergency Communications (BUEC) Site
- Charlotte, NC Relocate RCAG
- Galena, AK Relocate RCAG
- Jacksonville, FL Refurbish RTR

For FY 2018, $2,000,000 is requested for RCE obsolescence study, supportability of repair facility, and RCE attrition support for NAS growth until NextGen requirements have been fully deployed. 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.

What Does This Funding Level Support?

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. The required funding for CFE also covers engineering and technical services/support to mitigate Radio Frequency Interference (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.

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 2018 – Air Traffic Control En Route Radar Facilities Improvements ($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Air Traffic Control En Route Radar Facilities Improvements	$5,810	$5,800	$5,400	-$400

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	26	$4,400.0
B. In-Service Engineering	---	1,000.0
Total	Various	$5,400.0

For FY 2018, $5,400,000 is requested to sustain approximately 26 facilities that are in poor condition and have a Facility Condition Index (FCI) rating below 90 percent.

The LRR Facilities Improvements program addresses the infrastructure requirements of the FAA-owned long-range surveillance facilities serving the National Airspace System (NAS).

The scope of the LRR infrastructure sustainment program includes upgrades and/or replacement of electrical, mechanical, lightning protection, fire detection, and facility security systems; buildings and structures; and facility access roads.

What Is This Program And Why Is It Necessary?

The NAS currently has 157 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.

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.

The ATC En Route LRR surveillance equipment will need to remain operational at least through year 2025. Average FCI of all 157 LRR facilities is currently at 83 percent which is below the minimum 90 percent required for such facilities. Due to the advanced age of these facilities, infrastructure maintenance and upgrades are urgently required.

The NAS requires reliable and continuous operation of surveillance equipment. The repairs, improvements, and modernization to existing infrastructure will enable the facilities to continue 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.

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.

What Does This Funding Level Support?

$5,400,000 is required to make repairs to the facilities that are in poor condition and have greatest impact to the NAS. This funding level will extend the service life and lower the risk of NAS outages from occurring. Evidence shows up to ten-fold savings if properly funded sustainment programs are instituted.

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 was at 83 percent in FY 2016. 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 2018 – Voice Switch and Control System (VSCS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Voice Switch and Control System (VSCS)	$9,900	$11,300	$12,800	+$1,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. VSCS Sustainment Activities	---	$6,431.2
b. Engineering Analysis	---	3,146.2
c. Program Management	---	411.0
d. Second Level Engineering	---	626.8
e. Contractor Support	---	2,184.8
Total	Various	$12,800.0

For FY 2018, $12,800,000 is requested to continue VSCS Technology Refresh Phase 3 activities including power equipment replacement, power supply retrofits, and storage of equipment in support of the FAA disaster recovery plan.

Ongoing tasks for the program include sustainment activities including Disk Array Replacement and PECO Power Supply Replacement.

What Is This Program And Why Is It Necessary?

The VSCS allows Air Traffic Controllers in the En Route environment to communicate with pilots, other controllers, other air traffic facilities, and commercial telephone contacts.

The VSCS technology refresh program supports the FAA Strategic Priority of sustaining operational availability by improving system reliability of En Route communications for both the current and future operations by replacing and upgrading components of the obsolete, non-supportable elements of the VSCS hardware and software in all 21 En Route Air Route Traffic Control Centers (ARTCCs). The technology refresh program is required to 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 VSCS is the existing legacy En Route voice switch system in the National Airspace System (NAS), and it will have to remain operational until the full deployment of the NextGen NAS Voice System (NVS), which is currently planned for 2025.

What Does This Funding Level Support?

$12,800,000 is required to ensure continued operation of VSCS, which is a Safety-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. Requested funding will ensure the availability of Air Traffic Control (ATC) Communications in the En Route environment. The requested funding will:

- Prevent Continued decline of VSCS availability; it is currently below the Safety-Critical NAS Services requirement of 0.99999 (National Airspace System [NAS] Requirements Document NAS-RD-2013: Reliability, Maintainability, and Availability [RMA] Section 3.3)
- Allow Failure rate growth to remain constant instead of increasing; 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?

The primary benefit of the VSCS technology refresh program is cost avoidance by reducing obsolescence and maintaining availability. 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 2018 – Oceanic Automation System
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Oceanic Automation System	$20,000	$24,000	$23,100	-$900

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. Prime Contract	---	$17,520.0
b. Program Management	---	1,580.0
c. Engineering Services	---	1,000.0
Total	Various	$20,100.0
B. Oceanic Service Enhancements	---	$1,000.0
C. ATOP Enhancements	---	$2,000.0

A. ATOP Technology Refresh

For FY 2018, $20,100,000 is requested to allow the ATOP Program Office to continue the technology refresh of the ATOP system. The investment is a full system technology refresh that addresses issues of performance, software end of service, and data storage. Technology refresh in FY 2018 will include the implementation of new hardware and software at the William J. Hughes Technical Center (WJHTC), and the three Oceanic Centers – New York (ZNY), Anchorage (ZAN) and Oakland (ZOA). The investment funding will allow for improved performance of the ATOP system to support NextGen activities, Surveillance Broadcast Services (SBS), and other National Airspace System (NAS) system improvements required in the oceanic domain, and improved system supportability.

B. Oceanic Service Enhancements

For FY 2018, $1,000,000 is requested for the Oceanic Service Enhancements. The investment supports a category of requirements that address necessary and unplanned changes. These 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. The funding 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 services.

C. ATOP Enhancements

For FY 2018, $2,000,000 is requested for the ATOP Enhancements program. The ATOP Enhancements program addresses the operational shortfalls within the current oceanic system as the FAA moves forward with NextGen and other NAS upgrades. The initial investment under the ATOP Enhancements Program has been identified as ATOP Work Package 1 (WP1). The program will address the continued evolution of the capabilities and services validated by the FAA's Oceanic/Offshore Standards and Procedures Group. The program will develop the following six planned enhancements:

- Enhanced Controller Coordination Interface
- Enhanced Conflict Probe in Surveillance Airspace
- Expanded Oceanic International Interfaces
- Approval of User Requests in Oceanic Airspace (Auto Re-Probe)
- Data Exchange via SWIM (New Services)
- Data Exchange via SWIM (Interface Rehost and Publish Services)

What Is This Program And Why Is It Necessary?

From 2005 to 2007, 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 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.

There are no viable alternatives in the near future (FY 2016 through 2028) 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.

A. ATOP Technology Refresh

The technology refresh of the ATOP system will provide compatible technology upgrades and replace the hardware at the three Oceanic Centers, the WJHTC, and prime contractor labs. Based on system supportability and the additional functionality to be integrated into the ATOP system during the FY 2018 to 2023 timeframe through the ATOP Enhancement program (WP1), it was critical to begin this technology refresh 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 is replaced on schedule per the program baseline and that the system replacement addresses the shortfalls listed below:

- Degraded system response times due to spike processing for system functions such as weather forecast updates and high traffic loads at New York Center (ZNY)
- Limited ability to process increased surveillance tracks from additional radar sources and Automatic Dependent Surveillance – Broadcast (ADS-B)
- Inability to store required amount of System Analysis and Recording (SAR), playback data, and security related events to meet required FAA standards/policy
- Lack of vendor support from IBM and Microsoft for obsolete operating systems (i.e., AIX 5.3 and Windows XP)
- Potential increased lifecycle costs to maintain proprietary system components

B. Oceanic Service Enhancements

The Oceanic Service Enhancements support operational analysis, engineering analysis, solution development, and solution implementation activities designed to improve the delivery of oceanic domain services. The scope of these NAS enhancements is limited to operational changes that do not require significant capital investments. The identification, management, documentation, and overall governance of these NAS changes will be articulated in an ATO domain service enhancement Standard Operating Procedure (SOP) and coordinated with applicable stakeholders.

C. 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 initial investment for the ATOP Enhancements program, WP1, will address ATOP system shortfalls with enhancements currently being assessed and planned for implementation after a Final Investment Decision (FID) in the second quarter of FY 2018.

Current ATOP System Shortfalls:

- User interface and data processing limitations impacting controller coordination
- Lack of five nautical mile surveillance probe
- Lack of Air Traffic Services Inter-Facility Data Communications (AIDC) 3.0 support for coordination with international Air Navigation Service Providers (ANSPs)
- Lack of support for automatic re-probing of user requests
- Inability to access automated Special Activity Airspace (SAA) information
- Inability to access required external weather data

What Does This Funding Level Support?

The current baseline funding for the oceanic automation system was completed in FY 2015. At this time there are no plans to retire the current oceanic automation system.

A. ATOP Technology Refresh

The ATOP System is experiencing operational and supportability limitations with the current hardware/software baseline.

The technology refresh will address performance and data storage limitations, and address vendor software and operating system end of life issues. The modifications are necessary to support planned NextGen activities and other NAS system requirements. The ATOP technology refresh program will support a 10-year operational life of the oceanic automation system.

B. 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 services. These small but critical enhancements are identified by current operations, and support FAA and/or ICAO changes.

C. ATOP Enhancements

The ATOP Enhancements program is linked to the NAS Segment Implementation Plan (NSIP) and NextGen Operational Improvements (OIs) or Operational Sustainments (OSs). ATOP WP1 will provide necessary enhancements required to minimize the current system's operational shortfalls defined by various stakeholder requests, as the FAA moves forward with NextGen and other NAS upgrades. Funding is necessary to initiate engineering analysis for a subset of the enhancements planned to be delivered from 2020 to 2023.

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

The Oceanic Automation System (OAS) improvements will provide the following benefits:

User Benefits

- Technology Refresh will provide:

  - A more stable and capable oceanic air traffic control system
- Oceanic Service Enhancements will provide:
  - Automation changes that will enable improved coordination, data link, special use airspace, and user request capabilities that support more optimum flight profiles
- ATOP Enhancements will provide:
  - Improved target level of safety for the flying public by providing the oceanic air traffic controllers better coordination, conflict probe, and surveillance tools
  - Reduced airline and general aviation operating costs and reduced system delays by delivering improved coordination, data link, special use airspace, and user request capabilities that support more optimum flight profiles

FAA Benefits

- Technology Refresh will provide:
  - Improved performance and capacity to support integration of planned NAS and NextGen improvements
  - Increased data storage through expanded enterprise data storage solution
  - Reduced lifecycle hardware support costs by replacing nine-year-old components with state-of the-art components
  - Reduced supportability risk by replacing end-of-life operating systems and aging hardware components
- Oceanic Service Enhancements will provide:
  - Increased ATC efficiency and improved target levels of safety though the implementation of high priority ATOP functional enhancements
- ATOP Enhancements will provide:
  - Improved flight coordination between oceanic, domestic, and international air traffic control operations
  - Reduced lifecycle costs for the delivery of ATOP-required weather products
  - Improved access to ATOP flight and system status data

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 2018 – Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$43,600	$53,000	$53,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. NEXCOM Segment 2 Phase 1		
a. Program Management	---	$4,000.0
b. Engineering Support	---	4,000.0
c. Hardware/Software	---	26,000.0
d. Logistics	---	1,000.0
e. Implementation	---	15,000.0
Total	Various	$50,000.0
B. NEXCOM Segment 2 Phase 1 Hardware/Software	Various	$3,000.0

For FY 2018, $50,000,000 is requested for NEXCOM Segment 2 Phase 1 to install 3,000 Very High Frequency (VHF) and Ultra High Frequency (UHF) radios (receivers and transmitters) at 160 terminal and flight services facilities and to purchase radios. Achieve initial operating capability (IOC) at 450 sites. Deploy VHF/UHF Emergency Transceivers at key site for testing.

For FY 2018, $3,000,000 is requested for NEXCOM Segment 2 to purchase radios off our existing contract.

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. The existing VHF analog controller-to-pilot communications system lacks the capacity and flexibility to accommodate future growth in air traffic. 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 Segment 2 Phase 1 2009 to 2018 will continue deployment of 12,000 VHF and UHF radios that will service the high-density terminal areas and the flight service operations
- NEXCOM Segment 2 Phase 2 2018 to 2024 funding will be used to purchase additional radios for implementation

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.

What Does This Funding Level Support?

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 currently 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	264	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 2018 – System-Wide Information Management (SWIM)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
System-Wide Information Management (SWIM)	$37,400	$28,800	$50,050	+$21,250

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. SWIM Segment 2B		
a. Enterprise Service Monitoring (ESM) Phase 2 Software Develop/Testing	---	$7,600.0
b. Identity and Access Management (IAM) Software Development	---	2,300.0
c. NAS Common Reference (NCR) Software Development	---	4,800.0
d. SWIM Terminal Data Distribution System Release 4/5 Software Develop	---	12,000.0
e. SOA Suitability Assessment, Sys Specification Develop/Gov. Support	---	3,900.0
f. Maintenance	---	1,300.0
g. Program Management and System Implementation Support	---	3,500.0
Total	Various	$35,400.0
B. Common Support Services, Phase 1 – Weather		
a. Prime Development Contract (Hardware and Software)	---	$7,400.0
b. Program Management and System Engineering	---	3,000.0
c. Telecommunications	---	1,800.0
d. Test and Evaluation	---	1,100.0
e. Second Level Engineering	---	400.0
f. Implementation	---	300.0
Total	Various	$14,000.0
C. Independent Operational Assessment (IOA)	---	$650.0

For FY 2018, $35,400,000 is requested for Segment 2B. This will cover the development, configuration, test and operational implementation of the following SWIM Service Oriented Architecture infrastructure services:

- Enterprise Service Monitoring (ESM)
- Identity and Access Management (IAM) Phase 2
- NAS Common Reference (NCR)
- SWIM Terminal Data Distribution System Phase 2 (Release 4.0, 5.0 and 6.0)

$14,000,000 is requested for development of the operational system including: continuation of CSS-Wx solution implementation activities, software development, and site survey activities.

Currently, SWIM funding has been used to support:

- SWIM Terminal Data Distribution System (STDDS) system engineering, testing, deployment, second level engineering of STDDS Release 3.3 and interfacing the data acquired by STDDS to SWIM/ National Airspace System (NAS) Enterprise Messaging Service (NEMS)

- SWIM NAS Service Registry and Repository (NSRR), COTS and Wiki support
- Purchasing and Deploying SWIM NEMS Nodes for the following Air Route Traffic Control Centers: Houston (ZHU), Denver (ZDV), Memphis (ZME) and Cleveland (ZOB)Developing Segment 2A Core Capabilities
- On-ramping National Airspace System (NAS) Mission Services
- Finalizing Design Requirements and starting System development for IAM Phase 2
- Finalizing Design Requirements and starting System development for ESM

$650,000 is also requested to support IOA activities. This work was formerly known as Independent Operational Test and Evaluation (IOT&E).

What Is This Program And Why Is It Necessary?

A. SWIM Segment 2B

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. The initial phase of SWIM, Segment 1, included 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. Continued funding for these SWIM accomplishments are being transitioned to operations and maintenance in FY 2018.

SWIM Segment 2B received the Joint Resource Council (JRC) Final Investment Decision (FID) approval in October 2015. SWIM Segment 2B continues to improve the FAA's ability to manage the efficient flow of information through the National Airspace System (NAS). Segment 2B includes additional capabilities to strengthen the overall NAS information system security posture and is leveraging the NAS Integrated Systems Engineering Framework (ISEF) version 3.2 to specify SWIM capabilities and responsibilities consistent with an enterprise-level functional architecture. NAS Common Reference (NCR) will focus on the development of efficient Net-Centric Operations (NCO) for ATM situational awareness, geospatial awareness, data correlation, and support services. NAS enterprise IAM capability will facilitate interoperability of security controls with NextGen partners. STDDS is a NAS-EA Support Services system that has the capability to support various mission services in the terminal mission services area. ESM will provide situational awareness of Operations and Maintenance (O&M) status of NAS infrastructure and the SOA services, including service outages.

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. 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.

B. Common Support Services, Phase 1 – Weather

CSS-Wx will be the FAA's common support services capability for weather and 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. 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 be the FAA's single provider of aviation weather data, consolidating several legacy weather dissemination systems, and will provide weather information for integration into NextGen enhanced decision support tools (DSTs). CSS-Wx will also be scalable to facilitate the addition of new users and new systems. The CSS-Wx 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 IT Web Services, and other weather sources, available to FAA and NAS users for input into collaborative decision-making. A Final Investment Decision (FID) occurred on March 18, 2015 and a Prime Contract was awarded in April 2015. The CSS-Wx program is now in the FAA's Solution Implementation Phase.

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, gaps and inefficiencies in today's weather dissemination system results in weather information not being utilized effectively or at all. Different decision makers currently have access to different weather information. 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.

What Does This Funding Level Support?

$35,400,000 is required for the development of SWIM Segment 2B. For FY 2018, SWIM funding will be used to:

- Complete Initial Operational Capability (IOC) for Strong Authentication using digital certificates for internal connections between SWIM and NAS systems (IAM Phase 2) (APB Milestone)
- Complete Final FIXM Compliant Schema Development for STDDS Flight Data (APB Milestone)
- Complete NCR Critical Design Review (CDR) (APB Milestone)
- Complete ESM Phase 2 Initial Operational Capability which enables ESM to accept status messages from a Communication, Information and Network Programs SWIM Producer (APB Milestone)
- Complete Service Oriented Architecture (SOA) suitability assessments for NAS programs entering the FAA investment analysis process in 2017

$14,000,000 is required for the development contract for the CSS-Wx System. The development contract will include the necessary software development. Included in the request, is funding for Program Support (e.g. Program Management, Engineering Support, Integrated Logistics Support), Telecommunications and Test and Evaluation (T&E) support.

$650,000 is required to support IOA 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

Detailed Justification for - 2A12 ADS-B NAS Wide Implementation

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

FY 2018 – ADS-B NAS Wide Implementation
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
ADS-B NAS Wide Implementation	$184,600	$154,800	$139,150	-$15,650

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	---	$14,132.0
b. Baseline Services	32	17,197.0
c. Exelis Non-Subscription Costs	---	1,571.0
Total	Various	$32,900.0
B. ADS-B and Colorado WAM Subscription Costs	---	$102,900.0
C. ADS-B In Application - Independent Operational Assessment (IOA)	---	$350.0
D. Relocation of ADS-B/Communication/Weather/Equipment Gulf of Mexico	---	$3,000.0

The Automatic Dependent Surveillance – Broadcast (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 and pilot advisory services.

A. ADS-B NAS Wide Implementation - Baseline Services and Applications

For FY 2018, $32,900,000 is requested to provide for the continued implementation of the following 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 also allow for the continued execution of Airport Surface Surveillance Capability (ASSC).

The anticipated FY 2018 accomplishments for ADS-B Baseline Services and Applications are as follows:

- Achieve Initial Operating Capability (IOC) of Terminal Air Traffic Control (ATC) Separation Services at 31 sites (136 cumulative)
- Complete IOC at one ASSC site (3 cumulative)

B. ADS-B (Subscription Costs)

For FY 2018, $102,900,000 is requested for continuing ADS-B Baseline Services, utilizing subscription fees for ADS-B infrastructure owned and operated by the prime contractor. Subscription fees to the Service Provider consist of Service Establishment Charges (SECs) for new service volumes and annual subscription fees to provide essential services to existing service volumes.

The budget also provides subscription fees for the Wide-area Multilateration (WAM) surveillance service capability providing aircraft location information to the automation system. These services allow controllers to provide separation services at airports in Colorado and North Carolina.

Activities planned by ADS-B for FY 2018 include the following:
- Provide WAM surveillance services supporting air traffic operations for four Colorado airports and 1 in North Carolina
- Provide service to more than 300 service volumes within specified requirements
- Pay performance based subscription charges

C. ADS-B In Application - Independent Operational Assessment (IOA)

$350,000 is also requested to support IOA activities. This work was formerly known as Independent Operational Test and Evaluation (IOT&E).

D. Gulf of Mexico Equipment Relocation

$3,000,000 is requested to relocate ADS-B, Communications Equipment, and Weather Equipment that currently is positioned on oil platforms in the Gulf of Mexico. Each year instances occur where the company that has been operating the oil platform determines that it is in their best interest to shut down the facility. In that circumstance FAA is left with equipment that would be devoid of power and oversight. In these instances, FAA must find other facilities to relocate these systems and execute the relocation to continue the current level of services in the Gulf of Mexico.

What Is This Program And Why Is It Necessary?

ADS-B is a cornerstone technology for NextGen. It 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 (GNSS) 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 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 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. 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 and capabilities have a significant dependency on the successful implementation of ADS-B:

- STARS
- Airport Surface Detection Equipment (ASDE)

- Time Based Flow Management (TBFM)
- Separation Management Portfolio Runway Status Lights (RWSL)

ADS-B has a significant dependence on the successful implementation of the following investments and capabilities:

- ATOP
- ERAM
- TBFM
- STARS
- Airport Surface Detection Equipment (ASDE-X)

ADS-B consists of a network of radios that provide service to more than 300 service volumes, utilizing subscription fees for ADS-B infrastructure owned and operated by the prime contractor. Subscription fees to the Service Provider consist of SECs for new service volumes and annual subscription fees to provide essential services to existing service volumes.

What Does This Funding Level Support?

The national deployment of 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 WAM in select En Route and Terminal environments will continue.

The requested funding is required to maintain the ADS-B schedule for ASSC. The 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.

In FY 2018 NAS Wide operation of ADS-B will continue with subscription services for surveillance across the NAS and for weather in the Gulf of Mexico and Alaska.

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 more efficient use of airspace, fewer delays, and more optimal routing for aircraft. The efficiency benefits include reduced weather deviations and fewer cancellations 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 $3.2 billion 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.

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.

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 Airport Surveillance Radar (ASR) to provide a comprehensive airport approach and surface surveillance picture. Expected benefits include improved safety on the airport surface and improved airport surface surveillance to enhance controller, pilot and vehicle operator situational awareness.

Also included in this activity are subscription charges for the WAM services in Colorado and Charlotte. 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. The increased accuracy of this surveillance technique safely expands the capacity of airports in Colorado and North Carolina to allow additional aircraft operations during instrument landing conditions.

Detailed Justification for - 2A13 Windshear Detection Service (WSDS)

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

FY 2018 – Windshear Detection Service (WSDS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Windshear Detection Service (WSDS)	$5,200	$4,500	$1,000	-$3,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Complete Wind Measuring Equipment (WME) Technology Refresh	---	$250.0
b. Complete Low-Level Windshear Alert System (LLWAS) Tech Refresh	---	200.0
c. Contractor Support	---	250.0
d. MIT/LL Weather System Processor (WSP) Technical Support	---	250.0
e. Second Level Engineering Support	---	50.0
Total	Various	$1,000.0

For FY 2018, $1,000,000 is requested to finalize completion of high mast pole installation and relocation at six airports totaling 12 poles as a part of Low-Level Windshear Alert System (LLWAS) site upgrades, and wrap-up all remaining incomplete Wind Measuring Equipment (WME) upgrade tasks to meet the APB milestones. Weather Subsystem Processor (WSP) deployment will complete in FY 2018 by resolving site specific issues. Funding for the Windshear Detection Services (WSDS) Work Package 1 (WP1) program is consistent with the program's Joint Resources Council (JRC) approved Acquisition Program Baseline (APB) and 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.

The WSDS WP1 work performed in FY 2018 will result in the following key outcomes:

- Reduced risk of WSP outages due to deployment of new processor
- Resolution of National Telecommunications and Information Administration (NTIA) narrowband compliance issues at LLWAS-Relocation and Sustainment (RS) sites due to deployment of compliant radio

What Is This Program And Why Is It Necessary?

WSDS 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, 64 WME, and 49 LLWAS systems currently deployed in the NAS.

The program will accomplish several key milestones by the end of FY 2017:

- Acquire Production Units for WSP RVP7 Replacement
- LLWAS Pole Procurement and Installation
- WME Hardware Procurement
- WME Hardware Installation by Engineering Services

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. WSDS 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.

What Does This Funding Level Support?

$1,000,000 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 WSDS 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. WSDS 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) Technologies**

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

FY 2018 – Collaborative Air Traffic Management Portfolio (CATM) Technologies ($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Collaborative Air Traffic Management (CATM) WP4	$11,770*	$10,000*	$9,000	-$1,000

*indicates a comparability adjustment to prior budget structure as two projects, Strategic Flow Management Integration and Strategic Flow Management Engineering Enhancement, were moved from this BLI into the Improved Surface Portfolio.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
CATMT Work Package 4	---	$9,000.0

CATMT Work Package 4 (WP4), after JRC approval will be the next enhancement package providing NextGen Midterm Traffic Flow Management (TFM)/CATM capabilities. Capabilities under analysis for CATMT WP4 include:

- Improving Demand Predictions (IDP) - Enhancements aimed at improving the Traffic Flow Management System (TFMS) predictions of demand for National Airspace System (NAS) resources; this will help reduce unnecessary delays
- Integrated Departure Route Planner (IDRP) - Provides strategic/tactical forecast of departure route and fix status affected by convective weather and volume for specific terminals; provides traffic managers with semi-automated resolution algorithm to solve departure constraints
- TFMS Ingestion of Weather Data (CSS-Wx) – TFMS will replace the legacy Corridor Integrated Weather System (CIWS) Data Distribution System (CDDS) prototype with the new System Wide Information System (SWIM) Common Support Services – Weather service

For FY 2018, $9,000,000 is requested to:

- Complete Detailed Design Review for the Improving Demand Predictions (IDP) capability
- Complete the System Design Review for the Integrated Departure Route Planner (IDRP) capability

What Is This Program And Why Is It Necessary?

The CATMT WP4 program provides a series of software enhancements designed to deliver improvements on existing capabilities and new modeling functions for TFMS. TFMS supports the Federal Aviation Administration's (FAA) Traffic Management personnel in providing efficiency-critical NAS services. Throughout each day, Traffic Managers use the TFMS to maintain near real-time situational awareness and predict areas that may experience congestion due to capacity reductions or unusual demand increase. The TFMS is used to facilitate planning teleconferences every two hours to proactively plan impact mitigation strategies between the Air Traffic Control System Command Center (ATCSCC), Traffic Management Units (TMU) at all major Air Traffic Control (ATC) facilities, and flight operators. TFMS remote sites are also located at other FAA and Government offices.

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. CATMT WP4 addresses the shortfalls listed below:

- 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 constraint impacts due to constraint prediction uncertainty
- Follow-on and cascading effects from failure to estimate demand properly 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 reroutes or traffic vectoring in response

What Does This Funding Level Support?

CATMT WP4 contains user requested software enhancement to TFMS. The capabilities developed by WP4 will help to improve the management of demand and capacity imbalances in the NAS. The capabilities will minimize the over constraint demand in TFMS and assure efficient operations once constrained. CATMT WP4 requires funding to continue the system engineering and development work of the WP4 capabilities.

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 adversely 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 expected benefits provided by CATMT WP4 include:

- Improved efficiency of Traffic Management Initiatives, such as: Airspace Flow Programs, Collaborative Trajectory Options Programs, Ground Delay Programs, and Ground Stops due to improved demand predictions
- Improved departure route and fix management for busy metroplexes

The above benefit mechanisms will result in Investment Planning and Analysis validated benefits of $1,007 million (risk adjusted over the lifecycle) associated with airline direct operating cost savings and savings associated with passenger value of time.

Detailed Justification for - 2A15 Time Based Flow Management (TBFM) Portfolio

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

FY 2018 – Time Based Flow Management (TBFM) Portfolio
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Time Based Flow Management (TBFM) Portfolio	$42,600*	$49,600*	$40,450	-$9,150

*indicates a comparability adjustment to prior budget structure as TBFM WP4 was moved from this BLI into the Improved Surface Portfolio.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. TBFM– Work Package 3 (WP3)	---	$40,100.0
B. TBFM WP3 – Independent Operational Assessment (IOA)	---	350.0
Total	Various	$40,450.0

The TBFM portfolio includes Tech Refresh and TBFM WP3 initiatives that support the National Airspace System (NAS). The capabilities enhance system efficiency by leveraging the TBFM decision-support tool, a system that is already deployed to all Continental United States (CONUS) Air Route Traffic Control Center (ARTCCs), Terminal Radar Approach Control (TRACON) facilities and Air Traffic Control Towers. Evaluating and maturing these concepts and capabilities include validation activities and demonstration and integration of operational capabilities. Improvements in TBFM's core Time-Based Metering (TBM) capability, an expansion of TBFM and its departure capabilities to additional locations will enhance efficiency and optimize demand and capacity. For FY 2018, $40,450,000 is requested to provide the following:

- Complete TBFM Terminal Sequencing and Spacing (TSAS) software development
- Conduct Capability Level Integration and Testing between TBFM and Terminal Automation Modernization and Replacement (TAMR)
- Continue Site Surveys
- Complete Integrated Departure/Arrival Capability (IDAC) hardware procurement

In addition $350,000 of the $40,450,000 is requested for the Independent Safety Assessment Team to conduct Independent Operational Assessments (IOAs) of designated systems or solutions before they are deployed throughout the NAS. For each IOA, a team of subject matter experts conduct a structured, system-level assessment of a system or solution in an operational environment. The team identifies safety hazards and operational concerns.

What Is This Program And Why Is It Necessary?

TBFM WP3 capability maximizes traffic flow and airport usage by improving flow management into and out of the busy metropolitan airspaces and corresponding airports. 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 currently focuses on the tactical metering of traffic flows in the En Route cruise environment. This improvement of metering accuracy also removes obstacles to the implementation of Performance-Based Navigation (PBN), an important NextGen Advisory Committee (NAC) priority. TBFM WP3 will improve upon the existing TBFM system by extending the functions of TBM into the terminal environment. TBFM WP3 leverages the integration of TAMR and ARTCC En Route Automation Modernization (ERAM) with TSAS.

TBFM WP3 is a follow-on phase of TBFM WP2 that will implement additional NextGen concepts, such as:

- TSAS, which will provide efficient sequencing and runway assignment by extending time based metering to the runway
- Expansion of IDAC to additional locations, which will increase efficiency of departure operations

The design, development, installation and deployment of these concepts will occur during the 2015-2022 calendar year timeframe.

What Does This Funding Level Support?

A. Time Based Flow Management (TBFM) WP3

The FY 2018 funding required is needed to enable TBFM WP3 to complete four software builds and conduct system level integrated testing of TSAS software between TBFM and TAMR.

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

The TBFM WP3 capabilities described above will enable an increase in arrivals and departures in areas where demand for runway capacity is high as well as areas in close proximity to airports with potential interference to airspace/approach. TBFM will also increase efficiency by allowing aircraft to fly PBN operations down to approach. Subsequent to TBFM WP3 implementation, the public will experience fewer delays, reduced carbon emissions, and less airport noise. TBFM technology refresh will reduce maintenance costs of the existing hardware and continue sustainment of the TBFM system.

Detailed Justification for - **2A16 Next Generation Weather Processor (NWP) Work Package 1 (WP1)**

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

FY 2018 – Next Generation Weather Processor (NWP) Work Package 1
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Next Generation Weather Processor (NWP) (WP1)	$7,000	$27,800	$35,450	+$7,650

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Prime Development Contract (Hardware and Software)	---	$27,750.0
b. Program Management and System Engineering	---	4,000.0
c. Test and Evaluation	---	1,600.0
d. Second Level Engineering	---	1,000.0
e. Implementation (Planning and Site Preparation)	---	300.0
f. Integrated Logistics Support	---	450.0
g. NWP - Independent Operational Assessment (IOA)	---	350.0
Total	Various	$35,450.0

For FY 2018, $35,450,000 is requested to provide the following:

- Software Development for NWP WP1
- Completion of Functional Qualification Testing
- Development of Factory Acceptance Test (FAT) Test Procedures and Performance of FAT Dry Run
- Performance of Integration Testing
- Logistics Support Planning, Site Surveying, and Site Preparation
- Independent Operational Assessment Activities

The NWP program achieved a successful Final Investment Decision (FID) on March 18, 2015, awarded a Prime Contract in April 2015, and is now in the Solution Implementation Phase.

What Is This Program And Why Is It Necessary?

The objective 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. NWP Work Package 1 (WP1) uses data from the FAA and National Oceanic and Atmospheric Administration (NOAA) radar and sensors, and NOAA forecast models. NWP WP1includes sophisticated algorithms to create aviation-specific current and predicted weather information. NWP WP1 creates enhanced weather products that will be available via the Common Support Services-Weather (CSS-Wx) system. It will perform the weather translation necessary to 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. Collectively these features will reduce operations and maintenance costs by consolidating the systems listed below which are funded under separate Budget Line Items (BLIs).

- 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 2B19: Provides weather information to terminal air traffic supervisors and controllers

Air Traffic Management (ATM) and flight operations rely on weather information for decision making. Current aviation weather processing infrastructure and capabilities are inadequate and do not meet the real-time needs of ATM DSTs, operational decision-makers. Existing aviation weather products lack the spatial resolution and the timeliness necessary to assess the impact of weather phenomena on air traffic. 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 systems are built on closed architectural systems that are not compatible with one another. Legacy weather system infrastructure is limited and unable to ingest and process observation, forecast, and modeling data to create high-quality weather products with a longer time horizon then currently available. Existing legacy software is inefficient, difficult to modify, and unable to serve users across multiple domains.

What Does This Funding Level Support?

$35,450,000 is required to continue work for the NWP WP1 and achieve the Initial Operating Capability (IOC) milestone on-time. The funding in FY 2018 will be used towards software development, completion of functional qualification testing, development of FAT procedures and performance of Dry Runs. As previously mentioned, NWP WP1 provides a weather processing platform that replaces the aging FAA weather processor systems and provides new capabilities to meet the anticipated needs of DSTs and operational decision makers in the NextGen era. NWP WP1 delivers the following benefits:

- Transition to reliable, high-resolution , aviation weather products that meet the needs of users and DSTs
- Generate weather information in formats useable by ATM DSTs. DSTs include 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 serves multiple domains with the capacity to support the 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
- Independent Operational Assessments activities

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

The American public benefits from reduced airline operating costs (e.g. fuel) and passenger delays through NWP's delivery of aviation-relevant weather products that meet the needs of users and decision-support tools. Users will be able to identify the best routes to fly based on aircraft type, flight plan and flying preferences, using optimized weather observations, improved predictions, and translation of weather information into airspace constraints. Improved weather products will enable Traffic flow management to plan operations that optimize airspace capacity and reduce passenger delays.

Detailed Justification for - 2A17 Airborne Collision Avoidance System X (ACAS X)

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

FY 2018 – Airborne Collision Avoidance System X (ACAS X)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Airborne Collision Avoidance System X (ACAS X)	$10,800	$8,900	$7,700	-$1,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Airborne Collision Avoidance System X (ACAS X)	---	$7,700.0

For FY 2018, $7,700,000 is requested to support ongoing standards development activities of ACAS X - Xa and Xo variants within joint RTCA Special Committee 147 and The European Organization for Civil Aviation Equipment Working Group 75 (RTCA SC-147/EUROCAE WG-75) forums. Efforts including Operational Evaluation (OpEval), System Validation and Verification, Stress Testing and Safety Hazard Analysis will inform standards development which will be incorporated into final Minimum Operational Performance Standards (MOPS) for RTCA publication.

Activities include:

- Requirements Substantiation, Justification and Traceability; Publication of ACAS Xa/Xo MOPS Documentation; and Program Management Support
- Safety Risk Management and Advanced Stress Testing; Operational Outreach (Focus Groups; pilots, controllers, etc.)
- System Validation and Verification Testing; Test Suite Development
- System Logic Optimization and Tuning; Operational Validation and Suitability Assessment of System Performance; and Operational Evaluation Execution

What Is This Program And Why Is It Necessary?

The ACAS-X is being developed to meet future collision avoidance requirements. The 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 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 Automatic Dependent Surveillance Broadcast (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: 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: 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

What Does This Funding Level Support?

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).

The required funds will resolve the TCAS conflicts with everyday normal operations (i.e., 50 percent of RAs as a result of 500 ft. Instrument Flight Rule (IFR)/Visual Flight Rule (VFR) separation). The ability to execute envisioned NextGen reduced separation operations will be maximized. The opportunity to leverage the current 2020 ADS-B out equipage mandate, as a means to minimize potential future operator implementation costs will be promoted. The development of collision avoidance capability for UAS platforms, as a means to ensure forward/backward compatibility with existing TCAS systems, will be enhanced. Finally, recommendations from the ADS-B Aviation Rulemaking Committee (ARC), Certification Authority Software Team (CAST), Aircraft Electronics Association (AEA), Special Committee (SC)-147, Single European Sky Air Traffic Management Research (SESAR) to address TCAS performance shortfalls, as they pertain to near-term operations, will be addressed.

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 the system performance and safety analysis shows that ACAS X could produce 54 percent fewer alerts and achieve a risk ratio over 50 percent safer than existing TCAS II v7.1 logic. These results are elaborated in further detail as follows:

Increased Efficiency - ACAS Xa produced 34 percent fewer total 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 feet Visual Flight Rule (VFR)/Instrument Flight Rule (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 of 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.

Adapted 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 Instrument Meteorological Conditions (IMC) and increased flexibility to modify airspace more frequently.

Detailed Justification for - 2A18 Data Communications in Support of NextGen

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

FY 2018 – Data Communications in Support of NextGen
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Data Communications in Support of NextGen	$234,900	$232,000	$154,100	-$77,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Segment 1 Phase 1 (S1P1)		
a. PM, SE, Test Ops, Implementation Support	---	$6,608.7
b. Tower Data Link Service (TDLS)	---	2,594.2
c. En Route	---	2,299.4
d. Data Comm Integrated Services (DCIS)	---	12,316.5
e. Avionics Equipage Initiative	---	12,481.2
Total (S1P1)	Various	$36,300.0
B. Segment 1 Phase 2 (S1P2) En Route Services		
a. PM, SE, Test, Ops, Implementation Support	---	$33,919.5
b. En Route	---	33,144.9
c. Data Comm Integrated Services (DCIS)	---	30,350.7
d. Tower Data Link Service (TDLS)	---	2,384.9
e. Independent Operational Assessment (IOA) formerly IOT&E	---	400.0
Total (S1P2)	Various	$100,200.0
C. Segment 1 Phase 1 (S1P1) and Segment 1 Phase 2 (S1P2) DCIS Network Services	---	$17,600.0

In FY 2018, $154,100,000 is requested for the Data Communications (Data Comm) program. This funding supports the deployment of Segment 1 Phase 1 (S1P1) and the development work of Segment 1 Phase 2 (S1P2) Initial En Route Services. It also includes funding for the network service. Data Comm S1P1 includes Departure Clearance (DCL) service in the tower environment and will continue to be supported in FY 2018. S1P2 includes enhancements to En Route services and will be implemented beginning in FY 2019.

The requested funding for S1P1 and S1P2 Initial and Full En Route Services is 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, and the October 2014 NAC NextGen Integration Working Group (NIWG) Activity Prioritization report, and the 2016 NAC NIWG Rolling Plan.

A. Segment 1 Phase 1 (S1P1)

Data Comm is requesting a total of $36,300,000 for S1P1 in FY 2018.

This funding will enable continued support of the Departure Clearance Service at select air traffic control towers by delivering ERAM and TDLS software updates and fixes, as required. This request also funds the Data Comm Avionics Equipage Initiative, which will result in approximately 359 aircraft getting equipped with FANS 1/A and VHF Data Link Mode 2 (VDL-2) avionics. Furthermore, funding is required for continued build-out and operation of the Data Comm Network Service (DCNS) air-ground communications infrastructure, along with other activities including Data Comm program office management support services.

Based on industry recommendations and Agency commitments through the NIWG, the program worked to an accelerated deployment schedule and completed last site IOC for Tower Services (APB milestone) in FY2017. In February of 2017, Data Comm received approval from the Joint Resources Council (JRC) to deploy to seven additional airports.

B. Segment 1 Phase 2 (S1P2) Initial En Route Services

In FY 2018, Data Comm is requesting $100,200,000 for S1P2 Initial En Route Services, of which $400,000 is for Independent Operational Assessment, formerly known as Independent Operational Test and Evaluation (IOT&E). This funding will enable the continuation of ERAM enhancements required to deliver Initial En Route Services. In FY 2018, activities will include the completion of the deployment of the National Single Data Authority (NSDA) log-on capability, as well as the completion of development and coding of the Initial En Route Services. System integration and testing for Initial Services, including developmental test and evaluation, regression testing and adaptation will also be completed in FY 2018.

Funding is required to order DCNS to support the En Route airspace. Funding is also needed for program management, program control, operations and contract management support as well as second-level engineering test support. S1P2 Initial En Route Services milestones include:

- Contractor detailed design completed (APB Milestone) – FY 2017
- Complete developmental testing and evaluation (APB Milestone) - FY 2018
- Deliver ERAM software for system-level test and evaluation – FY 2018
- Order DCNS service volume for S1P2 Initial En Route service key site (APB Milestone) – FY 2018
- Complete Operational Evaluation – FY 2019
- Achieve First Site IOC for En Route Services (APB Milestone) – FY 2019
- Achieve ISD for En Route Services (APB Milestone) – FY 2020

C. Segment 1 Phase 1 (S1P1) and Segment 1 Phase 2 (S1P2) DCIS Network Services

Data Comm is requesting $17,600,000 in FY 2018 for network services. This funding will provide the Very High Frequency (VHF) Data Link (VDL) Mode 2 air ground network service that provides connectivity between the controllers and the cockpit. The DCIS network services also include operations and maintenance, monitoring and control, and certification suite activities. This Data Communications Network Service supports both surface and en route operations.

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 existing avionics.

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 efficiency improvements and will permit capacity growth without requisite cost growth associated with equipment and maintenance. Data Comm is comprised of automation enhancements for ATC 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 and 30 percent of the high severity En Route operational errors were deemed to be communications related. The results of this study were independently reconfirmed in July

2009 and again in 2017. Data Comm will significantly reduce communications related operational errors and improve the safety of air travel. Segment 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 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)
- Increase efficiency
- 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.

What Does This Funding Level Support?

The Data Comm program needs funding at the requested level in FY 2018 to continue the deployment activities for S1P1 tower services; these activities include site acceptance and testing, software updates, and fixes. The funding is also required to support the avionics equipage initiative and the continued build-out of the DCNS infrastructure. These activities are augmented by program management, operations, and systems engineering support.

Funding is also needed at the requested level so that developmental testing and evaluation can be completed, as well as regression testing and adaptation for S1P2 Initial En Route Services. The DCNS service volume will also be ordered at the key site in FY 2018.

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 reduce delays resulting in estimated passenger value of time (PVT) savings of $11.3 billion for Tower and Initial En Route Services over the program life cycle. The addition of Full Services capabilities would add another $734 million of PVT savings over the program life cycle.

Detailed Justification for - 2A19 Offshore Automation

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

FY 2018 –Offshore Automation
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Offshore Automation	$0	$3,000	$11,000	+$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Program Management and Contract Support	---	$1,700.0
b. Systems Engineering Studies and Analyses	---	1,500.0
c. Solution Development and Hardware Procurement	---	7,800.0
Total	Various	$11,000.0

For FY 2018, $11,000,000 is requested to:

- Conduct engineering analysis to address unique needs for each offshore site
- Perform final investment analysis for the Offshore Automation investment
- Award a prime system vendor contract for the replacement system selected for each offshore site and begin initial solution development work

What Is This Program And Why Is It Necessary?

This program will conduct the necessary investment and technical analyses to identify solutions to replace existing Offshore Automation systems, followed by the implementation of these solutions. The desire is to replace and consolidate the number of differing NAS systems that provide similar functionality which will help reduce sustainment costs, improve the delivery of air traffic services, enhance NAS interoperability, and support NextGen capabilities.

These four sites currently use a variety of unique and aging surveillance and flight data automation systems to support the provision of air traffic services. These unique systems to be replaced are FDP2000, OFDPS (Oceanic Flight Data Processing System) and Micro-EARTS (Micro En Route Automated Radar Tracking System). These systems are unique to the rest of the NAS which operates en-route and terminal automation systems and a common flight data processing system. These systems are common across the entire CONUS NAS. As a result, the lifecycle costs to sustain these unique platforms (e.g. maintenance, logistics, and training) are becoming prohibitive. Additionally, each of these unique systems has inherent functional limitations, resulting in increased controller workload and suboptimal air traffic service provisioning.

All four of the Offshore facilities and their associated remote tower locations, use Micro-EARTS for Surveillance Data Processing (SDP). Micro-EARTS is a combined system that provides en route and terminal air traffic services to the facilities in a single, site configurable platform. The system was developed by the Federal Aviation Administration (FAA) and deployed approximately 20 years ago. The system has had continual, incremental technical refresh cycles over the last two decades and has national Second Level Engineering (SLE) support. The system does not have national training support at the FAA Training

Academy and requires all training for air traffic controllers and technical operations to be completed at the individual facilities. This creates inefficiencies in workforce flexibility and limits the ability to create robust contingency plans for the facilities. Micro-EARTS has limited flight data functions built in and requires a standalone Flight Data Processor (FDP) to supply it with the needed information to function at full capacity.

The Offshore facilities operate on a separate, unique flight data processing (FDP) systems. Anchorage ARTCC utilizes the Flight Data Processing 2000 (FDP-2000) which is a sever-based FDP developed by personnel at the Anchorage ARTCC. The system does not have nationalized training for air traffic controllers or technical operations personnel. The number of facility personnel with first hand system knowledge is decreasing as the workforce retires, this will increase the difficulty of making routine software enhancements and hardware upgrades.

Honolulu Control Facility (HCF) and Guam Combined En Route/Radar Approach Facility (CERAP) utilize the Offshore Flight Data Processing System (OFDPS) which is a mainframe based FDP that operates on Host/Oceanic Computer System Replacement (HOSCR) code that has been replaced in the CONUS. The system is based in Honolulu and feeds flight data to Guam via a Flight Data Input/Output (FDIO) system that is adapted to OFDPS. When OFDPS is taken down for maintenance or emergency situations, Guam loses its flight data processing capability. Due to the time difference in Guam even regular service outages would have a negative impact on the facility due to the outage occurring during the facility's peak traffic time.

San Juan CERAP utilizes an FDIO and site unique adaptation software in the Miami ARTCC ERAM. The unique adaptation provides the facility with en route flight strips and gives ZSU the ability to input Discrete Code Requests (DQ) and Combine Sector (CS) messages. When a CS message is received, ZMA personnel must make any airspace or sector changes for ZSU before ZSU can configure the Micro-EARTS system. The increased process can results in delays for those changes being realized at the ZSU facility. The ZMA ARTCC will occasionally run out of beacon codes during high volume days. ZSU is dependent on the ZMA ERAM assigning the beacon codes and when ZMA runs out of beacon codes it impacts the workload at ZSU.

What Does This Funding Level Support?

Replacing the automation systems at Anchorage, Honolulu, San Juan, and Guam with NAS baseline system(s) will

- Improve NAS interoperability and reduce cost
- Allow for standardized site training consistent with other CONUS facilities
- Eliminate these unique local systems
- Resolve end of the life issues
- Provide sustainable platforms
- Extend NextGen capabilities to these sites and align with NextGen goals
- Provide safer and more efficient systems, and reduce the operational risk associated with attempting to sustain these systems

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

The American Public would benefit from reduced federal costs for maintenance and enhanced reliability and safety of the automation systems at these four offshore facilities, which in turn will enhance the delivery of safe and efficient air traffic services at these locations.

Detailed Justification for - 2A20 SBS Advanced Surveillance Enhanced Procedural Separation (ASEPS) (Formerly Reduced Oceanic Separation)

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

FY 2018 – SBS Advanced Surveillance Enhanced Procedural Separation (ASEPS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
SBS Advanced Surveillance Enhanced Procedural Separation (ASEPS)	$15,000*	$1,000*	$4,350	+$3,350

*indicates a comparability adjustment to prior budget structure as Reduced Oceanic Separation was moved from the Separation Management Portfolio to this new standalone BLI.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Advanced Technologies and Oceanic Procedures (ATOP) Prototype Design	---	$3,187.0
b. Surveillance and Broadcast Service (SBS) System Enhancements	---	517.8
c. SBS ASEPS Final Investment Decision (FID)	---	295.2.0
d. Independent Operational Assessment (IOA) formerly IOT&E	---	350.0
Total	Various	$4,350.0

SBS ASEPS Program evaluates and matures concepts and capabilities that focus on the enhancement of surveillance services in U.S. managed oceanic airspace, supported by ground-based automation and aircraft technology enhancements. The SBS ASEPS Program supports pre-implementation activities to achieve Final Investment Decision (FID) that is currently planned for the fourth quarter of FY 2018.

For FY 2018, $4,000,000 is requested to provide the following:

- Achieve SBS ASEPS FID
- Continue engineering analysis of Automatic Dependent Surveillance – Contract (ADS-C) and Space-Based ADS-Broadcast (SBA) to support SBS ASEPS objective
- Continue enhancements of SBS System to receive SBA data
- Complete ATOP Prototype Design

Also requested is $350,000 for IOA activities.

What Is This Program And Why Is It Necessary?

The SBS ASEPS Program will investigate options for reduced oceanic separation service below 30 nautical mile (NM) lateral and 30 NM longitudinal separation (30/30) to enhance operations in U.S. Oceanic Airspace. Oceanic airspace is different from the rest of the National Air Space (NAS) due to current limitations in surveillance, navigation, and communication capabilities. Enhancing surveillance and communication capabilities can provide significant improvements to air navigation services by reducing separation minima for optimum routing or new air routes for increased airspace capacity. The performance of required communications, navigation, and surveillance equipment must be capable of providing the overall accuracy necessary for reducing separation standards. The SBS ASEPS Project will examine the potential to reduce oceanic separation standards.

The SBS ASEPS Program will continue maturing the analyses, and return to the JRC in the fourth quarter of FY 2017 for an Initial Investment Decision (IID), followed by a FID in the fourth quarter of FY 2018. Per the direction of the JRC in July 2015, the SBS ASEPS Program is currently working to enhance the ADS-B System to receive and test Space-Based ADS-B data at the FAA William J. Hughes Technical Center. Additionally, in advance of the FID, the program will develop a prototype ATOP system to be used in simulations to validate requirements.

What Does This Funding Level Support?

$4,350,000 is required to evaluate and mature concepts and capabilities that focus on the enhancement of separation assurance through the use of both Space-Based technology and aircraft technology enhancements. The program will provide cost savings, enhance capacity, flight efficiency, and ensure safe aircraft separation. Additionally, this program will help to reduce time for search and rescue missions.

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

The automation capabilities will enable air traffic controllers and pilots to manage increasing traffic levels in oceanic airspace (through reduced separation between aircraft), and enable new air routes to increase airspace capacity. The cost savings to the user will be provided via optimum routing, which is measured by fuel (both burn and contingency needs) and flight time. The efficiency will be improved through airlines' potential to schedule departures closer together. It also will provide better approach control for South Pacific Islands with no towers. In addition, the safety for search and rescue missions will be improved with reduced time.

Detailed Justification for - 2A21 En Route Service Improvements

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

FY 2018 – En Route Service Improvements
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Estimate
En Route Improvements	$0	$0	$3,000	+$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
En Route Improvements	---	$3,000.0

For FY 2018, $3,000,000 is requested for En Route Improvements. This program supports a category of requirements that address necessary and unplanned changes. These sudden needs are the result of operational changes in the field, unanticipated changes from external organizations (e.g. International Civil Aviation Organization (ICAO), third party data providers, neighboring Air Navigation Service Providers (ANSP) or potential cost-savings initiatives. The funding will be directed for the operational analysis, engineering analysis, solution development, and solution implementation activities to improve the delivery of En Route domain services.

What Is This Program And Why Is It Necessary?

The En Route Improvements support operational analysis, engineering analysis, solution development, and solution implementation activities designed to improve the delivery of domain services. The scope of these NAS enhancements is limited to operational changes that do not require significant capital investments (e.g. requiring a Final Investment Decision (FID) nor involve significant systems complexity, interdependencies, and/or NAS operational changes. The identification, management, documentation, and overall governance of these NAS changes will be articulated in an ATO domain service enhancement Standard Operating Procedure (SOP) and coordinated with applicable stakeholders.

What Does This Funding Level Support?

$3,000,000 is required to improve the presentation, access, and use of ERAM and other systems data by air traffic controllers and managers, resulting in more efficient, safer, and cost-effective delivery of En Route services. This program will conduct operational analysis, engineering analysis, solution development, and solution implementation activities designed to improve the delivery of En Route domain services. These small but critical enhancements are identified by current operations, and support FAA and/or ICAO changes.

Candidate enhancement areas for FY 2018 include:

- Improved Computer-Human Interface features
- Improved accuracy of flight data presentation and use
- Enhanced interface processing with adjacent systems/facilities
- Improved weather data management
- Additional system hardware platforms and components

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

This program will provide increased ATM efficiency, improved target levels of safety, and enhanced productivity through the implementation of high priority En Route functional enhancements. Improved interaction between the human and the systems, and increasing the accuracy and use of flight data will directly enhance the timeliness and fidelity of controller decisions, thereby improving delivery of services and accruing the aforementioned benefits. Advancing the interoperability between systems and facilities decreases manual coordination which directly enhances workforce productivity, while increasing effective integration of weather data into controller decision making enhances safety and flight efficiency.

Detailed Justification for - 2A22 Commercial Space Integration

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

FY 2018 – Commercial Space Integration
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Commercial Space Integration	$2,000*	$2,000*	$4,500	+$2,500

*indicates a comparability adjustment to prior budget structure

<u>COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR</u>

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Commercial Space Integration into the NAS	---	4,500.0

$4,500,000 is requested to continue advancing the Space Data Integrator (SDI) project through the Final Investment Decision (FID) milestone of the Acquisition Management System (AMS). In addition, this funding will support Space Traffic Management (STM) that will enable the FAA to monitor space traffic services and their impact to aviation, consistent with the FAA's public safety mission.

What Is This Program And Why Is It Necessary?

The Commercial Space Integration into the NAS program will integrate launch and reentry operations into the NAS through the acquisition and development of a Space Data Integrator (SDI). Existing air traffic tools and procedures were not designed to support launch and reentry operations and lack the real-time capability to support the needs of both aviation and launch/reentry vehicles when they must share the national airspace. As the commercial space industry continues to grow, many of the planned missions will include new technologies that have never been undertaken such as reusable rockets, presenting an unprecedented level of complexity. Planning and execution challenges are making it increasingly difficult for the FAA to manage the growing volume of operations in the NAS without significant disruptions to both space and air operators. Interfaces for the ingest of space vehicle data into existing NAS systems do not exist, so a small FAA team transfers data across tools and networks verbally and on paper, enters the data by hand, completing 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.

FAA developed an SDI prototype that enables a "reduce, respond, release" approach to safely minimizing the effects of these operations on NAS efficiency and capacity and demonstrates the benefits of an integration system but is limited in capability. The development and implementation of an operational SDI to integrate launch and reentry operations into the Air Traffic Management environment will enable the FAA to safely <u>reduce</u> the amount of airspace that must be closed to other users, <u>respond</u> to off-nominal scenarios and during normal operations, and <u>release</u> airspace that is no longer at risk as the mission progresses.

Work under this project will also support a pilot space situational awareness system (high performance computing system) and associated governmental and commercially developed orbital analysis software. An initial space situational awareness system comprised of 4 analytical stations with the capability to store and utilize a dynamic orbital object database of roughly 500,000 individual objects will be developed. The system will be a high-performance computing system composed of commercial and governmentally developed analytical software.

What Does This Funding Level Support?

Funding is required to complete the investment analysis process and continue prototype assessments for the SDI, allows 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 enable FAA-automated systems, allowing the FAA to identify multiple, complex constraints much earlier in the process and work them in parallel. This also allows FAA to support more than one launch and reentry operation at a time, maximizing the opportunity to address them in a way that best benefits the NAS.

This funding will also support a pilot space situational awareness system (high performance computing system) and associated governmental and commercially developed orbital analysis software, communications architectures, program management support contracts, and commercial surveillance data contracts.

These resources allow the FAA to automate launch and reentry operations that are currently manual in nature, time consuming, error-prone, and limits the FAA's ability to respond to dynamic conditions. This project will advance Space Traffic Management (STM) that will enable the FAA to monitor space traffic services and their impact to aviation, consistent with the FAA's public safety mission.

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

Commercial Space Integration into the NAS provides safety, flight efficiency, and cost saving benefits by enhancing the current level of safety through automating resource intensive, layered approaches, improving planning processes with advanced insight into complex constraints, and reducing the potential for human error during launch and reentry operations. 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 - 2B01 Terminal Doppler Weather Radar (TDWR) – Provide

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

FY 2018 – Terminal Doppler Weather Radar (TDWR) – Provide
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Terminal Doppler Weather Radar (TDWR) – Provide	$4,900	$5,000	$3,800	-$1,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Solution Implementation with Second Level Engineering	---	$2,200.0
b. FAA Logistical Support	---	500.0
c. FAA Power Engineering Group Support	---	600.0
d. Contractor Support	---	500.0
Total	Various	$3,800.0

For FY 2018, $3,800,000 is requested to support the following activities and/or tasks associated with the TDWR Service Life Extension Program (SLEP) Phase 2 sustainment projects:

- Equipment software porting for Antenna Servo Controller and Transmitter Microwave Assembly
- System integration, procurement of modification kits and regression testing of Direct Digital Controller and Wind Shear Ribbon Displays
- Acquire components to replenish depot spares as identified in Diminishing Manufacturing Sources and Material Shortages (DMSMS) Study
- Procurement of Equipment and Implementation for Grounding System Refurbishment (31 of 47 complete)

These efforts involve logistical support, second level engineering support and contract support to develop required documentation and provide adequate testing.

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 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 windshear 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 windshear 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 ended in FY 2014 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.

What Does This Funding Level Support?

$3,800,000 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.

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)).

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. In addition, weather related delays have been reduced, allowing savings in aviation fuel consumption.

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.

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 - 2B02 Standard Terminal Automation Replacement System (STARS) Sustain

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

FY 2018 – Standard Terminal Automation Replacement System (STARS) Sustain
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Standard Terminal Automation Replacement System (STARS) Sustain	$81,100	$64,200	$86,700	+$22,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Task	Locations/ Quantity	Estimated Cost ($000)
A. STARS Technology Refresh (TAMR Phase 1)		
a. Software Design and Development	---	$8,000.0
b. G-4 Hardware Procurement	12	12,500.0
c. Site Preparation, Deployment and Installation	12	10,600.0
d. Logistics	---	1,200.0
e. Program Management Support	---	6,700.0
f. FTI	---	3,000.0
g. Prime Vendor Program Management Support	---	2,500.0
h. System Engineering (COTS/CAS)	---	8,300.0
Total	Various	$52,800.0
B. STARS Sustainment Technology Refresh 2 Planning/Engineering		
a. Engineering/Operating System	---	$6,106.0
b. Hardware Procurement/Tech Refresh	---	5,182.0
c. Prime Contract Gaps	---	1,211.0
d. Transition	---	9,049.0
e. Engineering Development Design	---	1,805.0
f. Retrofit	---	3,218.0
g. End of Life (EOL)	---	2,278.0
h. DRD Requirements	---	2,971.0
i. Trackball	---	2,080.0
Total	Various	$33,900.0

A. STARS Technology Refresh

For FY 2018, $52,800,000 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 and priority Software Trouble Reports (STRs). The funding will continue to provide for program, system engineering, and technical support. The program will conduct site surveys, site prep, and deployment at 12 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.

B. STARS Technology Refresh 2

Additionally, $33,900,000 is requested to begin engineering that will enable the FAA to replace key elements of STARS that are reaching their end of life (EOL) and/or that are no longer compatible with current commercial offerings.

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 funds the replacement of the automated radar processing and display systems at 47 Terminal Radar Approach Control (TRACON) facilities and their associated Air Traffic Control Towers with Ultra-5 processors and Sony 2K displays (1996 – 2005). 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. The STARS program is currently in a technology refresh cycle. As part of the refresh cycle, 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 Terminal Automation Modernization and Replacement (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 COTS based system, an aggressive hardware technology refresh program is essential. Planning for it enables the 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, which are 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 upgrades needed for enhanced performance and capacity.

What Does This Funding Level Support?

A. STARS Technology Refresh

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 Automatic Dependent Surveillance Broadcast (ADS-B). The STARS infrastructure can be expanded and extended to meet increased traffic demands and to accommodate the introduction of new automation functions necessary for improved safety, efficiency, and capacity.

Replacing the original Ultra-5 processors, which have reached their end of maintenance, provides technology refresh for continued STARS terminal services. Replacing the original Sony 2K CRTs (Cathode

Ray Tube), which have degraded display capability, provides air traffic controllers with high definition displays.

$52,800,000 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, including:

- Procure hardware for upgrades from G1 to G4 configuration at 11 operational sites
- Implement mandatory software security and safety enhancements, new functionality and upgrades needed for enhanced performance and capacity in support of NextGen initiatives
- Complete IOC at 10 sites (32 of 48 sites, 68 percent)
- Complete IOC at 26th site (APB milestone)

B. STARS Technology Refresh 2

The STARS technology refresh 2 program will provide engineering that will enable the FAA to replace key elements of STARS that have reached their end of life (EOL) and/or that are no longer compatible with current commercial offerings in the future.

$33,900,000 is required to begin the engineering to support the continued high operational availability of STARS by engineering hardware technology refresh components. This includes:

- Start the engineering analysis to support STARS transition to new Operating System (OS)
- Purchase hardware for Technical Refresh of remaining five STARS G1/G2 LITE systems that were not included in any TAMR Program baseline and start site preparation
- Complete identification of "Gaps" between standards on existing Prime contract and the FY 2018 FAA standards for FAA-G-2100 and FAA-STD-019
- Complete engineering design for STARS Lightweight Data Access Protocol (LDAP), a set of protocols for accessing information directories
- Finalize requirements for X4000 Processor/Digital Recording Device for continuous data recording

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

The STARS platform is an 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 and begin the engineering necessary to replace key components that are reaching end of life.

Detailed Justification for - 2B03 Terminal Automation Modernization/Replacement Program (TAMR Phase 3)

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

FY 2018 – Terminal Automation Modernization/Replacement Program (TAMR Phase 3)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Terminal Automation Modernization/Replacement Program (TAMR Phase 3)	$159,350	$108,900	$66,100	-$42,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks		Locations/ Quantity	Estimated Cost ($000)
TAMR Phase 3 Segment 2			
a.	Prime Contractor	24	$33,124.0
b.	Service Areas	---	2,288.0
c.	HQ Program Management	---	9,316.0
d.	Telco (FAA Telecommunication Infrastructure)	---	769.0
e.	Logistics and Training	---	272.0
f.	Second Level Engineering (Terminal Second Level Engineering)		17,331.0
g.	Common Terminal Digitizer (CTD)	13	3,000.0
Total		Various	$66,100.0

For FY 2018, $66,100,000 is requested for TAMR Phase 3 for hardware procurement, testing, site preparation, and equipment installation of the STARS ELITE system.

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 Automated Radar Terminal System (CARTS) automation systems at 108 TRACONs and associated ATCT facilities with STARS to meet NextGen mid-term goals. Eleven systems were previously installed under the Segment 1 program. System configurations to be replaced under Segment 2 include 91 ARTS IIEs and 6 ARTS IEs. The FAA will continue to sustain the automation systems at these sites while monitoring system performance to identify any deterioration in service.

The TAMR Phase 3 Segment 2 program will replace 91 ARTS IIEs, 6 ARTS IEs, and associated ATCT 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 65th ARTS IIE site (APB milestone)
- Achieve IOC at 18 sites, for a cumulative total of 89 sites
- Deliver 12 additional systems (11 operational and one support)
- Procure 10 ELITE systems (eight operational and two supports)

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 increased safety risks.

The ARTS IEs will be replaced to complete the convergence to a single terminal automation system.

What Does This Funding Level Support?

$66,100,000 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, decreasing 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 to complete the convergence to a single terminal automation system.

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

By replacing 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 operational at 60 terminal sites, and over the past five years, the average equipment availability for STARS has been 99.9996 percent.

Quantitative benefits that are expected include:

- Cost avoidance to maintain aging equipment
- Maintaining a single software baseline versus two software baselines
- Lifecycle benefits of common displays and processors
- Common hardware for re-use and expansions

Qualitative benefits are expected to enhance controllers' 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 - 2B04 Terminal Automation Program

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

FY 2018 – Terminal Automation Program
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Terminal Automation Program	$7,700	$7,700	$8,493	+$793

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Flight Data Input/Output (FDIO) Replacement	---	$2,800.0
B. Terminal Work Package 1	---	$3,693.0
C. Terminal Domain Service Enhancements	---	$2,000.0

A. Flight Data Input/Output (FDIO) Replacement

For FY 2018, $2,800,000 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 FDIO system components at Federal Aviation Administration (FAA) and Department of Defense (DOD) Air Traffic Control (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 switches, printers, and FDIO-G items. In 2018, it is estimated that 600+ printers will be procured and the 1900+ printers procured in previous years will be installed.

B. Terminal Work Package 1

For FY 2018, $3,693,000 is requested to finalize the detailed requirement for Terminal Automation enhancements established at Final Investment Decision (FID). Activities include developing detailed requirements for Terminal Automation changes, identifying procedural changes to support these automation changes within the TRACON domain, quantifying benefits, and finalizing the Business Case. The activities conducted in support of Terminal Work Package 1 will reduce technical risk and identify safety concerns.

C. Terminal Domain Service Enhancements

$2,000,000 is requested in FY 2018 to conduct operational analysis, engineering analysis, solution development and solution implementation activities. This program supports a category of requirements that address necessary and unplanned changes. These sudden needs are the result of operational changes in the field, unanticipated changes from external organizations (e.g. International Civil Aviation Organization (ICAO), third part data providers, neighboring ANSPs) or potentially cost-savings initiatives. The funding will be directed for the operational analysis, engineering analysis, solution development, and solution implementation activities to improve the delivery of terminal domain services.

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 Wake Re-Categorization to air traffic controllers located at approximately 690 remote sites. FDIO also provides Flight Data Service to Honolulu Control Facility and San Juan Combined Control Facility. The FDIO system interfaces to several En Route automation systems including: En Route Automation Modernization (ERAM), Flight Data processor 2000, and Offshore Processing system where it provides flight data information to NAS Terminal facilities. In addition, FDIO provides flight data information to other mission critical terminal automated systems. This information assists controllers in tracking aircraft, providing departure clearances, and anticipating the arrival of aircrafts in the sector under their control. The FDIO system also receives data from the Terminal Radar Approach Control Facility (TRACON), Air Traffic Control Tower (ATCT), and Radar Approach Control (RAPCON) facilities and relays this data back to the En Route Automation System.

The FDIO Replacement program replaces the end-of-life/ obsolete FDIO equipment with fully compatible (form/fit/function) commercial off the shelf (COTS) and modified COTS equipment. Individual components are procured and replaced as they reach their end of life. The program is based on a five year replacement cycle for the various components in order to maintain system operational availability. In addition to replacing components it's necessary to provide a common Internet Protocol infrastructure to support future ERAM, NextGen architectures, and the Terminal Flight Data Manager System.

The FDIO program replaces end of life, obsolete FDIO equipment with modern and modified COTS equipment, thereby reducing potential outages and delays. The five year replacement cycle that FDIO employs ensures sustained system operational availability at the core airports reportable facilities.

B. Terminal Work Package 1

The Terminal Work Package 1 investment is the next useful segment for the Standard Terminal Automation Replacement System (STARS) platform, building upon previous investments designed to consolidate to a one terminal automation platform. As envisioned by NextGen, the objective is to develop and implement capabilities necessary to enable trajectory-based operations in the terminal environment.

Terminal Work Package 1 will consist of software capabilities and changes implemented on existing systems in the Terminal domain as well as associated procedures. The Standard Terminal Automation Replacement Program (STARS) will be the primary display platform. Terminal Work Package 1 will address outstanding operational needs in the Terminal environment that are not part of the STARS program baseline.

C. Terminal Domain Service Enhancements

This program will support operational analysis, engineering analysis, solution development, and solution implementation activities designed to improve the delivery of terminal services. The scope of these NAS enhancements are limited to operational changes that do not require significant capital investments (e.g. requiring 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 domain service enhancement Standard Operating Procedure and coordinated with applicable stakeholders.

What Does This Funding Level Support?

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 required funding is needed to finalize the Business Case Analysis, develop detailed program requirements to provide enhancements to the existing Automation platforms within the Terminal Automation environment, quantify benefits, and to pay for Raytheon proposal costs and negotiations. Terminal Work Package 1 will result in improved efficiency and productivity with the addition of new operational capabilities and is the next useful segment for the STARS platform.

C. Terminal Domain Service Enhancements

This funding will be used to improve the presentation, access, and use of STARS and other systems data by air traffic controllers and managers, resulting in more efficient, safer, and cost-effective delivery of terminal services. This program will conduct operational analysis, engineering analysis, solution development, and solution implementation activities designed to improve the delivery of terminal domain services. These small but critical enhancements are identified by current operations, and support FAA and/or ICAO changes.

Candidate enhancement areas for FY 2018 include:

- Additional system hardware platforms and components
- Improvements to existing communications mechanisms
- Surveillance integration and display enhancements
- Functional and computer-human interface enhancements

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. 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 Terminal Automation 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, and predictable service provided by the FAA. Benefits will be fully determined as part of Investment Analysis activities.

C. Terminal Domain Service Enhancements

Increased ATM efficiency, improved target levels of safety, and enhanced productivity through the implementation of high priority terminal functional enhancements. Additional existing hardware components, in response to changes in NAS demand, enable more efficient and safe services to the flying public. Improvements in communications means and surveillance data enhance the timeliness and efficacy of controller decisions, thereby increasing flight and workforce efficiency. Improvements in the interaction between the controller and the automation systems will increase the accuracy of flight data, thereby improving delivery of services and accruing the aforementioned benefits.

Detailed Justification for - 2B05 Terminal Air Traffic Control Facilities – Replace

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

FY 2018 – Terminal Air Traffic Control Facilities – Replace
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Terminal Air Traffic Control Facilities – Replace	$45,500	$58,800	$31,118	-$27,682

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	---	$8,500.0
b. Segment 2 - Land Acquisition/Site Prep/Design	2	3,500.0
c. Segment 4 – Equipment and Utilities Installation	1	19,118.5
Total	Various	$31,118.5

Terminal Air Traffic Control Facilities–Replace is one of the programs included in the Air Traffic Control (ATC) Facilities Sustainment Strategic 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 National Airspace System (NAS), NextGen. The FAA is seeking funding for design starts at two sites, and the purchase of long lead equipment and utility installation at one site.

Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) replacement are large capital investments. Given constrained resources, the FAA is focusing on risk-based analysis to ensure that those facilities in greatest need are replaced first. The FAA has a prioritized listing of all NAS Terminal sites and conducts ongoing studies that determine if and when the FAA needs to replace an ATCT due to siting, size, and physical conditions. From that list, the FAA then initiates siting and design studies, and ultimately construction of the facilities with the greatest need.

Segment 1 funding in the amount of $8,500,000 is requested in FY 2018 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, which encompasses the design phase of an ATCT/TRACON replacement project, is requested in the amount of $3,500,000 in FY 2018 for two sites. The design starts are scheduled for Baltimore, MD (BWI) $2,000,000; and Charleston, SC (CHS) $1,500,000.

Segment 4 funding in the amount of $19,118,485 is requested in FY 2018 to procure equipment and utilities installation at the facility in Charlotte, NC (CLT) that is currently nearing the end of construction. Equipment planned for purchase and installation includes: airport surveillance connectivity, voice switches, FAA Telecommunications Infrastructure (FTI), and utilities.

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 33 years, and the average age of a TRACON is 26 years. There are facilities that are 65 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 efficient method for the FAA to meet operational needs and conform to current building codes and design standards.

What Does This Funding Level Support?

$31,118,485 is required to ensure continued progress on construction, real estate acquisition/site prep, and disposition activities. The required funding will continue the efforts to replace aging terminal facilities and 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 and 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 current codes

These benefits are instrumental in providing efficiency and effectiveness, which in turn will produce cost savings for taxpayers.

Detailed Justification for - 2B06 ATCT/Terminal Radar Approach Control (TRACON) Facilities - Improve

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

FY 2018 – ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve ($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve	$58,990	$50,720	$56,800	+$6,080

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. Condition Assessments, Configuration Mgmt. Risk Mgmt.	---	$42,790.0
b. Facility Planning and Program Support	---	1,510.0
c. In-Service Engineering	---	2,500.0
Total	Various	$46,800.0
B. Facility Realignment Implementation	---	$10,000.0

For FY 2018, $56,800,000 is requested for the following:

A. ATCT/TRACON Modernization

$46,800,000 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.

B. Facility Realignment Implementation

$10,000,000 is requested for conducting transition planning, initiating and completing facility modifications, installing necessary equipment, supporting realignment-related training, and preparing workforce, facilities, and equipment for the transition. Facility realignments are expected to deliver cost savings, cost avoidance, and staffing and operational efficiencies upon implementation and may continue to accrue overtime.

Facility realignments include the Permanent Change of Stations (PCS) costs. PCS costs are associated with employee relocations due to realignment of services and operations from one facility to another. This program will provide the required PCS funding to implement realignment scenarios and accommodate the relocation expenses of personnel. The number of scenarios and facilities slated for realignment and employees eligible for PCS moves depend on the outcomes of the congressionally-mandated Section 804 process.

Airport Traffic Control Tower (ATCT)/TRACON Facilities–Improve is one of the programs included in FAA's Air Traffic Control (ATC) Facilities Sustainment Strategic Plan.

What Is This Program And Why Is It Necessary?

A. ATCT/TRACON Modernization

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 and addressing accessibility, structural, mechanical 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 sytems and components (e.g., siding, roof, windows, fascias, eaves, gutters, downspouts, soffits, and curtain walls)
- Mechanical–replace/repair HVAC and mechanical systems and components (e.g., air handling units, condensing units, compressors, motors, fans, controls, pumps, boilers, chillers, and rooftop units)
- Electrical– replace/repair electrical systems and components (e.g., conductors, conduit, fixtures, wiring devices and panels)
- Elevators–replace/major refurbishment of elevators
- Plumbing–replace/repair of facility plumbing system and components
- Specialties in Operations Areas–major replace/repair of tower cab or TRACON consoles, renovation of interior finishes and 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, steps and railings)
- Interior Finishes–replace/repair of interior finishes in administrative areas (e.g., doors, carpets, floor and ceiling tiles, stairs, handrails, catwalks, and reconfiguration of administrative areas)
- Life Safety-replace/repair fire detection and suppression systems

B. Facility Realignment Implementation

The $10,000,000 requested will fund the implementation of realignment recommendations submitted by the FAA Administrator to Congress, per Section 804 of the FAA Reauthorization Bill, Public Law 112-95 – Feb 14, 2012. Following a 30 in-person day congressional review window, the FAA Administrator shall implement facility realignments, unless they are disapproved by Congress.

What Does This Funding Level Support?

$56,800,000 is required to initiate modifications, improvements, repair ATCT/TRACON facilities, and for facility realignment. The required funding level will assist in the reduction of the current FAA maintenance backlog 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 that repairs will be made to critical infrastructure that facilitates the movement of air traffic. These repairs will increase the overall Facility Condition Index of Terminal Facilities, and reduce the risk of air traffic control outages by providing safe, secure, resilient and efficient buildings that meet modern codes.

Detailed Justification for - 2B07 Terminal Voice Switch Replacement (TVSR)

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

FY 2018 – Terminal Voice Switch Replacement (TVSR)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Terminal Voice Switch Replacement (TVSR)	$6,000	$6,000	$6,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Interim Voice Switch Replacement (IVSR) Procurement/Installation	5	$2,049.7
b. Legacy Terminal Voice Switch Sustainment Project/System Engineering	---	671.2
c. Prime Contractor IVSR Program Management and Tech Support	---	501.5
d. Prime Contractor Legacy Terminal Voice Switches Program Management	---	454.6
e. Prime Contractor Voice Switch By-Pass (VSBP) Program Management	---	65.8
f. Contractor Support Engineering, Program Management, Logistics	---	2,077.2
g. Site Preparation	---	180.0
Total	Various	$6,000.0

For FY 2018, $6,000,000 is requested to procure, test, deliver and install up to five terminal voice switch systems and refurbish and/or cannibalize associated legacy systems for spare parts to mitigate supportability risk of terminal legacy voice switches.

Current available funding is being used to procure and deliver five IVSR systems to replace various terminal locations as well as recover available legacy terminal voice switches.

What Is This Program And Why Is It Necessary?

The ongoing Terminal Voice Switch Replacement (TVSR) program involves replacing the aging, obsolete voice switches in Air Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) facilities. Terminal voice switches provide voice communication services to Air Traffic Controllers in the airport towers and TRACONs. This allows the terminal air traffic controllers to communicate with other Air Traffic Controllers, pilots and with other locations as required.

The TVSR program ensures that controllers continue to have reliable voice communications in the terminal environment. The program consisted 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), Interim Voice Switch Replacement (IVSR), and the Conference Control System (CCS-W) in the Air Traffic Control Command Center in Warrenton, VA. Of these contracts, IVSR is the only voice switch currently in production and is the only contract vehicle available to the FAA to procure voice switch equipment for new or modernized terminal facilities. Replaced voice switches are recovered for refurbishment or cannibalized for spare parts to restock the logistics depot to support sustainment efforts.

What Does This Funding Level Support?

$6,000,000 is required to continue the replacement of aging and obsolete voice switches in the terminal environment. It will cover the procurement, testing, delivery and installation of up to five terminal voice switches. In addition, as the legacy terminal voice switches are replaced, they are recovered, refurbished and/or cannibalized for spare parts to help mitigate the supportability risk of Terminal legacy voice switches.

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

TVSR provides voice switches to terminal facilities throughout the National Airspace System (NAS) with three main benefits to the American Public:

- **Safety**: The TVSR 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
- **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:** The TVSR program 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 - 2B08 NAS Facilities Occupational Safety and Health Administration (OSHA) and Environmental Standards Compliance

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

FY 2018 – NAS Facilities Occupational Safety and Health Administration (OSHA) and Environmental Standards Compliance
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
NAS Facilities OSHA and Environmental Standards Compliance	$39,600	$42,700	$46,700	+$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Program Management		$4,252.45
b. Arc Flash Assessment	140	9,777.50
c. Fire and Life Safety	48	8,721.70
d. Fall Protection Systems	70	8,598.35
e. Subject Matter Expert (SME) Contract Support Initiative	---	10,000.00
f. Comprehensive Evaluations of Environmental Compliance	15	2,450.00
g. EOSH Training	---	1,000.00
h. Job Hazard Analysis	---	1,000.00
i. Requirements and Compliance Assurance	---	900.0
Total	Various	$46,700.00

For FY 2018, $46,700,000 is requested to conduct risk management initiatives that safeguard FAA personnel from occupational hazards and minimize the impact of Air Traffic Organization (ATO) activities on the environment. The EOSH program efforts ensure that employee health and safety and environmental protection initiatives are founded upon and promote compliance with regulations, internal and external standards, and collective bargaining unit agreements.

What Is This Program And Why Is It Necessary?

The ATO National Airspace System (NAS) Facilities OSHA and Environmental Standards Compliance (EOSH) Program provides occupational safety and environmental risk management technical expertise to support compliance with applicable safety and environmental protection standards and mitigate identifiable hazards in the ATO workplace.

ATO acquisitions, installations, modifications, and operations must comply with a wide variety of safety and environmental protection standards governing areas ranging from fire and life safety for our facilities through the storage and disposition of hazardous wastes and materials.

EOSH provides safety and environmental protection risk management support management expertise through the lifecycle of ATO operations. EOSH professionals consult in the planning phases of retrofitted and new construction efforts to mitigate risks and even completely engineer out hazardsat the earliest possible point. EOSH professionals devise, develop, and publish orders, policies, procedures, and practices that promote cultural risk management. EOSH professionals conduct job hazard analyses and facility inspections to identify actual and potential risks. Risk mitigation plans are developed and enacted. Risk mitigation methodologies range from educational opportunities focused on safety and environmental risks and how to apply risk awareness and mitigation techniques through modification of existing ATO assets.

The EOSH program performs data analysis to identify, track, and mitigate emerging or recurrent risk concerns. EOSH program risk management efforts:

- Protect employees and the environment
- Prevent damage and loss of FAA resources
- Promote a culture of safety and environmental responsibility

What Does This Funding Level Support?

$46,700,000 is required to provide technical compliance expertise designed to address Federal, State, and local environmental and safety regulations and binding commitments.

Non-compliance with Federal, State, and local environmental, safety, health, legal, and other requirements imposes significant liabilities on the FAA in the form of personnel injury or loss, interruptions to NAS operations, violations of bargaining unit agreements, post-incident response actions (such as costly cleanups), and a decrease in employee morale. Failing to effectively manage safety and environmental risks also incurs short- and long-term financial impacts for the agency. Employee injuries directly impact not only the injured worker (lost time and productivity) but also require the cost and time commitments associated with first- and second-level responders, generate unplanned workload for post-incident investigatory and administrative personnel, and create personnel backfill requirements to achieve the continuing mission.

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

The goal 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, reduced employee injuries and associated costs, a strong agency compliance posture, and reduced impacts to FAA operations.

Detailed Justification for – 2B09 Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)

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

FY 2018 – Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP) ($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$10,000*	$20,900*	$11,400	-$9,500

*indicates a comparability adjustment to prior budget structure as ASR-9 and Mode-S work have been redistributed across BLIs 2B09 and 2B15 to group projects according to the primary and secondary surveillance systems.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Terminal Radar (ASR) ASR-9 Service Life Extension Phase 2	---	$1,200.0
b. ASR-9 Service Life Extension Phase 3	---	9,300.0
c. In Service Engineering	---	900.0
Total	Various	$11,400.0

For FY 2018, $11,400,000 is requested to continue the ASR-9 Service Life Extension Program (SLEP). For SLEP Phase 2, $1,200,000 will fund the completion of 35 installations of Digital Remote Surveillance Communication Interface Processor (SCIP) Replacement (DRSR) units. For SLEP Phase 3, $9,300,000 will procure Data Communication Equipment (DCE), first article and production Clutter Memory Map (CMM) Circuit Card Assemblies (CCAs), first article Radio Frequency (RF) Driver units, and prototype of Modulator Pulse Assembly (MPA) Monitoring and Control.

Also requested for FY 2018 is $900,000 for In-Service Engineering activities to allow for immediate response to emerging technology solutions.

ASR-9 SLEP Phase 2 Final Investment Decision (FID) was June 27, 2012 and is scheduled for completion in September 2019. ASR-9 SLEP Phase 3 anticipates a FID in December 2017.

What Is This Program And Why Is It Necessary?

The ASR-9 SLEP Phase 2 and 3 programs will implement modifications to the ASR-9 system to sustain primary radar surveillance in terminal airspace. Without the needed modifications, the ASR-9 system will experience decreasing reliability, lowering availability and increasing supportability risks due to the limited commercial availability of some critical components. The ASR-9 was procured in the mid-1980s, fielded between 1989 and 1994, and is intended to remain operational through the 2035 time period, bridging critical capabilities until a replacement system is deployed. The ASR-9 uses hardware and software architectures that are becoming obsolete. The SLEP will procure DRSR systems, Transmitter Backplanes, Radar Data Access Point (RDAP) and replenishment of depot inventory of critical components. SLEP Phase 3 is planning to replace the following Line Replaceable Units (LRUs): Racal Milgo Omnimode 96 Modem (DCE); CMM; RF Driver; MPA; Analog to Digital (A/D) Converter; Receiver Protector; Maintenance Display Units (MDU); RF Coaxial Hardlines; and Remote Monitoring System (RMS) Samgom and LRUs identified by

Diminishing Manufacturing Sources and Material Shortages (DMSMS) study, planned for completion November 2017.

The ASR-9 provides aircraft position and weather information to air traffic controllers. An accurate depiction of this information is a key element in reducing delays and improving safety at high activity airports. The ASR-9 tracks all aircraft within its range and provides those tracks, as well as, six-level weather intensity information to terminal automation systems so it can be displayed on the controller's screen. The ASR-9 also provides data to the Airport Movement Area Safety System (AMASS) and to the Airport Surface Detection Equipment model X (ASDE-X) to aid in the prevention of accidents resulting from runway incursions. The sustainment of the ASR-9 aligns with the NAS Enterprise Architecture Surveillance Roadmap, and the Surveillance and Broadcast Services (SBS) Automatic Dependent Surveillance Broadcast (ADS-B) backup strategy.

The SLEP Phase 2 FID was approved on June 27, 2012 to address obsolescence and supply/support issues of system LRUs and components within the ASR-9 system.

The ASR-9 SLEP Phase 2 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) 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.

ASR-9 SLEP Phase 3 anticipates a FID in December 2017.

The ASR-9 SLEP Phase 3 will mitigate issues of obsolescence, reliability and maintainability, and lifecycle costs for:

- ASR-9 Communications Infrastructure: Replace the legacy Racal Milgo Omnimode 96 Modems and the Analog to Digital (A/D) Converter
- ASR-9 Control and Monitoring Infrastructure: Replace the legacy Modulator Pulse Assembly (MPA) Monitoring and Control CCA, Maintenance Display Unit (MDU), Remote Monitoring System (RMS) Sangoma Board.
- ASR-9 Depot Replenishment: Replenish the FAA Logistics Center inventory spares of Clutter Memory Map (CMM) Circuit Card Assembly (CCA), Receiver Protector, Radio Frequency (RF) Driver, RF Coaxial Hardline Cables and Connectors

What Does This Funding Level Support?

The ASR-9 was procured in the mid-1980s and fielded between 1989 and 1994. The system is expected to remain operational until 2035, but 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 99.9 percent operational level.

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

ASR-9 outages are a significant contributor to aircraft arrival and departure delays at major airports throughout the United States. The ASR-9 service life extension will increase equipment and service availability and reduce delays that cost airlines and the flying public money and time.

ASR-9 SLEP Phase 2 and 3, 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 of ASR-9 SLEP is in the solution implementation phase. Phase 3 is in the investment analysis phase.

Detailed Justification for – 2B10 Terminal Digital Radar (ASR-11) Technology Refresh

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

FY 2018 – Terminal Digital Radar (ASR-11) Technology Refresh
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Terminal Digital Radar (ASR-11) Technology Refresh	$9,900	$6,100	$3,200	-$2,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
ASR-11 Technology Refresh, Segment		
a. Program Management	---	$293.0
b. System Engineering	---	1,453.0
c. Implementation	29	1,454.0
Total	Various	$3,200.0

For FY 2018, $3,200,000 is requested to continue the ASR-11 technology refresh, Segment 2 implementation of the Site Control Data Interface/Operator Maintenance Terminal (SCDI/OMT) replacement and to provide Program Management, System Engineering, and Second Level Engineering support. Funding will support SCDI/OMT installations at 29 additional sites to complete a total of 30 kit installations by September 2018.

The Segment 2 Final Investment Decision (FID) was received in December 2013. Activities prior to FY 2018 have included procurement of Uninterruptable Power Supply (UPS) Capacitor kits at 50 sites by September 2016 and completion of Employee Occupational Safety and Health (EOSH) implementation at 74 sites by March 2017.

What Is This Program And Why Is It Necessary?

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 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.

The ASR-11 Technology Refresh, Segment 2 addresses shortfalls created by SCDI/OMT, UPS capacitor replacement, and EOSH safety issues, and it will ensure continued reliable and cost effective operation of the radar system through its designated lifecycle.

What Does This Funding Level Support?

$3,200,000 is required for ASR-11 Technology Refresh, Segment 2 to continue implementation in support of SCDI/OMT replacement, and it will provide funds for Program Management, System Engineering, and Second Level Engineering. At the requested funding level, the ASR-11 Technology Refresh Segment 2 in FY 2018 will fulfill its primary mission of providing terminal radar service to the National Airspace System and reduce SCDI obsolescence issues related to future service reductions and/or outages.

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

The ASR-11 Technology Refresh program ensures the continued safe and cost effective operation of terminal radar service for the flying public by addressing the most urgent obsolescence issues.

Detailed Justification for – 2B11 Runway Status Lights (RWSL)

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

FY 2018 – Runway Status Lights (RWSL)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Runway Status Lights (RWSL)	$24,170	$10,500	$2,800	-$7,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. RWSL Implementation Phase		
a. Program Management	---	$695.0
b. Implementation	2	350.0
c. Hardware Procurement	---	155.0
d. System Engineering	---	428.0
e. Logistics and Documentation	---	887.0
f. Second Level Engineering	---	285.0
Total	2	$2,800.0

For FY 2018, $2,800,000 is requested for RWSL Implementation Phase 1 activities that include: delivering, installing and achieving Initial Operational Capability (IOC) at two airports in FY 2018 and one airport in FY 2019 contingent on a work-share Memoranda of Agreement (MOA) being executed by May 16, 2017. The remaining funds will be used for implementation activities, systems engineering, depot logistics and documentation, spare parts, second level engineering support, initial utility service, information system security requirements, documentation for technology refresh and contractor support.

What Is This Program And Why Is It Necessary?

RWSL integrates 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 layer of redundancy in runway safety and is a backup and reinforcement of controller guidance. A summary of accomplishments are provided below:

- Fourteen production sites are commissioned: Orlando (August 2013), Phoenix (March 2014), Houston (April 2014), Washington-Dulles (July 2013), Seattle (August 2014), Las Vegas (October 2014) Charlotte (March 2015), Ft. Lauderdale (May 2015), New York-LaGuardia (July 2015), Minneapolis (August 2015), Los Angeles (October 2015) Newark (April 2016), and Detroit (April 2016), New York-Kennedy (June 2016)
- Three sites are IOC: Chicago (April 2016), San Francisco (November 2016) and Baltimore-Washington (March 2017)
- Two sites are under construction: Dallas/Ft. Worth and Boston Logan

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 little time for corrective action. The National Transportation Safety Board issued a safety recommendation to the FAA requiring at all airports with scheduled passenger service, a ground movement area safety system that will prevent incursions; the system should provide a direct warning capability to flight crews. RWSL addresses 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.

What Does This Funding Level Support?

$2,800,000 is required to maintain the baseline schedule and achieve the safety improvement benefits upon which the investment is based.

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

RWSL provides 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 does not replace air traffic control issued clearances.

To address budget constraints and unexpected costs to implement the program, in July 2013, 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. In August 2016, the JRC approved replacing the prototype systems at Dallas/Ft. Worth and Boston Logan with baseline production systems contingent on the FAA executing cost/work share MOAs with the respective Airport Authorities. In February 2017, the JRC approved replacing the prototype system at San Diego with a baseline production systems contingent on the FAA executing cost/work share MOA with the SAN Airport Authority. The agency continues to work with individual airports to provide solutions that address airport-specific challenges and improve safety and efficiency.

Detailed Justification for - 2B12 National Airspace System Voice System (NVS)

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

FY 2018 – National Airspace System Voice System (NVS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
National Airspace System Voice System (NVS)	$53,550	$48,400	$68,750	+$20,350

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Hardware: Tech Ops Training System	2	$1,597.2
b. Hardware: Dynamic Simulator and Cutover Switch	1	3,306.9
c. Hardware: Remote Radio Nodes	---	770.2
d. Hardware: NVS Enterprise Management System	2	1,740.3
e. Hardware: Depot Spares	---	1,090.2
f. Hardware: Key Site Systems	---	5,400.0
g. Vendor Installation	---	743.5
h. Vendor Program Management	---	1,517.5
i. Vendor Testing	---	2,883.4
j. Enterprise Voice Network Engineering	---	2,169.2
k. Installation: Key Site Preparation	---	1,881.2
l. Program Office Contract Support	---	13,000.0
m. Human Factors	---	737.9
n. Logistics Support – Training, Manuals, and Maintenance	---	7,230.9
o. Systems Engineering and Development	---	20,690.0
p. Second Level Engineering	---	1,003.5
q. Security	---	501.5
r. Telecommunications	---	2,136.6
s. Independent Operational Assessment (IOA) formerly IOT&E	---	350.0
Total	Various	$68,750.0

For FY 2018, $68,750,000 is requested to procure hardware and associated spares for Key Sites, the NVS Technical Operations training systems, Enterprise Management Systems and other implementation hardware. In addition, systems engineering, system development, testing and installation activities will be performed as factory and key site operational testing continue in FY 2018. The FY 2018 request also includes $350,000 to continue Independent Operational Assessment (IOA), formerly known as Independent Operational Test and Evaluation (IOT&E), activities in support of NVS.

Ongoing activities include systems engineering and software development in order to complete our next major milestone, Physical Configuration Audit/Functional Configuration Audits of the test article systems in FY 2018. NVS received a Final Investment Decision (FID) from the Joint Resources Council (JRC) in September 2014 for NAS Qualification of the NVS system. A second FID will be requested from the JRC in FY 2019 to determine cost, schedule, and quantities for the production and system deployment.

What Is This Program And Why Is It Necessary?

NVS is the next generation voice communication equipment that allows Air Traffic Controllers to continue to talk to pilots, other controllers, ground personnel and other facilities. The NVS Program will replace a limited quantity of legacy voice switches in both En Route and Terminal facilities in the NAS. NVS will replace decades old voice switch equipment with a secure, digital Voice over Intranet Protocol technology. NVS will also be capable of supporting the expected future NextGen concept of operations for networked facilities and provide features such as off-loading during non-peak operations.

The current switch technology continues to age and faces parts obsolescence and diminishing manufacturing sources. It also will not support the expected future NextGen concept of operations for networked facilities or off-loading during non-peak operations. These capabilities require that lines connected to a controller's workstation can be changed to add or eliminate lines as the geographical boundaries of the sector change. The legacy voice switches also do not have the capability to provide communication to Unmanned Aircraft Systems (UAS) operators, who are often at distant locations from the aircraft. NVS will support current and future ATC operations as envisioned by both government and industry forecasters.

This program maps to the FAA strategic priority of Delivering Benefits through Technology and Infrastructure, with a metric of maintaining an average daily airport capacity for Core airports of 58,006, or higher, arrivals and departures. NVS supports this FAA priority by:

- Increased Operational Efficiency and Return on Capital: NVS is replacing custom/expensive legacy systems with scalable, enterprise-managed platform that reduces acquisition costs
- Improved Flexibility: NVS is supporting reconfiguration of controller positions and facility alignment. NVS will enable seamless and efficient airspace control allowing safe balance and manage of traffic loads
- Improved Access: NVS will enable more capacity via efficient use of resources and services

What Does This Funding Level Support?

$68,750,000 is required to procure hardware for two technician training systems, two enterprise management systems, and other implementation hardware including a dynamic simulator, transition/cutover switches, and remote radio nodes. Funding is also requested for continued systems engineering, development, logistics, testing, and installation.

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

NVS is the next generation voice communication equipment that will allow Air Traffic Controllers to continue to talk to pilots, other controllers, ground personnel and other facilities. NVS will bring a new era of flexibility and resiliency to the nation's air traffic control facilities. NVS will replace decades-old analog systems with secure, digital Voice over Intranet Protocol technology. Current voice switch equipment only enables controllers to speak to others within the range of their nearby radio site. By contrast, NVS works over a secure FAA digital network and is not limited by geography.

Detailed Justification for - 2B13 Integrated Display System (IDS)

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

FY 2018 – Integrated Display System (IDS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Integrated Display System (IDS)	$23,300	$7,700	$5,000	-$2,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Enterprise Information Display System (E-IDS) Program	---	$5,000.0

For FY 2018, $5,000,000 is requested to complete the Initial Investment Analysis resulting in an Initial Investment Decision (IID), as well as start Final Investment Analysis activities.

What Is This Program And Why Is It Necessary?

E-IDS will replace multiple programs responsible for sustaining seven different legacy IDS systems operating in Air Traffic Control (ATC) facilities. Deployment will extend beyond the Terminal domain, consisting of the Terminal Radar Approach Control (TRACONs) and the Airport Traffic Control Towers (ATCTs). It will also include the En Route domain, consisting of Air Route Traffic Control Centers (ARTCCs), the Combined Center/Radar Approach Control (CERAPs) domain and the Alaska Automated Flight Service Station (AFSSs). Finally, E-IDS will also provide an IDS system for the oceanic domain.

This enterprise system will collect data reliability through System Wide Information Management (SWIM) and distribute the information for display to client users in all domains. By utilizing authorized information sources in conjunction with an enterprise infrastructure that shares the information, users will be assured a common system operation (Ops) picture between them even if they are located in different domains. E-IDS will reduce manual entry, facilitate inter-facility coordination, and integrate information.

E-IDS will support contingency operations when a catastrophic event occurs by migrating and restoring position functionality to a different facility for the restoration of operations upon the divesture of resources. The basis for this resiliency capability is the creation of an enterprise database that stores the functions, data requirements, and presentation design that are unique to each specific position in the enterprise.

In general, the IDS systems (particularly the IDS-4s) are facing part shortages and technology obsolescence that puts operational use at risk. The lack of repair parts has also put system sustainment at risk. The cost of maintenance support also increases as the equipment ages. Essential hardware components needed to support these systems and software (particularly the DOS-based software from IDS-4) are not available from industry and the proprietary software is no longer supported by the vendor.

What Does This Funding Level Support?

The legacy IDS systems are bounded by their respective domains. E-IDS is needed because aged legacy IDS infrastructures cannot be efficiently enhanced to enable NextGen capabilities and continued sustainment is cost-prohibitive. E-IDS is the most cost-effective investment for replacing legacy systems and providing enhanced capabilities. The new functionality planned to be implemented into E-IDS, particularly SWIM-based products, will not be possible without a major replacement and integration of new capabilities into all existing information display systems.

Fewer IDS-4s are being replaced than originally planned due to the recent IDS-R Baseline Management Notice (BMN), which results in an increased risk of system failure for the remaining legacy IDS-4 systems. The E-IDS program addresses this concern by establishing enterprise operations throughout the NAS, for terminal and all ATC domains.

Implementation of E-IDS will promote reliable, effective, and efficient operations.

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

E-IDS will:

- Enable interoperability among systems by establishing a service-oriented architecture (SWIM), along with defining standards for data exchange (AIXM, WXXM, FIXM)
- Increase the efficiency of data sharing throughout the NAS by consuming data from common sources, thus ensuring uniformity of data among facilities
- Address common Human Factors across Air Traffic environments and users, as well as reduce training costs
- Reduce the cost of maintaining disparate systems by requiring identical skill sets for hardware and software maintenance across Air Traffic environments

Detailed Justification for - 2B14 Remote Monitoring and Logging System (RMLS)

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

FY 2018 – Remote Monitoring and Logging System (RMLS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Remote Monitoring and Logging System (RMLS)	$4,700	$9,900	$7,400	-$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Remote Monitoring and Logging System (RMLS) Technology Refresh	3	$4,400.0
B. Automated Maintenance Management System (AMMS) Segment 1	1	3,000.0
Total	4	$7,400.0

A. RMLS TR:

For FY 2018, $4,400,000 is requested to install, assemble, test and checkout Remote Monitoring and Logging System (RMLS) National Logging Network (RMLS NLN) and security equipment at three Federal Aviation Administration (FAA)'s Operations Control Centers (OCCs): Pacific Operations Control Center, Atlantic Operations Control Center, and Mid-States Operations Control Center. In addition, RMLS NLN equipment will be installed at the National Operations Control Center for the Data Repository for the primary management infrastructure.

B. AMMS:

For FY 2018, $3,000,000 is requested to address System Engineering/Project Management activities, refine requirements definition, support the continued development of a data exchange standard, perform product evaluations of commercially available products, and initiate a proof of concept environment for program risk reduction.

What Is This Program And Why Is It Necessary?

A. RMLS TR:

RMLS Technology Refresh will replace aging legacy RMLS core hardware components to accommodate National Airspace System (NAS) growth and ensure that the legacy Remote Maintenance and Monitoring (RMM) infrastructure supports the agency's storage, bandwidth, and security needs. This program is necessary because it will provide the means for Technical Operations to meet the FAA's Strategic Priority initiative of maintaining an operational reliability rating of 99.7 percent. This program is necessary because the hardware upgrade will allow the RMLS infrastructure to comply with the FAA's mandated security requirements.

B. AMMS:

AMMS will deliver benefits through technology and infrastructure by interfacing dispersed maintenance system within the currently existing System Wide Information Management (SWIM) Service Oriented

Architecture environment. System interfaces will be standardized, and governance will be applied to data exchanges. Data will be cleansed, and authoritative data sources will be documented. Data exchange services will be utilized to provide common services for maintenance systems, and enhanced, modernized maintenance tools will be implemented, as to promote more efficient maintenance practices. In summary, AMMS will:

- Implement interoperability for legacy and NextGen maintenance systems, services and equipment
- Introduce data standardization (harmonization) for maintenance data, as to improve data integrity
- Provide enhanced, modernized maintenance tools for the FAA maintenance workforce

AMMS is necessary because it allows for the standardization (harmonization) of data exchanges between the disparate and dispersed maintenance systems, as well as increasing situational awareness of maintenance data. The implementation of enhanced, modernized maintenance tools is necessary in order to exploit the additional data that will be available. Additionally, this will promote more efficient maintenance practices. These stated objectives will:

- Increase situational awareness of maintenance data
- Promote more efficient maintenance practices
- Reduce maintenance outages within the NAS, and contribute to the safety of the flying public

What Does This Funding Level Support?

A. RMLS TR:

$3,055,000 is required to perform hardware integration, assembly, test, and checkout of the National Logging Network (NLN) at the Operations Control Centers
$45,000 is required for site preparation materials to implement hardware at the Operations Control Centers
$80,000 is required for technical documentation for the solution implementation at the Operations Control Centers
$1,220,000 is required for program office program management support of the RMLS Tech Refresh solution implementation

B. AMMS:

$1,100,000 is required to perform requirements engineering and acquisition process activities to achieve initial program milestones.
$800,000 is required to perform the continued development of a maintenance data standard, and identify requirements for common data services. Data standards will be platform-independent, and it will increase data quality and availability between stakeholders.
$1,100,000 is required to perform evaluations of commercially available tools, and initiate a prototype environment for demonstration of technical risk reduction for the follow:

- Integration of SWIM services
- The exchange of data using a maintenance data standard

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

A. RMLS TR:

Benefits to be derived from this program include:
- Promotes increased safety to flying public by ensuring that the RMLS meets mandated security requirements
- Promotes cost benefit(s) in air travel through reduction in NAS outages due to continued maintenance related activities

B. AMMS:

Benefits to be derived from this program include:

- Cost savings and reduction in flight delays for the American Public and airline industry through:
  - Streamlined maintenance practices
  - Increased availability of equipment and services
  - Enhanced flight check scheduling for the restoration of NAS equipment and services
- Increased safety for the American Public and airline industry through:
  - Proper certification of NAS equipment and services
  - More timely issuance/cancellation of NOTAMs

Detailed Justification for – 2B15 Mode S Service Life Extension Program (SLEP) - Phase 2

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

FY 2018 – Mode S Service Life Extension Program (SLEP) - Phase 2
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Mode S Service Life Extension Program (SLEP) - Phase 2	$10,100*	$21,500*	$20,900	-$600

*indicates a comparability adjustment to prior budget structure as ASR-9 and Mode-S work have been redistributed across BLIs 2B09 and 2B15 to group projects according to the primary and secondary surveillance systems.

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	---	$757.8
b. Logistic Support	---	14.0
c. HGOPA Procurement and/or Refurbishment	---	3,228.2
Total	Various	$4,000.0
B. Mode S Service Life Extension Program Phase 3		
a. Program Management	---	$4,513.2
b. First Article Systems Procurement	---	10,503.0
c. Testing	---	350.0
d. Second Level Engineering	---	233.8
e. In Service Engineering	---	1,300.0
Total	Various	$16,900.0

For FY 2018, $20,900,000 is requested to continue Mode S SLEP Phase 2 and Mode S SLEP Phase 3 activities. The Mode S SLEP Phase 2 Final Investment Decision (FID) was approved on June 27, 2012. Mode S SLEP Phase 3 FID is planned for May 2018.

A. Mode S SLEP Phase 2

For FY 2018, $4,000,000 is requested to continue the procurement of antenna dipoles and matrix boards and refurbishment of High Gain Open Planar Arrays (HGOPA) for Depot Replenishment and associated program management and logistics support.

B. Mode S SLEP Phase 3

For FY 2018, $15,600,000 is requested for continued First Article procurement, design reviews, development of software interfaces and hardware procurement, testing, implementation at Keysites and associated program management, training, and logistics support.

For FY 2018, $1,300,000 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?

The Mode S system provides secondary aircraft surveillance in terminal and En Route airspace. Mode S uses selective beacon detection technology to provide target data as digital formatted messages and analog video tailored for automation and display systems. The Mode S is co-located with Airport Surveillance Radar Model 9 (ASR-9) and ASR-8, and Common Air Route Surveillance Radar (CARSR). The Mode S system and the co-located primary radars are capable of providing correlated radar and beacon reports to NAS En Route and Terminal automation systems at Terminal Radar Approach Control (TRACON), Air Route Traffic Control Center (ARTCC) facilities, the U.S. Department of Defense (DoD), and other users.

Terminal Mode S systems support aircraft separation standards, reduce delays, and improve safety at congested airports. Currently, there are 148 operational Mode S radar systems in the National Airspace System (NAS) which have been in operation since 1989. The Mode S System has exceeded the expected 20 year life cycle. As the systems continue to age, sustainment will become more difficult due to the challenges of obsolete parts and diminishing manufacturing sources and material shortages (DMSMS). These challenges have caused the operational availability of the Mode S systems to drop below the FAA Performance Metric 2 requirement of 99.7 percent. The sustainment of Mode S secondary radar systems are essential to sustaining the NAS as the Agency progresses to 2035 and begin deployment of Spectrum Efficient National Surveillance Radar (SENSR) in 2025

A. Mode S SLEP Phase 2

The Joint Resources Council (JRC) approved the FID for the Phase 2 program on June 27, 2012. This program will replace the Beacon Video Reconstitutor (BVR) with more modern components. Critical Line Replaceable Units (LRUs) that process radar data will be assessed for sustainability in support of the Mode S SLEP Phase 3. To address obsolescence and supply/support issues, the following will be purchased for depot replenishment: 1) HGOPA (or refurbishment of existing antennas); 2) Local, Remote and Radar Intelligent Tool (RIT) Maintenance Terminals; 3) Keyboard Cathode Ray Tube (KCRT); and 4) Non-Volatile Memory (NVMEM) chips. The sustainment of the Mode S system aligns with the NAS Enterprise Architecture (EA) and the Surveillance and Broadcast Services (SBS) Automatic Dependent Surveillance Broadcast (ADS-B) back-up strategy.

B. Mode S Service Life Extension Program Phase 3

FAA Logistics Center Mode S Radar Products Division's conducted a DMSMS Study in April 5, 2014. The study identified 11 critical LRUs with major obsolescence issues, End of Service life, and Diminishing Manufacturing Sources.

The Mode S SLEP Phase 3 received FAA Joint Resource Council (JRC) Investment Analysis Readiness Decision approval on September 30, 2015. A Market Survey has determined that a competitive procurement to replace 120 LRUs is a cost effective alternative. This strategy was presented and approved by the JRC on December 14, 2016.

A FID is currently planned for the third quarter of FY 2018. The competitive procurement is anticipated to be awarded in the fourth quarter of FY 2018.

What Does This Funding Level Support?

The required funding will extend the service life of the Mode S system, maintain availability of service, and will reduce outages due to performance deterioration and parts obsolescence. The requested funding will decrease maintenance costs and increase reliability. The program will also ensure continued reduction of operational costs and a decrease of maintenance man-hours for the Mode S system.

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

The extended service life of the Mode S system 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.

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 Mode S Final Requirements.

Detailed Justification for - 2B16 Terminal Flight Data Manager (TFDM)

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

FY 2018 – Terminal Flight Data Manager (TFDM)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Terminal Flight Data Manager (TFDM)	$15,000*	$42,200*	$90,350	+$48,150

*indicates a comparability adjustment to prior budget structure since this project was moved from the Improved Surface Portfolio to a standalone BLI in the FY 2017 budget submission.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Terminal Flight Data Manager (TFDM)	---	$90,000.0
b. Independent Operational Assessment (IOA)	---	350.0
Total	Various	$90,350.0

For FY 2018, $90,000,000 is requested to fund the TFDM development contract for the following:

- Complete Build 1 Early User Involvement Events (EUIEs)
- Complete implementation of the TFDM Test Lab at WJHTC
- Complete Build 1 System Development and Integration
- Start Build 1 Development Testing (DT)
- Conduct Pre-Site Survey (PSS) for Build 1 Keysite
- Complete site survey for Build 1 Keysite
- Complete Build 1 Keysite Site Preparation and Design
- Start Build 1 Keysite Hardware/Software Installation
- Start Build 1 Keysite Site Optimization and Customization
- Complete Build 2 System Requirements Review (SRR)
- Complete Build 2 Preliminary Design Review (PDR)
- Complete Critical Design Review (CDR) for Build 2 Development and Integration
- Start TFDM detail design for Build 2 Development and Integration
- Conduct Pre-Site Survey (PSS) for Build 2 Keysite
- Complete final Site Implementation of Electronic Flight Strip Transfer System (EFSTS) Key Pack Technology Refresh
- Start incremental funding for the development of the modifications required for Flight Data Input Output (FDIO) System, Tower Data Link Service (TDLS), Remote Monitoring and Logging System (RMLS), and Traffic Flow Management System (TFMS) to support the TFDM implementation

TFDM provides an integrated data automation system that will improve tower controller's common situational awareness and automate many fundamental processes.

Also requested is $350,000 for IOA activities.

What Is This Program And Why Is It Necessary?

The TFDM program will deliver to tower Air Traffic Controllers (ATC) and FAA traffic managers NextGen decision support capabilities that integrate flight, surface surveillance, and traffic management information. TFDM will provide the equipment for the collection, distribution, and update of flight data information in the terminal area, and to improve access to information for the safe and efficient control of air traffic. The use of Electronic Flight Data and Strips (EFD/EFS) will allow tower controllers to maintain an integrated view of the air traffic environment, improving their situational awareness of airport operations. TFDM decision support capabilities will promote safe and efficient airport operations in managing airport surface traffic sequencing and scheduling. TFDM will automate manual flight data processes to enable enhanced data sharing between the Tower, En Route, Approach Control, Traffic Flow Management (TFM) and Flight/Airline Operations Centers (FOC/AOC).

A key component of the TFDM system is the transition from paper flight strips to electronic flight data representation and exchange. This will facilitate enhanced flight data exchange between controllers within the tower, those in other ATC facilities, and those overseeing Traffic Flow Management Systems. This will also facilitate data exchange with aviation partners such as the airlines' flight operations centers and airport operators to support Collaborative Decision Making (CDM). Providing flight data in electronic format eliminates the necessity of the physical exchange of flight data, reduces telephone call volume between facilities and reduces the manual re-entry of data among multiple ATC systems. Air traffic controllers will have more heads up time, looking out the window, to focus on the surface traffic, therefore, increasing safety.

Another key component of the TFDM system is the introduction of a surface scheduler/metering capability that will provide the basis for efficient management of traffic flows on the surface at U.S. airports by transitioning the performance of airport surface operations from a "first come, first served" model to a more strategic model that allocates taxi clearances to minimize taxi distance and time, thus reducing fuel burn and CO_2 emissions.

Final Investment Decision (FID) was approved in June 2016 and the prime contract was awarded in June 2016. The program's implementation plan is based on a two software build approach and deployment to 89 airports from FY 2020 to FY 2028.

What Does This Funding Level Support?

$90,000,000 is required to provide funding for TFDM development. The funding will support a key site Initial Operating Capability (IOC) in FY 2020 and will fund the Prime Contractor for the planned software development. The TFDM development contract will focus on continued system design, testing, and preparations for build 1 and 2 keysite IOCs.

TFDM will be integrated into the NAS and will have program interdependencies for data exchanges with numerous other systems. The costs associated with other system interfaces and modifications required to deliver TFDM capabilities is included in the TFDM cost baseline. Funding at the requested level is needed to support the interfaces required for TFDM. Interdependencies include the following:

- Airport Surface Detection Equipment, Model X (ASDE-X)
- Tower Data Link Service (TDLS)
- System Wide Information Manager (SWIM)
- Time Based Flow Management (TBFM)
- Traffic Flow Management System (TFMS)
- Standard Terminal Automation Replacement System (STARS)
- Flight Data Input Output (FDIO) System

Also required is $350,000 for IAO activities.

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

This program 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. The surface capabilities being implemented in this program are expected to improve both the efficiency of individual flights while optimizing runway throughput. This work will make travel safer for the traveling public, help reduce passenger delays leading to a better traveling experience, and contribute to less pollution.

Once implemented, TFDM will provide the American public with benefits, such as reduced surface delay, reduced taxi time and fuel burn resulting in lower CO2 emissions. TFDM will enhance airport capacity utilization during severe weather and other off-nominal conditions; improved usability and situational awareness; and enhanced safety.

Detailed Justification for - 2B17 NAS Voice Recorder Program (NVRP)

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

FY 2018 – NAS Voice Recorder Program (NVRP)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
NAS Voice Recorder Program (NVRP)	$3,000	$2,000	$5,000	+$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Systems and Spares Procurement and Installation	---	$361.0
b. Vendor Program Management and Systems Engineering	---	561.0
c. Program Office Contractor Support	---	3,428.0
d. Information System Security (ISS) Support	---	81.0
e. Testing and Evaluation	---	488.0
f. Second Level Engineering	---	81.0
Total	Various	$5,000.0

For FY 2018, $5,000,000 is requested for contract support for the source evaluation and contract award activities, the purchase of one test article system and the associated contract support for testing and second level engineering activities.

Current available funding is being used for program office contract support to assist with pre-award acquisition activities, including Final Investment Decision (FID) documents and source evaluation activities.

What Is This Program And Why Is It Necessary?

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) and provide enhanced digital voice recording functionality to meet new requirements that have evolved since the implementation of the NG VRRP. The replacement of aging voice recorders will reduce operational costs and address the increasing demand for more expeditious audio access and capabilities such as increased recording capacity, recording of Voice Over Intranet Protocol (VoIP) telephones, connection to FAA Telecommunications Infrastructure (FTI)'s enterprise Network Time Protocol (NTP).

In support of the FAA Strategic Priority to Make Aviation Safer and Smarter and as required in the NAS Systems Requirements Document (NAS-SR-1000), 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 across all domains. As the voice recorder technology and voice recorder requirements have evolved, earlier digital voice recorders are experiencing obsolescence and supportability issues. There are currently over 460 recorders in operation today which were deployed between 2007 and 2015; they begin to reach their end of service life starting in 2017.

What Does This Funding Level Support?

$5,000,000 is required for contract support for the source evaluation and contract award activities, purchase of one test article and associated testing and second level engineering support.

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 primary FAA benefit is cost avoidance in the reduction of technical refresh costs associated with current voice recorder models to support obsolescence and supportability concerns. Additionally, NVRP will incorporate new Safety and Audit Requirements which will provide the following user benefits:

- Provide Voice over Internet Protocol (VoIP) recorder functionality
- Centralized remote access, retrieval and dissemination through common, modern and flexible enterprise solution
- Increased channel capacity and increased user capacity
- Reduce workload-intensive download and manual transfer of audio data
- Provide near real-time accessibility of audio
- Provide for automated data-sharing required for Quality Assurance and Quality Control analyses
- Provide for the ability to synchronize audio with recorded radar video for analysis of potential safety issues, trends or hazards
- Provide audio data to the Operational Analysis Reporting System (OARS), under budget line item 1A01, as part of OARS effort to sustain and integrate current and new safety data sources to provide a safety information management framework at the NAS enterprise and domain service
- Provide enhanced security controls

Detailed Justification for - 2B18 Integrated Terminal Weather System (ITWS) – Sustainment

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

FY 2018 – Integrated Terminal Weather System (ITWS) – Sustainment
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Integrated Terminal Weather System (ITWS) – Sustainment	$5,400	$1,000	$1,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Hardware Sustainment	---	$900.0
b. Program Support	---	100.0
Total	Various	$1,000.0

For FY 2018, $1,000,000 is requested for software and hardware sustainment activities. Planned activities include; Test and Evaluation, hardware sustainment, software sustainment, implementation and program support. The ITWS sustainment will allow the FAA to continue 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 program sustainment will provide funding a lifetime buy of all necessary and available spare parts of the legacy hardware to sustain the current system until it is replaced by NWP. The ITWS program will also fund a contingency plan to mitigate any potential accelerated hardware failures. This effort consists of the adaptation of ITWS software to a new hardware platform, including key-site testing, but without deployment to the NAS. In the event that the legacy ITWS hardware cannot be sustained until NWP is commissioned, hardware for full replacement will need to be procured and deployed to all ITWS locations.

In accordance with the ITWS Supportability Study conducted by the FAA in 2010 the logistics support for the current ITWS sites has begun to diminish this year. System hardware spares, support tools and maintenance provisions for keeping the current ITWS sites operational is becoming unavailable, support costs are starting to escalate and system outages may increase in the future.

Interdependencies include NextGen Weather Processor (NWP) and Common Support Services – Weather (CSS-Wx). NWP and CSS-Wx are subsuming ITWS beginning in 2021. 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.

What Does This Funding Level Support?

$1,000,000 is required to support the ITWS sustainment. There are no other FAA weather programs that provide the type of airport-specific weather products that are generated by this program until NWP begins replacing it in 2021. Planned activities include: Test and Evaluation, hardware sustainment, software sustainment, implementation and program support. The ITWS sustainment will allow the FAA to continue 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 sustainment will extend the life of the commissioned ITWS systems, preventing system outages to ensure these benefits and savings continue to be realized

Detailed Justification for - 2B19 NextGen – Performance Based Navigation (PBN) and Metroplex Portfolio

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

FY 2018 – Performance Based Navigation (PBN) and Metroplex Portfolio

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Performance Based Navigation (PBN) and Metroplex Portfolio	$10,000*	$20,000*	$20,000	$0

*indicates a comparability adjustment to prior budget structure as PBN has been moved from an Activity 1 Portfolio to a standalone BLI in Activity 2. In addition, NextGen DME work that supports PBN procedures has also been grouped under this new BLI.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. NextGen Performance Based Navigation (PBN) Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)	5	$15,000.0
B. NextGen Distance Measuring Equipment (DME) for PBN Strategy	9	5,000.0
Total	Various	$20,000.0

The PBN portfolio conducts pre-implementation and implementation activities supporting PBN concepts and capabilities. PBN uses Area Navigation (RNAV) and Required Navigation Performance (RNP) to improve access and flexibility in the National Airspace System (NAS) with the goal of providing the most efficient aircraft routes possible from the departure runway and to the arrival runway while also enabling right-sizing of conventional procedures and navigation infrastructure. PBN defines the requirements for routes and procedures that enable aircraft to navigate with greater precision and accuracy. It provides a basis for designing and implementing new flight paths, redesigning airspace, and providing safe obstacle clearance. Progressive stages of PBN capabilities include the safe implementation of more closely spaced flight paths for departure, arrival and approach.

This NextGen DME program covers En Route and Terminal domains to provide support for performance based operations. It will provide resilient navigation signals in space to fill DME/DME RNAV coverage gaps. The NextGen DME program will allow continued utilization of RNAV operations by commercial operators, therefore maintaining NAS efficiency during GPS outages.

A. NextGen PBN – Metroplex RNAV/RNP

For FY 2018, $15,000,000 is requested to support work that includes the following:

- Complete the Evaluation Phase at two Metroplex project (e.g., Cleveland/Detroit and Denver)
- Complete Implementation Phase of one Metroplex project (e.g., Cleveland/Detroit)
- Complete Post-Implementation Review and Modification activities at two Metroplex projects (e.g., Charlotte and Southern California)
- Start the Evaluation Phase at one Metroplex project (e.g. Las Vegas)

NextGen DME Support for PBN Strategy

The NextGen DME program improves Area Navigation (RNAV) service coverage for En Route and Terminal airspace to support the implementation of the Performance Based Navigation (PBN) NAS Strategy – 2016.

For FY 2018, $5,000,000 is requested to provide the following:

- Procure 9 DMEs
- Perform site preparation for installation of DMEs
- Perform program management, system engineering, and logistics support

What Is This Program And Why Is It Necessary?

A. NextGen PBN – Metroplex RNAV/RNP

This program will develop procedures at Metroplexes to improve airspace efficiency. The Airspace Services Directorate integrates airspace design and associated activities, including traffic flow analysis, arrival and departure route design, and procedures optimization providing a framework for developing PBN initiatives. This program will continue optimizing airspace use and associated procedures development in Metroplexes by:

- Examining the use of additional transition access/egress points to/from terminal airspace not tied to ground-based navigation aids
- Developing and implementing optimized arrival and departure procedures
- Decouple conflicting operations to and from primary and secondary/satellite airports serviced by the same complex terminal airspace
- When necessary, developing PBN routes through congested airspace to create more efficient routes between major metropolitan areas

The Metroplex program executes this work via projects for Metropolitan areas that encompass a geographical volume of airspace that includes one or more of the core airports as well as surrounding regional airports. For example, the North Texas Metroplex includes Dallas/Fort-Worth (DFW) as well as Dallas Love Field (DAL), and other satellite airports, while the Florida Metroplex site includes Orlando (MCO), Miami (MIA), Tampa (TPA), Fort Lauderdale (FLL) and other regional airports.

In 2010, the NextGen Advisory Committee and the NextGen Management Board prioritized a list of 21 candidate Metropolitan areas, 12 of which have been approved as Metroplex projects that include 15 of the candidate Metropolitan areas. Three of these sites are NextGen Advisory Committee (NAC) NextGen Integration Work Group (NIWG) Implementation Commitments: Northern California (Las Vegas added when Northern California was completed), Atlanta, and Charlotte. Metroplex will continue assessment of its processes and opportunities going forward. Denver and Las Vegas were added as Metroplex projects while Boston, Memphis, and Chicago were postponed. Each Metroplex project follows a standard five phase process. The first phase is the Study phase, followed by the Design phase, the Evaluation phase, the Implementation phase, and concluding with the Post-Implementation phase. Community Involvement is being added to all phases of the process and impacts the originally planned timelines. All phases include industry representation. The details of the work accomplished during these phases are as follows:

- Study and Scoping: The Study Phase is conducted by study teams that identify issues and propose potential solutions through facility and industry interface meetings. Industry representation is achieved using lead operator representatives. The result of this phase is a set of conceptual designs, with a high-level assessment of benefits, costs, and risks.

- Design and Procedure Development: The Design Phase is where the detailed Integrated Airspace and Procedures design work is conducted. The work conducted in this phase uses the results of the study teams and is conducted by a Design and Implementation (D&I) team. Industry representation is achieved using lead operator representatives. When appropriate and justified, Human-in-the-Loop simulations and other design analyses are performed.

- Evaluation: The Evaluation Phase is the second stage conducted by the D&I team. It includes all necessary operational modeling, Safety Management System analyses, and environmental assessment. Industry representation is achieved using lead operator representatives. If analyses are conducted during the Design Phase, they may carry over into the Evaluation Phase.

- Implementation and Training: The Implementation Phase is the last part of the Optimization of Airspace and Procedures in the Metroplex (Metroplex) process conducted by the D&I team. This phase includes all steps required for implementation of the Metroplex project including flight inspections, publishing procedures, planning, training and executing. Industry representation is achieved using lead operator representatives.

- Post Implementation Review and Modifications: The Post-Implementation Phase includes a review of the implemented airspace and procedures changes to determine if they have delivered desired benefits and/or caused other impacts. Modifications or refinements may be made to better achieve the desired benefits or address unforeseen impacts.

B. NextGen DME Support for PBN Strategy

The PBN NAS Strategy – 2016 requires a resilient navigation service to maintain safety and security during Global Navigation Satellite System (GNSS) disruptions and minimize impacts to air traffic operations.

The objective of the NextGen DME program is to enable commercial aircraft to seamlessly continue PBN operations during GNSS disruptions. The NextGen DME program provides Area Navigation service to En Route and Terminal airspace to support the implementation of the PBN NAS Navigation Strategy – 2016. It will install additional DMEs to eliminate single points of failure (critical DMEs) and fill the coverage gaps to enable aircraft without Inertial Reference Units (IRUs) to continue PBN operations during GNSS disruptions.

What Does This Funding Level Support?

Metroplex program funding will allow for expedited design, publication, and implementation of PBN procedures. The NextGen Metroplex projects were jointly prioritized by the FAA and Industry. This program has been identified by Congress and the Government Accounting Office (GAO) as essential for the modernization of the NAS. The Metroplex program will deliver benefits to the users through improvement to the safety and efficiency of NAS operations, and to the community in general through environmental improvements and reduced carbon emissions through the implementation of PBN procedures in selected Metroplex locations and associated airspace optimization.

The NextGen DME program requires funding to procure DME systems, perform site preparation, installation, perform program management, conduct system engineering, and coordinate logistics for DME installations. The requested funding level is necessary in order to meet the PBN NAS Navigation Strategy – 2016 goals to provide en route RNAV 2 performance coverage in class A airspace and terminal RNAV 1 performance coverage at Navigation Service Group (NSG) 1 and select NSG 2 airports.

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

The PBN portfolio allows more efficient use of airspace and optimized arrivals and departures. Metroplex solutions may include changes to airspace structure to support the optimized procedures. Specific operational changes include removing level-offs on arrivals, deconflicting traffic flows, adding PBN routes, and realigning airspace to support the new procedures.

Metroplex optimization benefits indicate that when complete, the Metroplex program will reduce aircraft CO_2 emissions by about 225 thousand metric tons and fuel consumption by about 26 million gallons per year. These benefits are expected to generate about $77 million per year in savings for aircraft operators, the traveling public, and the FAA. The NextGen DME program provides benefits to users by allowing aircraft equipped with DME/DME Area Navigation (RNAV) to continue PBN operations during GNSS disruptions and avoid flight delays, workload increases for pilots and controllers and potential aircraft diversions.

Detailed Justification for - 2C01 Aviation Surface Weather Observation System

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

FY 2018 – Aviation Surface Observing System
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Aviation Surface Weather Observation System (ASWON)	$8,000	$10,000	$10,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($10,000.0)
a. ASOS Technical Refresh Production Contract	---	$8,000.0
b. Contractor Support	---	500.0
c. Construction, Site Preparation and Installation	---	500.0
d. NISC Contract/Software Support	---	1,000.0
Total	Various	$10,000.0

For FY 2018, $10,000,000 is requested for the ASWON technology refresh program. This funding level is identical to the program's Joint Resource Council (JRC) approved Acquisition Program Baseline (APB). Procurement, assembly/integration, software development, and deployment will continue using FY 2018 funds to ensure completion of the Automated Surface Observing System (ASOS), Digital Altimeter Setting Indicator (DASI) and Wind Equipment F-Series (WEF) technology refresh APB milestones planned for September 2019.

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 National Airspace System (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 National Oceanic and Atmospheric Administration (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 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. 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.

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)

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 Air Traffic Control (ATC) facilities
- Backup wind and altimeter required to maintain Parts 121 and 135 operations

What Does This Funding Level Support?

$10,000,000 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 continue 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 Automatic Dependent Surveillance - Broadcast (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 2018 – Future Flight Services Program (FFSP)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Future Flight Services Program (FFSP)	$3,000	$3,000	$14,039	+$11,039

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Future Flight Services Program	---	$14,038.5

For FY 2018, $14,038,515 is requested to develop acquisition related documentation to achieve a Final Investment Decision (FID) and support FFSP Offeror(s) proposal evaluations. Budgeted dollars will also be utilized to fund transition activities such as communications infrastructure/hardware costs in the first year of the new FFSP contract. It is anticipated that the new FFSP contract will be awarded in FY 2018.

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: pre-flight and in-flight flight planning, advisory services, weather briefings, pilot weather report (PIREP) processing, and Search and Rescue (SAR) coordination. These services are provided within the Continental United States (CONUS), Puerto Rico, and Hawaii. Flight Services also provides Visual Flight Rules (VFR) coordination, orientation support to lost aircraft, helps maintain continuous weather broadcasts on selected Navigational Aids (NAVAID), and issues Notices to Airman (NOTAM). GA pilots may access flight service information directly through web portals, thus eliminating much of 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, availability of the interdependent programs to perform their essential functions, and involvement from industry stakeholders such as Aircraft Owners and Pilots Association (AOPA), National Business Aviation Association (NBAA), etc. These interdependencies are as follows: FAA Telecommunications Infrastructure (FTI), National Airspace System (NAS) Enterprise Security Gateway (NESG), NAS Aeronautical Information Management Enterprise Systems (NAIMES), System Wide Information Management (SWIM), and Aeronautical Information Management (AIMM), Automatic Dependent Surveillance-Broadcast (ADS-B), National Voice Switch (NVS), Next Generation Very High Frequency Air/ground Communications Systems (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 contractor services in the lower 48 states.

FFSP will also leverage Next Generation Air Transportation System (NextGen) solutions in order to increase operational efficiency, and improve aeronautical data acquisition and utilization in the support of flight services. For example, prospective service providers will use weather data from Common Support Services - Weather (CSS-Wx) and aeronautical information from the Aeronautical Common Service (AIMM Segment 2) and leverage FAA enterprise infrastructure including SWIM, FAA Cloud Services, and other planned infrastructure enhancements to the extent possible.

The primary objective of FFSP is to realign the Flight Services mission by modernizing services and delivery methodologies. The FFSP will enhance services at lower overall cost to the taxpayers by:

- Leveraging emerging technologies and procedures
- Achieving operational efficiencies and cost reductions via the combining of contracts and through the use of a contract structure that will encourage and incentivize continuous innovation, improvement, and cost reduction while providing flight services that meet or exceed safety objectives

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 were defined by Flight Service as functions that need to be provided by the FAA for the safety of the NAS and include:

- Visual Flight Rules (VFR) search and rescue operations
- Emergency services to aircraft in distress
- Weather Observation Entry (METAR Entry)
- NOTAM Coordination, Entry and Dissemination
- Security related to Special Flight Rules Area (SFRA)/Air Defense Identification Zone (ADIZ)/Flight Restricted Zone (FRZ) Flight Plans
- Instrument Flight Rules (IFR) clearance relay
- Pilot weather report (PIREP) entry
- Instrument Flight Plans (IFR) and Services provided to DOD

The Automated Flight Service Stations (AFSS) contract with Leidos currently provides flight services in the CONUS and expired the last quarter of FY 2015. A 42 month single source contract extension is being finalized to ensure the continuity of services until the new FFSP contract is awarded.

The Direct User Access Terminal Service (DUATS) contracts that allow pilots direct access to flight service information expired in March 2015. The follow-on DUATS effort, DUATS II, was awarded to two Vendors (Lockheed Martin and Computer Science Corporation (CSC)) and will provide continued delivery of these services until the new FFSP contract is awarded. When the new FFSP contact is awarded, it will include those services provided via the DUATS II contracts.

The FFSP intends to leverage advances in technology and automation to enhance flight service capabilities, garnering efficiencies for long-term cost reductions. FFSP is a proposed single integrated service-based solution that will replace the existing Flight Service automation systems and services for CONUS, Hawaii, and Puerto Rico more cost effectively. FFSP will maximize technologies and procedures in use today to enhance automation, communications, navigation, and the way pilots manage information to generate cost savings, capture operational efficiencies, and consolidate services.

What Does This Funding Level Support?

$14,038,515 is required to fund development of acquisition related documentation and activities (final business case and Offeror proposal evaluations) required to ensure a Final Investment Decision (FID) and the subsequent award of the new FFSP contract. Budgeted dollars will also be utilized to fund transition activities such as communications infrastructure/hardware costs in the first year of the new FFSP contract. This contract will ensure attainment of goals, realization of cost reduction, and the successful transition of the services provided by DUATS II and AFSS to a single contract.

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

The American Public, as well as the GA community, will benefit from technology enhancements and cost savings gained by elimination/reduction of services which are redundant, obsolete and/or do not align with Flight Service Core Services.

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 based on collaboration with user groups and outcomes of Safety Risk Management panels.

Detailed Justification for - 2C03 Alaska Flight Service Facility Modernization (AFSFM)

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

FY 2018 – Alaska Flight Service Facility Modernization (AFSFM)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Alaska Flight Service Facility Modernization (AFSFM)	$2,650	$2,650	$2,650	$0

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 2018 $2,000,000 is planned tUpgrade the Heating, Ventilation, and Air Conditioning (HVAC) system at the Deadhorse FSS. Plans will also include upgrading the heating system boilers at Fairbanks and completing building interior repairs at Cold Bay, Homer and Iliamna FSSs. Also requested is $650,000 for in service engineering activities.

What Is This Program And Why Is It Necessary?

The Alaska Flight Service Facility Modernization (AFSFM) program is a multi-year facility modernization and sustainment program that addresses FAA FSS in Alaska. Thirty-three percent of the Alaska Flight Service facilities were constructed in the 1970's require extensive renovations to meet current building codes, fire life safety, electrical standards and generally do not meet the American's with Disabilities Act accessibility requirements, as defined and imposed by the Uniform Federal Accessibility Standards (UFAS) and the Architectural Barriers Act Accessibility Standard (ABAAS). These conditions endanger FAA personnel health and safety and increase the risk of service outages.

Specifically, 17 FSS facilities will be updated to meet environmental, safety and accessibility 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 reliable infrastructure for the continuity of flight service operations and ensuring a safe and secure working environment for employee safety and health.

The program identifies and 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 the reliability of flight service automation systems. Recent technology advancements, commercial business opportunities, and other socioeconomic factors drive the demand for flight services. The AFSFM program will right-size the existing Flight Service Stations (FSS) and/or flight service operations capability based on an assessment of future service demand.

Projects at each facility are prioritized and vary each fiscal year depending on available funding and the Program Office works closely with Alaska Technical Operations and Western Service Center personnel to develop and implement project plans and schedules.

What Does This Funding Level Support?

$2,650,000 is required for 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; alleviating disruption of flight service operations 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 FSS facilities to bring them up to date with current building and safety codes. Project schedules are developed 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. 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 2018 – Weather Camera Program
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Weather Camera Program	$1,000	$2,200	$1,300	-$900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Expand Camera Services to CONUS and Hawaii	---	$1,300.0

For FY 2018, $1,300,000 is requested to fund remote camera facility rehabilitation projects and to hosting of Non-Fed camera images on the FAA managed weather camera website in order to facilitate the low-cost expansion of FAA weather camera services in the CONUS and Hawaii. These funds will support contracts for technical system development, engineering support, and software licensing. The Weather Camera Program Office continues to complete, update, and modernize its systems and services. Ongoing efforts include work to complete the following system needs:

- Enable Non-Fed image hosting, allowing airport managers to upload airport weather-centric images to the Weather Camera Program managed website
- Procure Cloud Services – Migrate Weather Camera System Servers and Internet services to Cloud Service
- Fund the rehabilitation of remote site camera telecommunications infrastructure at up to 20 camera locations

What Is This Program And Why Is It Necessary?

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 Advisory 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 make 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 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 consumption. The weather cameras in Alaska are also 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.

The FAA Weather Camera Program Office (WCPO) currently owns and maintains 230 camera facilities in the state of Alaska and provides those images to pilots and the aviation industry on its managed website. Additionally, the WCPO is hosting 195 Non-Fed owned and managed camera site images on its website as a method expand its camera services to pilots who fly in Alaska and those who transit Canada on routes between Alaska and the CONUS. The process of Hosting Non-Fed images was vetted and approved as a part of the original Program Final Investment Decision (FID) and is being successfully employed in Alaska since CY 2013, to include the hosting of numerous of Nav Canada's weather camera images.

In response to numerous requests to expand FAA camera services to the CONUS and Hawaii, the Weather camera program office will use the proven low cost method of Image Hosting, which facilitates the use of already available images, while avoiding the costs associated with the traditional procurement and sustainment of camera hardware.

What Does This Funding Level Support?

Statistics indicate that weather cameras are contributing to the actual reduction in aircraft accidents in Alaska at a rate that is better than targeted. The weather camera service in Alaska has proven to be very useful to the aviation community for situational awareness, flight planning and flight decision making, and its direct benefits to aviation safety and efficiency is recognized. Funding the expansion of the camera services will facilitate increases to safety and efficiency across the NAS and will directly respond to the needs and requests of the FAA's Airport Safety and Standards Office (AAS-1), the FAA's Flight Technologies and Procedures Division (AFS-430), and the NTSB recommendations to establish camera services to Hawaii and the CONUS.

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 consumption. With the expansion of camera services to Hawaii and the CONUS it is expected that the aviation community will obtain similar increases in safety and efficiency.

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 (Final year of measurement)	0.04 accidents per 100,000 operations

Detailed Justification for - 2D01 VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)

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

FY 2018 – VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME) ($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$4,500	$7,000	$11,000	+$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. VOR Minimum Operational Network (MON) Implementation Program		
a. Program Management – Planning, Authorization Control	---	$1,000.0
b. Requirements and Architecture Engineering	---	400.0
c. Safety Engineering	---	400.0
d. Specialty Engineering (Spectrum)	---	200.0
e. Implementation Planning	---	1,000.0
f. Implementation Engineering	---	1,000.0
g Infrastructure and Co-located Equipment	---	1,000.0
h. Airspace Design	---	4,000.0
Total	Various	$9,000.0
B. VOR Collocated with Tactical Air Navigation (VORTAC) DVOR sites		
a. Misc OBS/Freight	---	$5.0
b. Program Management Support	---	200.0
c. Service Order Agreement (SOA)	---	25.0
d. Procure two DVOR Antenna Kits	---	500.0
e. Construction/Installation of one DVOR site	---	1,270.0
Total	Various	$2,000.0

A. VOR Minimum Operational Network (MON) Implementation Program

For FY 2018, $9,000,000 is requested for the continuation of the VOR Minimum Operational Network (MON) Program Phase 1 efforts and begin investment analysis activities in preparation for Phase 2 (FY 2021 to FY 2025) of the program.

B. VOR Collocated with Tactical Air Navigation (VORTAC)

For FY 2018, $2,000,000 is requested for engineering and technical services support, procurement of two VOR Doppler Antenna Kits, and funding to dopplerize one on-going DVOR projects.

What Is This Program And Why Is It Necessary?

A. VOR Minimum Operational Network (MON) Implementation Program

The VHF Omni-Directional Range (VOR) Minimum Operational Network (MON) Implementation Program will prepare the analysis, amend/cancel/replace procedures, flight check, relocate any services/equipment collocated with the VORs, develop documentation and implementation plans for downsizing the VOR network to the minimum required as a backup navigation system for VOR equipped aircraft. Additionally, the program will begin investment analysis activities in preparation for Phase 2 (FY 2021 to FY 2025) of the program. The VOR MON Implementation program will transition the legacy network of approximately 957 VORs to a MON of approximately 650 VORs with a target date of 2025. Downsizing the VOR network to the minimum required as a backup navigation system provides an opportunity for cost avoidance and supports the National Airspace System (NAS) Efficient Streamlined Services (NESS) Initiative. It would allow aircraft to navigate and land safely under Instrument Flight Rules (IFR) in the event of disruption in a Global Navigation Satellite System (GNSS) signal; however, the planned backup capability will be less than the current VOR network.

As the need for VOR based procedures and routes decreases due to the transition to PBN, resources that are currently being spent in sustaining and operating the current legacy VOR facilities, many of which are beyond their service life, can be shifted for more efficient use. The legacy VOR routes and procedures will be cancelled, amended, or replaced, as necessary prior to a particular VOR being discontinued. Removing the VOR infrastructure occurs as new PBN routes and procedures are added to support NextGen.

B. VOR Collocated with Tactical Air Navigation (VORTAC)

This program relocates VOR and VORTAC facilities and/or improves the VOR operational performance. The VOR and VORTAC (a combination of VOR and Tactical Air Navigation (TACAN) system) provide navigational guidance for civilian and military aircraft in both the en-route and terminal areas. As the FAA transitions gradually to performance based navigation (PBN), a VOR Minimum Operational Network (MON) will be retained to serve as a backup to satellite navigation and define VOR routes and procedures for legacy users. The VORs that are in the MON as well as the VORTACs must remain in service and may be relocated, technologically refreshed, or replaced. Currently 100 percent of the VORTAC systems are over 20 years old and beyond their service life.

This program also procures and installs Doppler VOR (DVOR) electronic kits and DVOR antenna hardware kits to upgrade the conventional VORs. Numerous VORs have radial restrictions due to encroachment by obstacles that block the transmission of VOR signals. These restrictions are having a serious impact on en-route, arrival and departure procedures. Natural encroachment also comes from trees, located outside the boundaries of the FAA controlled areas where the VORs are located, which have grown tall enough to cause signal distortions. Many manmade obstacles can cause the same kind of distortions. Examples include newly constructed tall buildings, nearby industrial parks with a high concentration of metallic buildings, overhead transmission lines, radio, television and cellphone towers, and, more recently, wind farm stations.

Dopplerizing a VOR eliminates the signal reflection restrictions caused by most of these obstacles. Relocating the VOR/VORTAC facilities provides a means of achieving maximum service availability when the dopplerization of VOR/VORTAC systems does not completely eliminate signal distortions. In some cases, both dopplerization and relocation techniques may be used to optimize performance.

What Does This Funding Level Support?

A. VOR Minimum Operational Network (MON) Implementation Program

$9,000,000 is required to meet the Phase 1 goals of the VOR MON Program and begin Phase 2 investment analysis activities. The Program will work with the appropriate groups to discontinue 4-18 VORs. This group includes Flight Procedures Teams (FPTs), Aeronautical Information Services (AJV-5) resources, and Planning and Requirements Leads. The program will fund approximately 655 procedures to discontinue at least 36 VORs in FY 2020, since procedures are typically funded two years in advance of a Navigational Aid's

(NAVAIDs) discontinuance. This work will require substantial engineering; cancellation, amendment and/or replacement of routes and approach procedures; program management and safety risk management (SRM) analysis. It is critical for this effort to maintain planned funding levels in order to prevent the Phase 1 implementation schedule extending beyond 2020 which would impact the goal for the entire program being implemented by 2025, the Administrator's NAS Initiative to provide more efficient, streamlined services as well as the NextGen goal to transition to Performance Based Navigation (PBN).

B. VOR Collocated with Tactical Air Navigation (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.

$2,000,000 is required for the procurement of VOR/DME VOR Doppler Antenna Kits and completion of a project to dopplerize a conventional VOR.

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

A. VOR Minimum Operational Network (MON) Implementation Program

The FAA is transitioning the NAS to more efficient PBN routes and procedures, so fewer VORs are needed. VORs do not enable PBN and fewer 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, and opportunities to avoid potential recapitalization costs.

This program will result in a more optimized NAS, where the more efficient PBN operations will be primary and a MON of VORs will be retained to serve as a back-up in the event of a GNSS outage or interference.

B. VOR Collocated with Tactical Air Navigation (VORTAC)

VOR/VORTAC equipment has been deployed and maintained in the NAS for more than 60 years. VOR/VORTAC equipment has beenthe 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.

Detailed Justification for - 2D02 Instrument Landing System (ILS)

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

FY 2018 – Instrument Landing System (ILS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
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	4	$2,540.0
b. Complete Four ILS Replacements	4	3,500.0
c. Logistics/Engineering Support Service	---	960.0
Total	Various	$7,000.0

For FY 2018, $7,000,000 is requested for engineering and technical services support; procurement of four ILS systems and ancillary equipment, and complete four ILS replacement projects.

What Is This Program And Why Is It Necessary?

This program supports the installation of ILS and/or High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) for the establishment of new Category II/III precision approach procedures. An ILS precision approach system is comprised of a grouping of electronic devices Localizer, Glide Slope and marker beacons) and, in some cases, ancillary aids (Distance Measuring Equipment, Approach Lighting System, Runway Visual Range, etc.) that provide landing aircraft with both electronic guidance and visual landing aids. These systems allow properly equipped aircraft to land safely in adverse weather conditions, which improves both system safety and capacity.

The ILS provides both vertical and lateral guidance information for the pilot to allow safe landing to touchdown and rollout. The ILS sends information to instruments in the cockpit so that the pilot can maintain a predetermined flight path to the runway even in low visibility. The ILS also provides a resilient approach and landing capability in the event of a loss of Global Navigation Satellite System (GNSS) service.

The ALSF-2 is a lighting system installed along the extended centerline extending a distance of 2,400 feet outward into the approach zone and ending at the runway threshold. ALSF-2 provides visual cues to help the pilot see the runway when the aircraft is at or above ILS minimum altitude.

The ILS contract is used to procure ILS that support Special Authorization (SA) Category II precision approach procedures funded with Enhanced Low Visibility Operation (ELVO).

This program supports ILS sustainment activities at airports that meet the following criteria: one percent or more of total U.S. enplanements (Large Hub), .75 percent or more of total U.S. non-military itinerant operations. Additionally, airports that have between .25 percent and .99 percent of total U.S. enplanements (Medium Hub) or between .50 percent and .74 percent of U.S. non-military itinerant operations are sustained under this program.

What Does This Funding Level Support?

Approximately 55 ILSs are more than 25 years old. Currently, the ILSs are being replaced because they have exceeded their expected service life and/or the manufacturer no longer provides support. The FAA is aggressively pursuing implementation of satellite navigation but until that transition is complete, the ILS remains the world standard for providing approach and landing services.

$7,000,000 is required for engineering and technical services support; procurement of four ILS systems and ancillary equipment, and complete four 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, therefore increasing the capacity of the airport. A precision approach capability allows an airport to remain open to traffic when it would have been required to close, thereby, avoiding weather caused flight delays. Additionally, replacement of aging ILS equipment will improve reliability and availability, which reduces the outage rate and 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 2018 – Wide Area Augmentation System (WAAS) for GPS
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Wide Area Augmentation System (WAAS) for GPS	$107,200	$111,600	$102,300	-$9,300

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Wide Area Augmentation System (WAAS)		
a. GEO Satellite Acquisition	---	$30,540.0
b. Technology Refresh	---	17,150.0
c. NAS Implementation	---	7,050.0
d. Technology Evolution	---	4,290.0
e. Technical Engineering/Program Support	---	15,770.0
Total	Various	$74,800.0
B. Wide Area Augmentation System (WAAS) Sustain Leased Services	---	$27,500.0

For FY 2018, $102,300,000 is requested for the Wide Area Augmentation System (WAAS) for GPS to complete the following:

A. Wide Area Augmentation System (WAAS)

a. GEO Satellite Acquisition, $30,540,000
- Complete GEO 5 cutover and integration into WAAS
- Complete GEO 6 orbit raising to final orbital location and In-orbit test (IOT)
- Develop GEO 7 contract materials
- Release GEO 7 Screening Information Request (SIR)

b. Technology Refresh, $17,150,000

- DFO Release 2 will complete GEO 5 integration and cut-over into WAAS
- DFO Release 3 will complete integration and cutover of the GPS Reference Receiver Rate Group Modification
- DFO Release 4 will complete development and testing of the safety computer upgrade
- Release 5 (GEO 6 Operational) will continue development and testing, supporting GEO-6 on-orbit WAAS integration testing
- National Airways System Engineering (NASE) will generate, test and cutover the WAAS CY 2018 Maintenance Release
- Generate the CY 2019 Maintenance Release

c. NAS Implementation, $7,050,000

- Develop and publish 170 WAAS LPV/LP approach procedures with possible additional LPV procedures due to change in Flight Standards 8260-series criteria
- Data collection by operators, benefits analysis, and development of WAAS-specific operations within the NAS to encourage increased WAAS equipage
- Airport de-confliction and reduced delays in the terminal area operations, to include helicopter EMS airspace design and demonstrations

d. Technology Evolution, $4,290,000

- Complete system level evaluation of Prototype Dual Frequency Algorithms using WAAS test equipment
- Complete Dual Frequency Antenna Minimum Operational Performance Standards (MOPS)
- Establish definition of operation and performance requirements needed to commence ARAIM safety case

e. Technical Engineering/Program Support, $15,770,000

- 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

B. Wide Area Augmentation System (WAAS) Sustain Leased Services, $27,500,000

- Provide lease payments and manage leases for the 3rd, 4th, Gap Filler, and 5th GEO operational lease services

Support resolution of any system anomalies, interference events or other issues to ensure compliance with WAAS performance requirements. Review GEO lease performance reports as well as review and approve GEO Ground Uplink Site design changes.

What Is This Program And Why Is It Necessary?

WAAS supports the FAA mission need of providing a satellite navigation capability across the National Airspace System (NAS). WAAS provides both horizontal and vertical navigation for precision approach-like operations for all WAAS equipped users at all qualified runway ends in the 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, Alaska, Hawaii, Puerto Rico, Mexico and Canada 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 capable of supporting all 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 internationally, 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.

GPS Civil Requirements Oversight:

GPS is the core system for Satellite Navigation through the aviation augmentations WAAS, RAIM, and GBAS. To enable continued use of GPS for these aviation augmentations, a number of GPS Civil Requirements need to be designed into the new versions of GPS satellites and the next generation operational control segment (OCX). GPS Civil Requirements oversight is a program that ensures that these requirements are designed, developed, and implemented in the GPS system. Among these requirements are those that assure the safety of the GPS signals for use by aviation augmentation users, and the Space-based Positioning, Navigation and Timing Executive Committee, co-chaired by the Deputy Secretaries of Transportation and Defense (the FAA Administrator is a member) decided in 2007 that two GPS Civil Requirements would be sponsored and funded by DOT: the new L1C signal and civil signal monitoring. The new L1C signal was designed, developed, and implemented on GPS III satellites. Civil signal monitoring is being developed in part on the OCX system and in part on non-OCX solutions. GPS Civil Requirements Oversight includes programmatic oversight of this activity through Volpe and MITRE.

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.

The 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 qualified 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 FAA is currently in the process of making a decision to begin the drawdown of Category I ILS. Decisions on the removal of individual ILSs are directly tied to WAAS LPV availability.

What Does This Funding Level Support?

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 2018 $102,300,000 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. In FY 2018, GEO 5 will be added to the WAAS and a selected legacy GEO will be decommissioned. GEO 6 development efforts will be completed, and on-orbit testing of the satellite will commence.

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 de-confliction 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.

GPS Civil Requirements Oversight enables GPS to continue to be used safely by aviation augmentation users WAAS, RAIM, and GBAS by ensuring that the aviation requirements are incorporated into the new GPS satellites and operational control system. GPS Civil Signal Monitoring oversight through Volpe and MITRE will deliver the capability for the GPS operators to monitor the civil GPS signals so that when an anomaly occurs on the civil signals, the GPS operators will know immediately and be able to take the appropriate action.

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)

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

FY 2018 – Runway Visual Range (RVR) Program
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Runway Visual Range (RVR) Program	$6,000	$6,500	$4,000	-$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Procurement of RVR Systems and Ancillary Equipment	8	$2,000.0
b. Complete/Initiate Establish/Sustain RVR Projects	8	1,700.0
c. Logistics/Engineering Support Services	---	300.0
Total	Various	$4,000.0

For FY 2018, $4,000,000 is requested for engineering and technical services/support, procurement of approximately eight RVR systems and ancillary equipment, and to establish/sustain RVRs at approximately eight locations.

What Is This Program And Why Is It Necessary?

The RVR program replaces older RVR equipment with PC-Based RVR equipment. RVR provides air traffic controllers with a measurement of the visibility at key points along a runway: touchdown, midpoint, and rollout. That data is used to decide whether it is safe to take off or land during limited visibility conditions. During reduced visibility weather conditions, RVR system measurements are used by Air Traffic to establish airport operating categories; thus, properly equipped aircraft with a trained crew may continue operations under reduced visibility Category I, Category II and Category III conditions. Depending on the category of approach, the runway may require multiple visibility sensors to achieve the lowest minimums. The acquisition of more visibility sensors is required for a Category II/III approach. Each category is defined by the lowest altitude at which a pilot is able to decide whether to land or abort (decision height) and visibility conditions on the runway.

- Category I operations may use a rollout sensor of an RVR system
- Category II operations require a touchdown and rollout sensor of an RVR system
- Category III operations require a touchdown, midpoint and rollout sensor of an RVR system

The RVR decreases diversions and delays at an airport by providing an accurate measure of the runway visibility. The RVR information affects airline scheduling decisions and air traffic management decisions regarding whether flight plans should be approved for an aircraft to fly to or take off from an airport with low visibility. There are 280 airports in the NAS that have RVR systems.

The new-generation RVR and PC-based RVR are safer than the older systems, because the equipment is mounted on frangible structures that break away if accidently struck by an aircraft during take-off or landing. Replacement decisions are prioritized based on the level of activity at the airport and life-cycle

issues. This program also provides the equipment for sites that have recently qualified for an upgrade from a Category I to a Category II/III precision approach.
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.

What Does This Funding Level Support?

Funding at the required level will promote the benefits associated with lower decision height minimums and to reduce the number of airport diversions and delays.

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

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 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.

Detailed Justification for - 2D05 Approach Lighting System Improvement Program (ALSIP)

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

**FY 2018 – Approach Lighting System Improvement Program (ALSIP)
($000)**

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Approach Lighting System Improvement Program (ALSIP)	$3,000	$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	---	$100.0
b. Installation of One MALSR	1	2,800.0
c. Logistics/Engineering Support Service	---	100.0
Total	Various	$3,000.0

For FY 2018, $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 replacement of a MALSR 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.

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.

What Does This Funding Level Support?

$3,000,000 is required for engineering and technical services/support; procurement of approximately four MALSR systems; replacement of a MALSR at one location.

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 2018 – Distance Measuring Equipment (DME)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Distance Measuring Equipment (DME)	$3,000	$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	20	$1,200.0
b. Complete and Initiate Establish/Replacement DME Projects	10	1,200.0
c. Logistics/Engineering Support Services	---	600.0
Total	Various	$3,000.0

For FY 2018, $3,000,000 is requested for engineering and technical services/support, procuring 20 DME systems and ancillary equipment, and attaining service availability for 10 establish/sustainment DME projects.

What Is This Program And Why Is It Necessary?

DME is a radio navigation aid used by pilots to determine the aircraft's slant distance from the DME location. The program is procuring and installing state-of-the-art DME systems to: support replacement of DMEs that have exceeded their service life expectancy, establish new DMEs at qualifying airports, to relocate DME facilities, and establish DMEs in lieu of Instrument Landing System marker beacons.

The program supports a Commercial Aviation Safety Team (CAST) recommendation to implement DME on various airport runways. The CAST includes FAA, airline and airport personnel, and it has identified 451 runway ends that require implementation of DME capability. These systems will support efforts to reduce the number of controlled-flight-into-terrain (CFIT) accidents at the most vulnerable locations in the NAS. The FAA has agreed to implement the 177 highest priority CAST DME installations.

For safety reasons, the aviation industry wants to discontinue using step-down non-precision approach procedures in which a pilot descends to the minimum allowable altitude to visually locate the runway. Using DMEs reduces the need for this type of approach. Due to the continuous ranging information provided by a DME, procedure designers have greater flexibility of where step down fixes are located and how many are needed; this leads to better specification and control over the vertical descent profile and reduces CFIT risk.

What Does This Funding Level Support?

$3,000,000 is required for engineering and technical services/support, procuring 20 DME systems and ancillary equipment, and attaining service availability for 10 establish/sustainment DME projects. 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 the FAA goal by contributing to 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 2018 – Visual Navaids – Establish/Expand
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Visual Navaids – Establish/Expand	$2,000	$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	5	$750.0
b. Complete PAPI Establish Project	5	1,000.0
c. Logistics/Engineering Support Service	---	250.0
Total	Various	$2,000.0

For FY 2018, $2,000,000 is requested for engineering and technical services/support; procurement of approximately five Precision Approach Path Indicator (PAPI) systems and to complete approximately five 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.

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 also supports a Commercial Aviation Safety Team (CAST) recommendation to implement a visual glide slope indicator approach capability on various airport runways including those affected by Land and Hold Short Operations (LAHSO) requirements. The CAST includes FAA, airline and airport personnel, and it has identified 781 runway ends that require implementation of a visual glide slope indicator approach capability. This capability will reduce the number of the controlled flight into terrain accidents during approach and landing.

LAHSO is an air traffic control tool used to increase airport capacity by allowing coordinated approaches on intersecting runways. Vertical guidance is required for air carrier operations on the hold short runway to avoid landing long and conflicting with operations on the other runway.

What Does This Funding Level Support?

$2,000,000 is required for engineering and technical services/support; procurement of approximately five PAPI systems and to complete approximately five PAPI establishment projects.

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 2018 – Instrument Flight Procedures Automation (IFPA)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Instrument Flight Procedures Automation (IFPA)	$3,371	$9,400	$8,500	-$900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks		Locations/ Quantity	Estimated Cost ($000)
a.	TARGETS Instrument Flight Procedures (IFP) Design tool Technology Refresh/COTS Software-System Development	---	$2,693.5
b.	TARGETS COTS Computers Procurement	315	1,106.5
c.	Aeronautical Information Services Production Workflow System (APWS) Technology Refresh/COTS Software-System Development	---	4,700.0
Total		Various	$8,500.0

For FY 2018, $8,500,000 is requested to continue IFPA technology refresh activities to include system development for workstation-based Commercial off the Shelf (COTS) software upgrades to the IFP design tool TARGETS (Terminal Area Route Generation, Evaluation and Traffic Simulation), and for server-based COTS software upgrades to APWS.

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 (TARGETS[1]) and APWS tools. In FY 2017, the program will enter the second segment of these activities. From FY 2017 through FY 2021 the IFPA program will be conducting technology refresh of its Information Technology tool suite, including both software and hardware, in accordance with FAA lifecycle guidance. Continuing the build-out of conventional navigation design capabilities in TARGETS, development and testing will be underway in FY 2018. For APWS, System Configuration and Development will start in FY 2017, continue with development and testing in FY 2018, and finish with system delivery planned for FY 2019.

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 TARGETS IFP design tool, Instrument Flight Procedures (IFP) database application, Airports and Navigations Aids database (AirNav) application, Obstacle Evaluation (OE) system, and the Aeronautical Information Services Production Workflow System (APWS).

The TARGETS tool provides space-based navigation (RNAV and RNP) procedure design capability, as well as ground-based navigation procedure design capability. The TARGETS tool must have COTS operating system software currency maintained as part of tech refresh activities.

[1] In 2015 AJV-5 began the transition from IPDS to TARGETS, consolidating Agency IFP design tools in partnership with Aviation Safety/Flight Standards (AVS-AFS) and the Performance Based Navigation (PBN) Office (AJV-14).

The APWS tool provides business process workflow automation for the Aeronautical Information Services organization, marshalling and metering work between AJV-5 Development, Quality Assurance, Flight Inspection, Pre-Publication and Publication work areas. The APWS tool contains COTS Software which provides the underlying routing of work via Business Process Management (BPM).
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 24,000 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

What Does This Funding Level Support?

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.

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 in April 2017 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 Information Services' 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. 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 2018 – Navigation and Landing Aids – Service Life Extension Program (SLEP)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
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	3	$1,250.0
b. Complete Replacement Projects	10	1,500.0
c. Logistics/Engineering Support Services	---	250.0
Total	Various	$3,000.0

For FY 2018, $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' (Mark 1F) removed from Focus Airports are reinstalled at lower activity airports to replace older existing Mark 1D and Mark 1E ILSs.

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.

What Does This Funding Level Support?

$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. These benefits will increase safety and airport capacity. Runway downtime is associated with delays, diversions, over-flights, and cancellations which impose economic penalties on both aircraft operators and users. The installation of the RLMS will reduce the need for technicians to physically monitor the ALSF-2s during adverse weather conditions.

Detailed Justification for - 2D10 VASI Replacement – Replace with Precision Approach Path Indicator

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

FY 2018 – VASI Replacement – Replace with Precision Approach Path Indicator ($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
VASI Replacement – Replace with Precision Approach Path Indicator	$5,000	$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	18	$970.0
b. Complete Replacement of VASI Systems with PAPI Systems	18	3,730.0
c. Logistics/Engineering Support Services	---	300.0
Total	Various	$5,000.0

For FY 2018, $5,000,000 is requested for engineering and technical services/support; procurement of approximately 18 PAPI systems; initiate approximately 18 new Visual Approach Slope Indicator (VASI) system with PAPI projects; and completion of approximately 18 VASI replace with PAPI projects.

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 used 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.

The VASI and PAPI systems have a set of lights that are arranged so that the pilot sees all red lights when the aircraft is below the glideslope and all white lights when the aircraft is above the glideslope. This visual reference helps the pilot maintain the appropriate descent rate to the runway.

At the inception of this program, there were approximately 1,387 older (pre-1970's) VASIs at international and other validated locations requiring replacement. There are now 647 VASI systems remaining in the NAS. The first priority of the program is to replace VASI systems at approximately 329 ICAO designated runway ends. The VASI replacement at ICAO designated runways will be completed in fiscal year 2018. The replacement of the remaining VASI systems at non-ICAO airports in the NAS will be completed in fiscal year 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

What Does This Funding Level Support?

$5,000,000 is required for engineering and technical services/support; procurement of approximately 18 Precision Approach Path Indicators (PAPI) systems; initiation of approximately 18 new Visual Approach Slope Indicator (VASI) system with a Precision Approach Path Indicator (PAPI) projects; and completion of approximately 18 VASI replace with PAPI projects.

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

- 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
- Reduces maintenance labor
- Minimizes the current supply support deficiencies related to lack of uniformity between various VASI configurations

Detailed Justification for - 2D11 Runway Safety Areas (RSA) – Navigational Mitigation

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

FY 2018 – Runway Safety Areas (RSA) – Navigational Mitigation
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Runway Safety Areas (RSA) – Navigational Mitigation	$30,000	$14,000	$1,600	-$12,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Program Management	---	$600.0
b. Installation of Navigational Aids (NavAids)	---	1,000.0
Total	Various	$1,600.0

For FY 2018, $1,600,000 is requested to complete the funding request for the RSA program and 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 completion of the remaining approximately four RSA improvements.

What Is This Program And Why Is It Necessary?

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. The FAA's runway safety program improves the overall safety of the Runways and Runway Safety Area (RSA). The RSA must be free of all objects that are three inches above the grade and are not frangible. The relocation or removal of existing rigid objects will decrease the potential for damage to aircraft and minimize injuries or fatalities to aircraft passengers and crew members if an aircraft has to use the RSA in an emergency. One key element of this program is RSA Sterilization which includes provisions for clear areas, surface drainage, and weight supportability.

The FAA currently owns and operates numerous NavAids that need to be modified to satisfy the language of Title 14 Consolidated Federal Regulations (CFR) Part 139 (Certification of Airports). Although measured incremental progress has been made to restructure these FAA-owned NavAids, a concerted, focused initiative will be necessary to comply with the current RSA airport design standards by December 31, 2018. Legislation requires FAA to report on the agency's progress toward RSA improvements.

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: 1) fixed by function and 2) 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.

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.

What Does This Funding Level Support?

$1,600,000 is required to complete the RSA program and 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. This funding will allow the completion of the RSA improvements by the Congressional commitment date of 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 456 RSAs. Seventy-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 - 2D12 Navigational Aids (NavAids) Monitoring Equipment

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

FY 2018 – Navigational Aids (NavAids) Monitoring Equipment
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
NavAids Monitoring Equipment	$0	$2,000	$2,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Hardware/Software Engineering Services	---	$900.0
b. Program Management	---	1,000.0
c. Second Level Engineering	---	50.0
d. Technical Center Test Support	---	50.0
Total	Various	$2,000.0

For FY 2018, $2,000,000 is requested to support the development of artifacts required to achieve Final Investment Decision (FID) and for the development and evaluation of the Screening Information Request (SIR).

What Is This Program And Why Is It Necessary?

There are currently two different types of consolidated Air Traffic control and monitoring systems operating in the National Airspace System (NAS) that replace multiple legacy control and monitoring panels used by air transportation system specialists (ATSSs) for monitoring and controlling navigational aids (Navaids) equipment at an airport. These two systems are the Integrated Control and Monitoring System (ICMS) and the Universal Interlock Controller (UIC) (also referred to as FA-30000). These systems, which are typically located in the air traffic control tower cab and equipment room, are used by Air Traffic Control Specialists (ATCS) and ATSSs to monitor and control predefined sets of Navaids from one or more user interfaces located in the airport facility. Instrument Landing Systems (ILS), Runway Visual Range (RVR) equipment, Runway End Identifier Lights (REIL), Precision Approach Path Indicator (PAPI) light arrays, and other airport Navaids are monitored and controlled by these control and monitoring systems.

The Navaids Monitoring Equipment (NME) program is necessary to address challenges in maintaining multiple software versions of the ICMS and UIC system deployments, technological differences in system functionality, system performance issues partly due to aging system technology, and challenges associated with FAA depot and second-level engineering supportability. The NME Program will address these challenges by either replacing or upgrading the ICMS and UIC systems that currently exist today.

Preparation and approval of business case artifacts are essential to ensure stakeholder acceptance and to justify FAA investment for the NME Program.

What Does This Funding Level Support?

$2,000,000 is required for program management and system engineering activities required to achieve FID. This funding is also required for the development and evaluation of the SIR.

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

The NME system development and deployment will maintain the safety and efficiency benefits of the legacy control and monitoring systems that are deployed in the NAS. This will be achieved by either replacing or upgrading the existing ICMS and UIC systems that exist today. The NME system will support the situational awareness of ATSSs by providing a status and the ability to control the states of the many Navaids that are used for arriving and departing aircraft. The NME system will provide the technological updates necessary to maintain the current levels of system availability and reliability for control and monitoring systems deployed today.

Detailed Justification for - 2E01 Fuel Storage Tank Replacement and Management

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

FY 2018 – Fuel Storage Tank Replacement and Management
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Fuel Storage Tank Replacement and Management	$18,700	$22,700	$28,100	+$5,400

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	109	$16,730.0
b. Replace Fuel Systems under Lifecycle Guidelines	44	8,240.0
c. Engineering and Program Support	---	2,130.0
d. Procure Specialty Monitoring System Hardware	---	1,000.0
Total	153	$28,100.0

For FY 2018, $28,100,000 is requested to fund 153 tank unit replacements, modernization, and upgrades at approximately 63 locations across the National Airspace System (NAS). Fuel systems at a given location may include multiple tank units.

The Fuel Storage Tank (FST) Replacement and Management funding is utilized to acquire hardware and integration services to support NAS operational requirements for bulk liquid storage. The FST program is included in the ATC Sustainment Strategic Plan (SSP).

What Is This Program And Why Is It Necessary?

The Air Traffic Organization (ATO) active tank system inventory includes over 3,700 units that support communication, navigation, weather, and surveillance missions. The FST systems store and supply electrical generator fuel, lubricating oil, building heater and boiler system fuel, service vehicle fuel, liquid waste, and similar bulk liquids.

FST system manufacture, installation, operation, and disposal is regulated under Federal, State and local statutes including the Clean Water Act (CWA), the Oil Pollution Act (OPA), and the Resource Conservation and Recovery Act (RCRA), among others, with significant penalties for compliance failures. The FST program received a final investment decision in June 2013.

The FST program operates to attain three primary objectives:

- Sustain NAS operational readiness — 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.
- Mitigate environmental damage and regulatory non-compliance — Non-compliance incurs short-term ATC operational impacts, (use prohibitions result in inability to support the mission), and longer-term fiscal impacts including, costly cleanup activities, fines, and unplanned retrofit costs.

- Conduct effective in-service management and lifecycle replacement — As fuel tanks age beyond their service life, there is an escalating risk of failure and associated leakage with attendant operational impacts and environmental damage.

The FST program interacts with and supports numerous internal and external organizations in sustaining bulk liquid storage requirements including:

- Coordination during the integration of new FAA tank systems
- Technical expertise supporting the FAA service areas, service centers, district offices, and systems support centers
- Interface with outside regulatory authorities or agencies

What Does This Funding Level Support?

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 impact to personal and environmental safety, and preventing regulatory fines of up to $32,500 per day per unit for failing to comply with regulatory standards.

The FST program implementation strategy and planning documents describe the processes and governance that the program office employs 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 the goal of 99.7 percent sustained operational availability. Operating modern, sustainable, and regulatory compliant fuel systems has the following benefits:

- Mitigate damage and associated costs resulting from incidental release of hazardous, toxic, or dangerous materials
- Assure the travelling public and aviation stakeholders of reliable and safe transit experience
- Reduce the 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 2018 – Unstaffed Infrastructure Sustainment
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Unstaffed Infrastructure Sustainment	$39,640	$40,490	$35,700	-$4,790

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Unstaffed Infrastructure Sustainment	255	$33,200.0
B. In-Service Engineering	---	2,500.0
Total	Various	$35,700.0

The Unstaffed Infrastructure Sustainment (UIS) Program is responsible for sustaining more than 12,000 Communications, Surveillance, Navigation, Weather, and support sites across the country.

For FY 2018, $33,200,000 is requested to complete approximately 255 unstaffed infrastructure projects located in all three service areas at communication, navigation, surveillance, weather, and support sites. In addition, $2,500,000 is requested to support in-service engineering activities.

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 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 more than 12,000 sites were built during the 1940s and 1950s so are operating well beyond their design service lives.

The UIS program sustains infrastructure supporting the NAS, which requires the reliable and continuous operation of surveillance, navigation, communication, and weather equipment. Unstaffed infrastructure protects electronic equipment from weather hazards and unauthorized entry. NAS sustainment includes major repairs to and replacement of real property and structures that are normally not staffed, such as:

- The major repair, refurbishment, and replacement of NAS antenna and equipment towers
- The major repair and replacement of buildings, shelters, roofs, HVAC equipment, electrical panels and distribution wiring, locks and alarm sensors, lighting, access roads, grounds, and fencing
- The backlog for these facilities is currently estimated at $446 million and is increasing. A substantial backlog increases the risk for operational service failures and the premature replacement of air traffic control equipment. Additionally, the growing backlog negatively impacts the agency's ability to use existing infrastructure required to support NextGen initiatives and other improvements.

What Does This Funding Level Support?

Not funding this program at the required level will result in the large backlog of work growing at an even faster rate. It will also likely result in increased NAS outages. The required funding will support critical infrastructure projects that include the following:

- HVAC replacement at airport surveillance radar (ASR) facilities
- NAS equipment shelter replacements at several locations
- Communication tower replacement and repair at several locations

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

The American Public will benefit from increased funding to the UIS program through:

- The improved availability and reliability 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 functional operating environment for electronic systems
- The extended operational service life of NAS remote facilities that house and protect valuable systems and equipment
- A safer and more secure work environment provided for Air Traffic Organization (ATO) technical operations personnel
- An increased alignment with NextGen implementation requirements, which will result from the identification of opportunities for consolidation, modification, or reuse of existing UIS assets

Detailed Justification for - 2E03 Aircraft Related Equipment Program (ARE)

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

FY 2018 – Aircraft Related Equipment Program (ARE)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Aircraft Related Equipment Program (ARE)	$9,000	$13,000	$12,500	-$500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Flight Inspection (FI) Flight Program	---	$9,000.0
B. Flight Simulation Testing and Research Technologies (START)	---	3,500.0
Total	Various	$12,500.0

A. Flight Inspection (FI) Flight Program

For FY 2018, $9,000,000 is requested for ongoing modifications/upgrades to FAA's FI aircraft, avionics, and mission equipment as follows:

- $4,718,300 for the Beechcraft 300 and Challenger aircraft modifications
  - Beech 300 Aircraft - Install upgraded Radio Frequency Interference (RFI) capabilities
  - Challenger 601/604/605 Aircraft - Acquire and install avionics upgrades that include communication, navigation, and surveillance systems
  - Challenger 601 Aircraft – Begin Modernization (Avionics/Interior)

- $3,592,200 to sustain the current Automatic Flight Inspection System (AFIS) by enhancing the Flight Operations Management System (FOMS) that is integrated with airborne systems and continue other legacy system upgrades

- $689,500 to continue installation of the next generation of AFIS (Phase I and Phase II)

B. Flight Simulation Testing and Research Technologies (START)

For FY 2018, $3,500,000 is requested for Flight START to:

- Purchase and install Visual Systems for both simulators
- Purchase spare parts for the updated Visual Systems

What Is This Program And Why Is It Necessary?

A. Flight Inspection (FI) Flight Program

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 organization currently operates 31 FAA-owned aircraft (18-Beechcraft 300; 6-Learjet 60; 6-Challenger 600 series; and 1-Gulfstream IV).

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 expands the useful life of the aircraft, avionics, and mission equipment 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 National Air Space (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

<u>Legacy Interdependencies</u>:

- Instrument Landing System (ILS)
- Visual Glideslope Indicator (VGSI)
- 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)
- Air Traffic Primary and Secondary Radar Systems

<u>NextGen Interdependencies</u>:

- 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)

B. Flight Simulation Testing and Research Technologies (START)

The next generation of Flight Simulation Testing and Research Technologies Program is a follow-on technology refresh to the Boeing 737-800 and the Airbus 330/340 Simulator. Flight START will integrate requirements for life cycle sustainment of the existing Flight Simulators and includes the development, design, and implementation of future technologies that will improve aviation safety. The FAA has regulatory authority for approving special instrument approach procedures and the introduction of new concepts and technologies for aircraft navigation. The upgrade of the simulators will enable FAA to analyze and test the viability of these new concepts and procedures for use in the NAS and develop the appropriate regulations regarding their use.

Flight Standards is currently using a Boeing narrow-body and an Airbus wide-body FBW simulator. Both are 6-axis, full flight aircraft simulators that are configurable to the performance and handling characteristics of a narrow-body aircraft with two jet engines (Boeing 737) or a wide-body aircraft with two/four jet engines (Airbus 330/340), utilizing electronic FBW flight control technologies. The Flight START Program will enable the continued technology refresh of the Airbus 320 Flight Package, existing A330/A340 simulator, and Boeing 737. The A330/A340 simulator, with side-stick control, complements the narrow-body Boeing 737-800 next generation 6-axis full flight aircraft simulator in performing realistic, high fidelity operational evaluation activities and supporting vital research and development projects such as Closely Spaced Parallel Operations, Required Navigation Performance, and Human-in-the-Loop (HITL) pilot/controller/aircraft terminal operations performance during introduction of new NextGen technology initiatives, NAS modernization, and National Transportation Safety Board (NTSB) safety initiatives.

Currently, there are no other FAA organic simulation platforms to test these advanced NextGen technologies and the Human Factors related issues. The FAA's Level D full flight simulation capabilities provide high fidelity platforms that test all operational parameters. With this capability the FAA can modify the computer code of the simulators to adjust for these new technologies. This ability is not allowed at outside commercial facilities as it would decertify their simulators.

What Does This Funding Level Support?

A. Flight Inspection (FI) Flight Program

$9,000,000 is required to continue the program's heavily integrated multi-year, multi-project, and multi-phased project plans. There are modification deadlines that must be met in order for aircraft to operate in the evolving international environment. These Flight Inspection aircraft ensure 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.

B. Flight Simulation Testing and Research Technologies (START)

$3,500,000 is required for technology refresh enhancements of FAA simulators. It will also provide simulation realism and high fidelity capability for Human-in-the-Loop data across all aviation safety areas. Furthermore, it will provide human factor evaluations of cockpit issues related to work load, operating procedures, and shared Air Traffic Management (ATM) responsibilities.

Technology refresh of the simulators is necessary to keep pace with the changing and expanding commercial airline fleet and will enable the FAA to conduct high fidelity operational procedures and concept development and Research, Engineering and Development (RE&D) programs on emerging technologies to ensure continued worldwide leadership in aviation safety.

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 to verify that NAVAIDS and IFPs conform to prescribed standards and provide accurate guidance to all users. Flight inspection identifies discrepancies that are repaired before they cause delays and diversions of aircraft. In FY 2014 a total of 17,332 flight inspections were conducted. Of the 5,998 periodic NAVAID inspections, 318 had reportable discrepancies or a 5.3 percent discrepancy rate. In the same period 3,238 new and amended IFP inspections were flown. Of those, 527 were found unsatisfactory or required correction, or a 16.3 percent discrepancy rate. These inspections avoided potentially unsafe IFPs from being published. Another 8,096 inspections were accomplished for installation, restoration and optimization of navigation systems.

The Flight START simulators improve air safety by providing the FAA with the capability to conduct operational evaluations on the impact of introducing new technologies and integrating advanced systems within the NAS. The simulators can also be connected via a high level architecture with an air traffic control lab to support on-going and future research and development projects providing regulators with analysis data to ensure safe implementation of new technologies. The aircraft simulators will improve safety by providing accident investigators, other inspectors, and analysts with capability to replicate incident and trend data for analysis and potential input into procedure and/or equipment modifications.

Detailed Justification for - 2E04 Airport Cable Loop Systems – Sustained Support

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

FY 2018 – Airport Cable Loop Systems – Sustained Support
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Airport Cable Loop Systems – Sustained Support	$12,000	$8,000	$8,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Site Engineering and Fiber Optic Installation	14	$7,250.0
b. Program Management	---	750.0
Total	Various	$8,000.0

For FY 2018, $8,000,000 is requested for advanced engineering, construction activities, and Fiber Optic Transmission Systems (FOTS) equipment installations for Ft. Lauderdale (FLL), Anchorage (ANC), Oakland (OAK) and Houston (IAH). Funding will allow completion of reconfiguration and electronics installations at Denver (DEN). Funding will also enable the program to start engineering, planning and installation activities at Salt Lake City (SLC). Funding will allow the program to start and complete eight smaller scale projects (regionals) that will be determined at the Air Ground Integrated Requirements Team (AGIRT) meeting in FY 2018.

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).

What Does This Funding Level Support?

$8,000,000 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 upgraded with fiber 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.

Detailed Justification for - **2E05 Alaskan Satellite Telecommunications Infrastructure (ASTI)**

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

FY 2018 – Alaskan Satellite Telecommunications Infrastructure (ASTI)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Alaskan Satellite Telecommunications Infrastructure (ASTI)	$12,500	$6,000	$20,900	+$14,900

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)	---	$17,270.0
b. Engineering, Technical and Program Support	---	3,630.0
Total	Various	$20,900.0

In FY 2018, $20,900,000 is requested to complete the remaining implementation phase of the Alaskan Satellite Telecommunications Infrastructure (ASTI) Moderation effort which started post Key Site installations in FY 2017 and will continue through the beginning of FY 2019. The funding will allow the continuation of the modernization of an additional 36 sites and is required to adhere to the revised implementation schedule strategy to expedite the program's goal to complete final site installation in 2019.

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)

Additionally, the current system, ANICS, has experienced increased outages and failures.

The ASTI program is projected to have an approved In Service Decision (ISD) by the end of April 2017 and a program re-plan is currently in-process for the Baseline Change Decision (BCD) which is scheduled for the third quarter of FY 2017.

What Does This Funding Level Support?

$20,900,000 is required to successfully continue the Alaskan Satellite Telecommunication Infrastructure (ASTI) modernization effort and achieve system-wide component replacements/upgrades at 62 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.

In FY 2016, the ASTI program completed a revised detailed activity-based schedule and will begin post Key Site installations in FY 2017. The revised schedule planned the majority of the implementation work to be completed in FY 2018. Implementation will complete in April 2019. Additionally, the program revalidated the cost requirements in accordance with the revised schedule. The requested FY 2018 required funding level allows the continuation of implementation of the system-wide upgrades ASTI sites as scheduled.

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 2018 – Facilities Decommissioning
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Facilities Decommissioning	$6,000	$6,200	$13,900	+$7,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Facility Disposition	150	$13,900.0

For FY 2018, $13,900,000 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.

What Does This Funding Level Support?

$13,900,000 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 150 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 2015, the Facility Decommissioning Program disposed of 1126 sites at a 10 year cost avoidance of $41,100,000.

Detailed Justification for - 2E07 Electrical Power System – Sustain/Support

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

FY 2018 – Electrical Power System – Sustain/Support
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Electrical Power System – Sustain/Support	$125,000	$109,800	$110,000	+$200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Location/ Quantity	Estimated Cost ($000)
a. National Airspace System (NAS) Battery Set Replacement	96	$5,300.0
b. Power Conditioning System (PCS)/Uninterruptible Power Supply (UPS)	8	2,040.0
c. Direct Current Backup Systems (DC BUS)	20	2,945.0
d. Air Route Traffic Control Center (ARTCC) Critical and Essential Power System (ACEPS)	4	31,850.0
e. Lightning Protection, Grounding, Bonding and Shielding (LPGBS) Elements	5	1,886.0
f. Electrical Line Distribution (ELD) Replacements	14	19,840.0
g. Engine Generators Replacements	50	11,835.0
h. Critical Power Distribution System (CPDS) Elements	2	2,864.0
i. Environmental Remote Monitoring System (ERMS) Elements	81	1,257.0
j. Program Management and System Engineering		30,183.0
Total	Various	$110,000.0

The Electrical Power Systems – Sustain/Support (PS3) program provides quality electrical power that is reliable and available to meet National Airspace System (NAS) Reliability, Maintainability and Availability (RMA) requirements. The funds are spent on power system components located at 300 Service Delivery Points (SDP) which includes top airports, large terminal facilities, and Air Route Traffic Control Centers (ARTCCs). Projects will be prioritized to provide the maximum risk reduction for a loss of NAS service. Funding will enable PS3 to reduce the large backlog of deteriorating power cables, engine generators, and ACEPS II Phase I equipment that have been identified as systemic problems within the NAS by the Air Traffic Control (ATC) Facilities Sustainment Strategic Plan (SSP). For FY 2018, $110,000,000 is requested to replace and refurbish components of existing prime power equipment, backup power equipment, and electrical power cable infrastructure as identified in the activity tasks.

What Is This Program And Why Is It Necessary?

The Electrical Power Systems – Sustain/Support (PS3) is an infrastructure sustainment and support program supporting 11 electrical power system programs to maintain and improve the overall electrical power quality, reliability, and availability of the National Airspace System (NAS). New NAS programs fund the initial purchase and installation of components for prime and backup power systems and power regulation and protection equipment. After new equipment or facilities have been commissioned, PS3 assumes responsibility for replacing and refurbishing components of the power system infrastructure. To support overall NAS RMA requirements, on a limited case-by-case basis as determined by Power Services Group (PSG), PS3 may provide PCS/UPS, EG, CPDS and DC BUS equipment for locations that currently do not have that equipment or power systems to ensure ongoing standardization of FAA power system components.

PS3 program funds the purchase and installation of components to sustain the $2.9 billion NAS electrical power infrastructure. The PS3 program is vital to both maintaining and increasing NAS capacity through 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 prevent system and equipment failures that result in costly delays.

The 11 electrical power system programs PS3 supporting are:

a. National Airspace System (NAS) Batteries: Batteries supply DC power either directly to NAS service equipment, such as Very High Frequency (VHF) Omnidirectional Range (VOR) installations, or indirectly to NAS equipment via the ACEPS/ACEPS-II, PCS/UPS, legacy DC BUS, or new DC BUS equipment. The batteries provide power for a period of up to 72 hours as required by the supported NAS service. The Battery Program periodically replaces batteries and monitoring components at En Route, Terminal, and GNAS facilities to ensure NAS service reliability. The periods of replacement range from 5 years to 20 years, depending on the type of battery technology that is used to support the NAS service.

b. 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 15 years. The PCS/UPS inventory requires replacement due to reliability and supportability issues attributable to the age.

c. A Direct Current Backup System (DC BUS): converts AC-to-DC commercial electrical power, providing a low-cost, short-term power source at facilities with limited equipment. System availability is increased by preventing commercial power outages that may disrupt air traffic operations for up to several hours. The PS3 sustains DC BUS systems with a useful life of up to 15 years, exception of batteries. A DC BUS averages approximately 10 years old and 40 percent of the DC BUS units that are currently in service are obsolete. There are no new parts that can be ordered to service the obsolete equipment. PS3 must replace the older units with new and serviceable units.

d. Air Route Traffic Control Center (ARTCC) Critical and Essential Power System (ACEPS): provides high-quality and high reliable power to the En Route and large Terminal Control Centers. Federal Aviation Administration (FAA) operates ACEPS at 21 ARTCCs and three large Terminal Radar Approach Control (TRACON) facilities. ACEPS is comprised of engine generators, switchgear, and UPS systems. The ACEPS EG's are severely obsolete with average age being 53 years old with 90 percent of the ACEPS equipment beyond its useful life of 20 years. Current replacement backlog is $560 million (for both ACEPS II Phase I and II). ACEPS current probability of failure is 94 percent over 20-year useful life. A single ACEPS outage results in approximately $2 million/hour economic impact to NAS users in terms of aircraft direct operating costs (ADOC) and passenger value of time savings (PVT) (based on an August 15, 2016, En Route Automation Modernization (ERAM) outage event at Washington ARTCC).

e. 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 at NAS facilities. Sites are hardened sufficiently to prevent NAS delay or loss of service, minimize or preclude outages, and enhance personnel safety. Replacing LPGBS components supports the optimum operation of NAS electronic equipment and personnel safety in the NAS work place. The backlog of replacing LPGBS components at the top 300 SDP's and supporting facilities in the NAS is estimated at $328 million; however, the PS3 is continuing to evaluate the estimate.

f. Electrical Line Distribution (ELD): is the FAA owned infrastructure at airports and ancillary facilities that distributes electrical power to NAS facilities. The ELD is comprised primarily of distribution cables, transformers, and switchgear. Approximately sixty percent of the cable is beyond its useful life, resulting in a cable replacement backlog of approximately $180.45 million. 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. Risk is even higher for the 2,200 NAS facilities that rely solely on commercial power provided by FAA ELD installations that have no backup EG or batteries.

g. Engine Generators (EG): provide backup power when commercial power is unavailable or becomes unreliable. EG have a 20-year useful life. Over 38 percent of the EG in the NAS have exceeded their useful life and out of production, no new parts available to service these obsolete EG's. The top 300 SDP's and supporting facilities has EG backlog of $140 million. EG replacements are based on current facility requirements including stability and suitability. When EG requirements impact Fuel Storage Tank (FST) programs, PS3 may need to perform some fuel line modifications on a case-by-case basis.

h. The Critical Power Distribution System (CPDS): it is a set of standardized power system configurations for Terminal facilities also includes Combined Control Facilities (CCF). It is comprised of components such as electrical distribution equipment, transfer switches, engine generators, UPS, and batteries. The CPDS types have different RMA requirements optimally matched to the criticality and activity level of the NAS facility it serves

i. Environmental Remote Monitoring System (ERMS): PS3 provides power systems interfaces to the ERMS 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.

j. The program management and system engineering component provides support 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. This effort includes identifying options for, preparing drawings of, installing, and administering training and test facilities. It also includes support for long lead time equipment purchases outside of standard project installation schedules.

What Does This Funding Level Support?

$110,000,000 is required for the PS3 programs to sustain NAS power system at 300 SDP's and supporting facilities which includes top airports, large terminal facilities, and Air Route Traffic Control Centers (ARTCCs). Ninety-two percent of NAS services are provided by NAS equipment at these sites. The estimated impact of a single ACEPS outage results in approximately a $2 million per hour economic impact to NAS users. This estimate is based on an August 15, 2016 En Route Automation Modernization (ERAM) actual outage event at Washington ARTCC (ZDC).

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

The Electrical Power Systems – Sustain/Support (PS3) efficiently and effectively achieves its goal using responsible program management techniques complying with requirements from Environmental and Occupational Safety and Health (EOSH) and Environmental Protection Agency (EPA) requirements by reducing arc flash hazards to employees. 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 ensures reliability and availability of the electrical power systems to prevent costly delays and enhances safety for NAS operation to provide reliable world-class air traffic control that is safe and reliable. The Electrical Power Systems – Sustain/Support (PS3) sustainment improves the power service technology assuring that the Next Generation Air Transportation System (NextGen) Program reliably meets its service goals to the NAS operations, global aviation community and to the American Public.

Detailed Justification for - 2E08 Energy Management and Compliance (EMC)

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

FY 2018 – Energy Management and Compliance (EMC)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Energy Management and Compliance (EMC)	$2,000	$2,000	$2,400	+$400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Energy Management and Compliance (EMC)	---	$2,400.0

For FY 2018, $2,400,000 is requested to improve energy efficiencies and achieve cost savings at ATO facilities by installing advanced electric meters, monitoring energy and water consumption, 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 advanced electric meters at four high energy using facilities
- Perform energy and water improvements at three high energy using facilities
- Perform high performance sustainable building (HPSB) infrastructure upgrades at two high energy using facilities
- Develop and implement performance based contracts to maximize third party investments in ATO infrastructure
- Provide required quarterly and annual reports on progress against legislative and executive order mandates to the Department of Transportation (DOT), 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 contact 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 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 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 building systems. 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 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. For the past 10 years, expenditures in electricity have been increasing by an average of three percent per year. Without proactive investments 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. 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 the following:

- Energy use: reduce by 2.5 percent annually from the 2015 baseline by 2025
- Greenhouse gas emissions: decrease by 35 percent from the 2008 baseline by 2025
- Water use: reduce by 36 percent from the 2007 baseline by 2025
- Renewable energy: increase to 25 percent of the total usage by 2025
- Sustainable buildings: increase by 15 percent of inventory by 2025 to reach the eventual goal of 100 percent

What Does This Funding Level Support?

At the requested funding level, the EMC program will be able to achieve measurable cost savings by installing advanced electric meters, monitoring energy and water consumption, 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 Energy Policy Act of 2005 (EPAct)
- The Energy Independence and Security Act of 2007 (EISA)
- Executive Order 13693
- The DOT/FAA Strategic Sustainability Performance Plan (SSPP)

The EMC program has identified 592 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 usage and associated costs at all of these facilities. The EMC program has already identified more than $220,000,000 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 HPSB upgrades are performed. These estimated costs and benefits of executing EMC program improvements are derived from a business case and include the 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 - 2E09 Child Care Center Sustainment

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

FY 2018 – Child Care Center Sustainment
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Child Care Center Sustainment	$1,600	$1,000	$1,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Child Care Center Sustainment	11	$1,000.0

For FY 2018, $1,000,000 is requested to improve the condition of Child Care Centers (Centers) that are located at FAA facilities. FAA will utilize the funding to sustain 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 11 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). Playground equipment located at FAA Child Care Centers is considered real property, permanent structures, and an integral part of the child care center facility. 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 sustainment program that will address facility requirements for the 11 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. 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. Centers continue to be funded if/when funds are available. 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 ensure that these facilities are evaluated and repairs are addressed to avoid deterioration.

What Does This Funding Level Support?

The required funding specifically allocated to these Centers will decrease:

- Deferred maintenance – which is the cost of rebuilding or replacing components whose service life has exceeded their scheduled lifetime
- The risk to building occupants from the potential failure of critical building components

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 benefit the American Public by making government more efficient. Additionally, these Centers have a 100 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 - 2E10 FAA Telecommunications Infrastructure 2 (FTI-2)

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

FY 2018 –FAA Telecommunications Infrastructure 2 (FTI-2)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
FAA Telecommunications Infrastructure 2 (FTI-2)	$1,000	$10,360	$2,000	-$8,360

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Program, Engineering and Implementation Planning Support	---	$2,000.0

For FY 2018, $2,000,000 is requested for program and contract support for engineering, implementation, planning, and market research required to define the requirements and develop the acquisition work products necessary to achieve an Investment Analysis Readiness Decision (IARD) in the first quarter of FY 2018 and begin work for the Initial Investment Decision (IID) in the first quarter of FY 2019. The current FAA Telecommunications Infrastructure (FTI) program is providing services today with its contract ending in 2017 and an extension contract through 2022.

What Is This Program And Why Is It Necessary?

The FTI-2 program is the successor to the existing FTI program which provides the majority of the telecommunications services required by the FAA. Telecommunications services are essential to the operations of the National Airspace System (NAS) and the FAA. As the FTI program comes to an end, FTI-2 is necessary to ensure there is no interruption to the NAS and FAA operations. 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.

In addition to ensuring continuity of existing operations, FTI-2 will be responsible for establishing a modern infrastructure that is capable of meeting the FAA's future demands for telecommunications services through 2035. FTI-2 will provide a robust competitive environment for meeting the FAA's future telecommunications needs. For example, FTI-2 will implement modern IP-based infrastructure to replace legacy TDM-based infrastructure that will no longer be supported in the commercial marketplace. The FTI-2 network infrastructure will support the NextGen concept of operations and the connectivity requirements of NextGen-enabling programs such as the NAS Voice System (NVS) and Data Communications (Data Comm).

What Does This Funding Level Support?

$2,000,000 is required to fund the necessary resources to complete the pre-acquisition activities and develop the acquisition work products necessary to achieve an IARD in FY 2018 and begin acquisition activities related to IID.

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

This funding will produce planning documentation and processes which will allow for full and open competition, ensuring maximum cost effectiveness and innovation in the delivery of these services. The American Public will benefit directly and indirectly through this request based on the following attributes and objectives of the FTI-2 program, to be realized upon implementation:

- Ensure continuity of the telecommunications services required for the operation of the United States Air Traffic Control system as the existing telecommunications services contract reaches the end of its period of performance
- Reduce telecommunications service delivery timeframes so that new capabilities can be put into operation more quickly to support the flying public and air carriers
- Provide enhanced network service monitoring, control, and security capabilities that improve visibility in outage impacts and reduce restoration times
- Provide the enhanced security capabilities needed to ensure secure communications with internal and external stakeholders that depend upon the FAA's wide area networks and SWIM enterprise messaging services
- Provide a highly resilient network infrastructure that has the ability to auto-recover when failures occur so they will be transparent to FAA end user systems and reduce air traffic delays incurred by the flying public and air carriers

Detailed Justification for - 2E11 Data Visualization, Analysis and Reporting System (DVARS)

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

FY 2018 – Data Visualization, Analysis and Reporting System (DVARS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Data Visualization, Analysis and Reporting System (DVARS)	$0	$6,500	$5,500	-$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Data Visualization, Analysis and Reporting System	---	$5,500.0

In FY 2018, $5,500,000 is requested to proceed with the implementation of the Data, Visualization, Analysis, and Reporting System (DVARS) since the current system Performance Data Analysis and Reporting System (PDARS) is no longer sustainable.

What Is This Program And Why Is It Necessary?

The Data, Visualization, Analysis and Reporting System (DVARS) program will provide data and analyses on NAS operations to FAA executives, Air Traffic Managers, and Air Traffic Operations personnel to help them identify deficiencies and develop proposals to improve NAS performance. DVARS is a replacement for the Performance Data, Analysis and Reporting System (PDARS) which currently provides a means for field facility personnel and FAA offices to develop recommendations for improving the NAS through identification of capacity and system efficiency improvements to reduce delays. PDARS provides data, tools, and analysis to operational facilities. Planning for facility and system enhancements requires the ability to track, monitor, and analyze the daily NAS operations. PDARS facilitates the modeling, measurement, and analysis of new runways, airfield improvements, air traffic procedures, and other technological implementations that improve airport capacity and system efficiency.

DVARS will serve as a replacement to PDARS utilizing a modernized platform. DVARS will provide the same capabilities as PDARS through integrated visualization and reporting tools that allow users to access quality NAS data and perform modeling, analysis, and trending. The DVARS requirements identify opportunities for technology insertions, analytical upgrades, and migration to enterprise architecture that implements service oriented architecture features defined by input from the user community. DVARS will provide added benefits to the FAA that include a centralized NAS Database, streamlined system updates with no required field facility technology refresh, the ability to expand user access, and less overall dependency on contract support.

Program work includes:

- Replacement of PDARS through the development and implementation of the DVARS utilizing a phased approach
- Leveraging new technologies to enhance the current capabilities of PDARS through the implementation of DVARS at a centralized FAA data center to provide streamlined system updates and expand user access

- Providing critical system enhancement to the existing PDARS to ensure continued currency of the system through system replacement
- Using PDARS/DVARS operational data to baseline the measurement and analysis of Next Generation Air Transportation System (NextGen) capability improvements such as support to Airspace Optimization (Metroplex)
- Transitional activities for migrating PDARS functions and data to DVARS

DVARS supports the FAA metric "Maintain an average daily airport capacity for Core airports of 57,975 or higher, arrivals and departures."

What Does This Funding Level Support?

$5,500,000 is required to proceed with the development and implementation of DVARS to meet data and processing requirements. The current PDARS system is no longer sustainable and DVARS will provide the appropriate processed information to support daily post operational review, analysis, and reporting to complete field and Headquarters activities. In addition, this program is necessary to provide the data and analytical capabilities required to support operational improvement decisions, program needs, congressional inquiries, and cost benefit analysis.

This funding will also allow for the continued critical enhancement to the PDARS system to ensure the system is current with data requirements for system outputs.

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

PDARS is the Air Traffic Control System Command Centers primary tool for accessing radar data and provides an objective tool for operational planning, assessment and support of flow management initiatives. PDARS is a well-accepted and often-used tool at all major ATC facilities. PDARS is used to increase productivity within the NAS and automated metrics, such as the Holding Report, have replaced previous manual calculations improving accuracy and efficiency. For example, PDARS increases productivity by expediting analysis and providing visual representation that better illustrate air navigation to audiences while saving users approximately 16 hours per analysis. Operational analysis of the PDARS data facilitates improved controller staffing levels within the ATO and supports the introduction of productivity enhancements.

The modernization of PDARS planned through the implementation of DVARS will provide a modernized enterprise solution inclusive of data processing, visualization, and reporting. DVARS will provide the same functionality and products as the legacy system on a modernized platform. DVARS will implement a service oriented architecture which will facilitate its ability to provide data across the FAA using web services in place of the current proprietary vendor format that is used for the PDARS data. Users will gain access to ad hoc reporting capabilities and will be able to query the database and create their own custom reports without assistance from the help desk. In addition, DVARS will increase its impact through improved accessibility of the tools that support this type of work across the FAA, which will result in greater productivity gains once the toolset is widely available. DVARS will provide three years of data in production and for selected users, it would include an additional five years of data in an online archived database.

Detailed Justification for - **2E12 Time Division Multiplexing (TDM)-to-Internet Protocol (IP) Migration**

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

FY 2018 –TDM-to-IP Migration
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
TDM-to-IP Migration	$0	$0	$3,000	+$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
TDM-to-IP Migration	Various	$3,000.0

For FY 2018, $3,000,000 is requested to establish a Program Office to oversee the investment portfolio for TDM-to-IP Migration and to begin the systems interface development work in order to modernize National Airspace System (NAS) Systems to be IP-compatible. The funding will be allocated to the FAA's highest priorities in the areas of automation, weather, navigation and remote monitoring. In addition, a portion of the requested funds will be allocated to pathfinder activities with other NAS programs such as ground-based navigation systems to accelerate their modernization to IP-based interfaces.

What Is This Program And Why Is It Necessary?

Major U.S. telecommunications carriers have stated their intention to discontinue TDM-based services as early as Calendar Year (CY) 2020. The FAA is highly dependent on these services. More than 90 percent of the 23,000+ services obtained under the FAA Telecommunications Infrastructure (FTI) contract are TDM-based to meet the interface requirements of systems that provide critical NAS services such as surveillance radar, air/ground voice, and interphone (ground/ground voice). FTI makes extensive use of the infrastructure of commercial telecommunications carriers to reach more than 4,000 facilities operated by the FAA within the Continental United States (CONUS) and outside the CONUS (OCONUS). To reach such widely dispersed locations, the majority of services are provisioned over wireline infrastructure provided by Local Exchange Carriers (LECs) and Inter-exchange Carriers (IXCs). As these carriers phase-out TDM-based infrastructure and migrate to IP-based technology, the potential impacts to the FAA are significant because the majority of NAS services are dependent upon the precision timing, deterministic performance, and low latency of TDM-based services.

While the FAA has modernization initiatives underway to reduce its dependency on TDM-based services, those initiatives are not fully funded, are not scheduled to be completed before CY 2020, and do not address the full scope of communications interfaces that need to be upgraded under the telecomm carriers proposals. It should also be noted that, while the TDM-to-IP migration by commercial carriers presents challenges for the FAA, it also presents an opportunity to migrate to a more cost-effective technology capable of supporting the NextGen concept of operations that is based on being able to dynamically reconfigure assets to balance workload across available resources. Internet Protocol (IP)-based services also represent a means to improve network resiliency because of the flexibility they provide to dynamically route communications.

The FAA has developed a TDM-to-IP migration strategy that identifies a three-pronged approach for addressing the phase-out of TDM-based services:

- Modernize NAS systems to support IP communications with standard Ethernet interfaces
- Modernize the system communications interface of NAS systems to be IP-compatible as part of the standard technology refresh process
- Implement FTI provided TDM-to-IP network conversion device

If no action is taken by the FAA, the following categories of NAS services will be impacted:

- **Voice** - communications between air traffic controllers and between air traffic controllers and aircraft; also includes voice communications between flight service specialists and aircraft
- **Surveillance** – data from radars that are used to track aircraft
- **Automation** – the processing and exchange of surveillance data between air traffic control facilities
- **Weather** – weather radars, weather sensors, weather reports and alerts, and weather forecast data
- **Inter-facility Data and Flight Data** – the exchange of flight data (including flight plans) between the En Route, Terminal, and Oceanic operating environments

What Does This Funding Level Support?

$3,000,000 is required to fund the establishment of a Program Office to oversee this portfolio investment and begin system interface development in advance of the discontinuance of TDM-based services by telecommunications carriers. If the program is not funded at the requested level, there are potential impacts to terminal automation systems used by controllers for aircraft separation, weather systems, and navigational aids. If these systems are not modernized in advance of the phase-out of TDM-based services, the FAA faces increased safety risks and greater potential for disruptions to NAS operations and air traffic delays.

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

The following benefits will be provided from the work under this program:

- Supports the NextGen concept of operations through the implementation of a dynamically reconfigurable infrastructure
- Supports FAA initiatives to improve the NAS resiliency through a robust 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 air traffic delays
- Accelerates the move to the SWIM Enterprise Messaging infrastructure as programs modernize; Specific benefits include
    - Lower development and operating costs to implement system-to-system interfaces
    - Improved information sharing with internal and external stakeholders
    - Centralized governance, security and management of NAS content and data access
- Ensure continuity of NAS capability to support National Defense and Security (FTI supports the Eastern and Western Area Defense Sectors and multiple joint use radars used by DoD and DHS)
- Ensure continued interoperability between other government Agencies that are essential to the NAS (e.g. Department of Defense, Department of Homeland Security, and National Weather Service)

Detailed Justification for - 3A01 Hazardous Materials Management

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

FY 2018 – Hazardous Materials Management
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Hazardous Materials Management	$26,400	$31,000	$35,300	+$4,300

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Superfund Sites Remediation [The FAA William J. Hughes Technical Center to address 10 Areas of Concern (AOCs)]	---	$13,300.0
b. Investigation and Remediation (Western Service Area to address 57 AOCs)	---	14,175.0
c. Investigation and Remediation (Eastern Service Area to address 10 AOCs)	---	3,425.0
d. Investigation of Other Sites, Regulatory Support, and Program Mgmt	---	4,400.0
Total	Various	$35,300.0

For FY 2018, $35,300,000 is requested to continue the management and remediation of 657 contaminated areas of concern (AOCs), as of October 2016. To achieve compliance with all Federal, State, and local environmental cleanup statutes, including the Resource Conservation and Recovery Act of 1976 (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the FAA must continue mandated program activities.

The $35,300,000 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.
- 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 majority of non-NFRAP status sites remaining on the Docket have significant technical challenges to obtaining closure (e.g., long timeframe for site remediation, Superfund site, and ownership liability issues). The five remaining FAA Docket sites include Mike Monroney Aeronautical Center (MMAC), the Ronald Reagan Washington National Airport (DCA), WJHTC, the Alexandria International Airport-Air Route Surveillance Radar (AEX ARSR), and Sunset Cove, Alaska (JNU RCO).
- Continue to perform investigations and remediation projects at all other identified contaminated sites under 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 657 contaminated areas of concern that require investigation, remediation, and closure activities. 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's National Priority List (NPL) or "Superfund" as one of the nation's most environmentally dangerous sites. Other contaminated sites (many of which are located in Alaska) and the requirements of the HAZMAT management program account for a large portion of unfunded environmental liabilities documented in the FAA's financial statements.

What Does This Funding Level Support?

$35,300,000 is required to continue the management and remediation of 77 contaminated AOCs in FY 2018. Postponing remedial activities at these contaminated AOCs 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 ten percent of the average Program's cumulative closures from FY09 to present calculated as 60 of the AOCs listed in the HAZMAT management program's published Environmental Site Cleanup Report (ESCR). The FAA continues to exceed its goal of closing 60 AOCs annually. In FY 2016 the HAZMAT program began the year with 697 AOCs and removed 150 AOCs. However, during FY 2016, 110 new AOCs were added to the program. These new AOCs were predominately inflows from the facility decommissioning program. From FY 2009 through FY 2016, the HAZMAT management program has closed 556 AOCS.

The direct outcome of closing these sites leads to overall decreased environmental remediation (ER) liability to the FAA. The FAA is currently analyzing alternate remedial technology that optimizes remediation and cost efficiency. Examples of this optimization are at Area D, Area 20A, and Area 29 at the WJHTC NPL site, which is expected to yield at least a 1,000 percent return on investment (ROI) at Area D, 69 percent ROI at Area 20A, and 280 percent ROI at Area 29.

Investigating, remediating, and obtaining site closure at FAA's contaminated AOCs also increase employee and 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 2018 – Aviation Safety Analysis System (ASAS)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Aviation Safety Analysis System (ASAS)	$20,200	$11,300	$12,000	+$700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Hardware/Software System/Services	---	$12,000.0

For FY 2018, $12,000,000 is requested for Segment 3 of the Aviation Safety Analysis System (ASAS) Regulation and Certification Infrastructure for System Safety (RCISS) program. ASAS RCISS Segment 3 will perform technology refresh of existing Information Technology (IT) infrastructure components supporting the Aviation Safety (AVS) safety workforce. ASAS RCISS Segment 3 will continue to deploy modern IT services in the following areas:

- Mobile Technologies
- Remote Connectivity Telecommunications
- Consolidated Server/Storage Area Network (SAN) Systems
- Safety System Hosting Services
- 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 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. 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.; and provides the access methods to all AVS national safety applications developed by System Approach for Safety Oversight (SASO), Aviation Safety Knowledge Management Environment (ASKME), Aerospace Medicine Safety Information System (AMSIS), 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 3, RCISS will perform technology refresh and enhancements on the enterprise infrastructure that was established during RCISS Segments 1 and 2.

RCISS encompasses the following six key components:

- Devices for AVS's 6,400+ 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 AVS 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 required to support new (SASO, ASKME and AMSIS) and legacy AVS safety applications
  - Provides enhanced data center environmental upgrades to increase reliability, maintainability and availability (RMA)
- Commercial-Off-the-Shelf (COTS) Software (Operating System Software, Database Software) - Activities include acquisition and 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 providing the knowledge and expertise necessary to refine and streamline 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's need for an enterprise IT infrastructure that supports 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 IT infrastructure to be modified to respond to changing business processes without additional staffing requirements, such as allowing for a more mobile workforce and the creation of virtual workplaces.

What Does This Funding Level Support?

$12,000,000 is required to support 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 performs 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, ASKME and AMSIS programs by providing the IT infrastructure they require. The data developed, manipulated, analyzed, and reported on by the SASO, ASKME and AMSIS programs will reside on the ASAS RCISS IT infrastructure. Without the ASAS RCISS IT infrastructure, the full capabilities and benefits promised by SASO, ASKME and AMSIS will not be realized.

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

The ASAS RCISS program provides detailed reports about its IT investments and their progress over time to senior FAA executives. The ASAS RCISS program assesses actual program results against baseline expectations determining if performance and benefit targets as well as customer needs are being met. The program management team continues to conduct surveys and data calls to monitor actual investment costs, schedules, benefits, performance, and mission outcomes.

The RCISS program management team periodically surveys end users to measure effectiveness of mobile safety devices deployed. Results are used to validate that 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 mobile telecommunication devices to the AVS safety workforce
- Technology refresh of end user devices to assure an acceptable level of system reliability, maintainability, and availability
- Development of standard aviation safety data sets to ensure enterprise conformity to increase efficiency and effectiveness of data analysis

Detailed Justification for - 3A03 National Air Space Recovery Communications (RCOM)

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

FY 2018 – National Air Space Recovery Communications (RCOM)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
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	---	$2,670.0
b. Emergency Operations Network (EON)	---	2,900.0
c. Emergency Operations Facilities	---	1,480.0
d. Communications Support Team (CST)	---	340.0
e. Secure Communications (COMSEC)	---	170.0
f. Information Technology Support	---	2,740.0
g. Satellite Telephone Emergency Network (STEN)	---	1,700.0
Total	Various	$12,000.0

For FY 2018, $12,000,000 is requested for NAS RCOM. For this amount the Command and Control Communications (C3)/RCOM program provides the FAA with the capability to directly manage the NAS during local, regional and national emergencies when normal common-carrier communications are interrupted; provides and enhances a variety of fixed-position, portable, and transportable emergency communications systems that support crisis management; enables the FAA and other Federal agencies to exchange classified and unclassified communications to protect national security; and supports and modernizes the Washington Operations Center Complex and several FAA continuity of operations (COOP) sites, which ensures FAA decision makers have command and control communications during times of crisis.

Funding is spent on the following activities:

- $2,670,000 to continue funding 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).
- $2,900,000 to continue funding the Emergency Operations Network (EON). Support includes the continued development of EON Geographical Informational Systems (GIS) layers, maps, and visualization tools, as well as the EON Dashboard, EON Collaborative Communication platform, and the EON Data Discovery platform.
- $1,480,000 to continue funding the Emergency Operations Facilities activities which includes the continued support of activities related to audio/video display systems, national situational awareness view, Domestic Event Network (DEN), incident monitor, emergency notification system, conference-bridge, help desk support, and equipment refresh.
- $340,000 for support of the Communications Support Team (CST) emergency response activities, related communication equipment, and Emergency Response Vehicle (ERV).

- $170,000 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.
- $2,740,000 for continued funding of C3 Information Technology (IT) activities used to maintain the IT infrastructure for COOP sites and the Emergency Operations Network.
- $1,700,000 for continued support and refresh of the Satellite Telephone Emergency Network (STEN).

What Is This Program And Why Is It Necessary?

$12,000,000 is requested to meet the minimum support necessary to maintain the infrastructure mandated by Federal continuity directives; Executive Order 13618, Assignment of National Security and Emergency Preparedness Communications Functions, Presidential Policy Directive 40 (PPD-40), Federal Continuity Directive 1 (FCD-1), Federal Continuity Directive 2 (FCD-2), Federal Executive Branch National Continuity Program and Requirements, and FAA Order 1990.1, FAA National Command and Control System, Office of Science and Technology Policy (OSTP)/Office of Management and Budget (OMB) Directive D-16-1, Minimum Requirements for Federal Executive Branch Continuity Communications Capabilities, DOD 5220.22-M, National Industrial Security Program Operating Manual (NISPOM), Intelligence Community Directive 705, Sensitive Compartmented Information Facilities (SCIF), and Presidential Decision Directive – 63 (PDD-63), Critical Infrastructure Protection. The infrastructure includes the Washington Operations Center Complex (WOCC), the Emergency Operations Center (EOC), and the Primary Alternate Facility (PAF), as well as the minimum requirements for Continuity Communications Capabilities.

The C3/RCOM program provides senior leadership with command and control emergency communications and provides the FAA and other Federal agencies the ability 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 COOP sites, which ensures FAA decision makers command and communications during times of crisis. Where applicable, C3/RCOM 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/RCOM 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 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/RCOM 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/RCOM 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/RCOM program has had its responsibilities increased to meet the current national security demands.

What Does This Funding Level Support?

$12,000,000 is required 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 Administration'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 C3/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 - 3A04 Facility Security Risk Management

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

FY 2018 – Facility Security Risk Management
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Facility Security Risk Management	$15,000	$21,000	$20,400	-$600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Facility Security Risk Management (FSRM)		
a. Personal Identification Verification (PIV) Retrofit	---	$8,775.0
b. Homeland Security Presidential Directive (HSPD) – 12 Security Level (SL) 1/2	---	1,200.0
c. HSPD – 12 Upgrades Security Level (SL) 3	---	5,125.0
Total	Various	$15,100.0
B. NAS Resiliency	---	$5,300.0

For FY 2018, $20,400,000 is requested to support the continuing effort for the following security upgrades, which will result in increased security at FAA staffed facilities:

A. Facility Security Risk Management

- 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
- Technology refresh of security systems at SL 3 facilities to replace outdated security equipment

B. NAS Resiliency

- Continuation of camera and PIV card reader installations at all access points to areas housing critical National Airspace System (NAS) equipment in all Air Route Traffic Control Center (ARTCC) and Air Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) facilities that support the busiest U.S. terminal areas

What Is This Program And Why Is It Necessary?

A. Facility Security Risk Management (FSRM)

In 1999, the FAA established the FSRM program to implement standardized facility protective measures at FAA staffed facilities, to protect FAA personnel and assets. These measures include personnel access control, surveillance, vehicle access control, visibility enhancements, x-ray machines, and maintenance services of installed security systems. To aid in NAS-wide standardization, and associated cost savings, 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.

The FSRM program is necessary because security vulnerabilities jeopardize air traffic services to the NAS. 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. The program is instrumental in ensuring that the FAA efficiently and cost effectively implements all issued Presidential Directives aimed at securing federal facilities and personnel, including HSPD-7 "Critical Infrastructure Identification, Prioritization, and Protection", HSPD-12 "Policy for a Common Identification Standard for Federal Employees and Contractors", and HSPD-16 "National Strategy for Aviation Security".

B. NAS Resiliency

The FSRM program also provides support to other FAA programs. To mitigate the risk from insider-threat scenarios, efforts to implement real time access control and monitoring through the expanded use of HSPD-12 required PIV card and cameras will continue in FY 2018. This includes all access points to areas housing critical NAS systems in all ARTCCs and ATCT/TRACONs that support the busiest U.S. terminal areas.

What Does This Funding Level Support?

A. Facility Security Risk Management

The funding is required to sustain the work of securing FAA facilities and performing the activities described above.

B. NAS Resiliency

The requested funding will increase the resiliency of the NAS through the installation of:

- Single factor PIV ID card readers at all doors to areas that contain critical system components and at facility perimeters
- Multi-factor PIV card readers at those exterior doors routinely used for access where contract security officers are present and at all exterior doors at those facilities where they are not present
- Surveillance cameras and intrusion-detection systems at the perimeter doors of areas that contain critical systems components

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

A. Facility Security Risk Management

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 these measures led to security accreditation of facilities as required by FAA Order 1600.69. The impact of those upgrades has been to reduce the risk of intrusion and unauthorized entry. This in turn provides increased safety to the American Public.

B. NAS Resiliency

The impact of these upgrades will be to reduce the risk of intrusion, unauthorized entry, and insider threats. This in turn will provide increased safety to the American Public and reduces the risk of economic disruption due to security breaches.

Detailed Justification for - 3A05 Information Security

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

FY 2018 – Information Security
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Information Security	$12,000	$24,970	$20,700	-$4,270

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Information Systems Security (ISS)	---	$12,000.0
B. NAS Critical Infrastructure Cyber Enhancements	---	8,700.0
Total	Various	$20,700.0

For FY 2018, $12,000,000 is requested to fund Mission Support Information Systems Security (ISS), and $8,700,000 is requested for National Airspace System (NAS) Critical Infrastructure Cyber Enhancements.

The FAA must ensure the integrity and availability of all critical systems, networks, and infrastructure under conditions of increased threat from cyber terrorism and malicious activities. Under FISMA 2014, the FAA must identify and provide information security protection commensurate with the risk and magnitude of potential harm that could result from unauthorized access, use, disclosure, disruption, modification, or destruction of information that supports the agency, aviation safety and security, and the NAS.

The funded programs provide mission assurance by rebalancing existing cyber organizational assets to ensure that all information and cybersecurity functions are synchronized under a cohesive security framework. This structure provides clear lines of communication, defined authorities, speed-of-action and agility, and fully incorporates National Institute of Standards and Technology (NIST) guidance throughout the system life cycle to achieve the FAA mission and vision.

The Presidential Policy Directive 21 and Executive Order (EO) 13636 identify the NAS as a national Critical Infrastructure and Key Resource (CIKR), for which, a cyber-attack could have catastrophic economic and national defense impacts requiring the FAA to further strengthen the security and resiliency of this critical infrastructure and further direct the FAA to protect and ensure the integrity, confidentiality and availability of all FAA information and information systems.

What Is This Program And Why Is It Necessary?

The continuing mission of the FAA is to provide the safest, most efficient aerospace system in the world. Protecting FAA's information systems is a priority for ensuring ongoing operations of our mission critical infrastructure. Cybersecurity is a priority in executing our mission and vision. It is becoming more critical every year as there are continuous cyber threats to breach FAA information systems and networks. To meet this challenge, the FAA builds on a collaborative and holistic enterprise-wide approach to cybersecurity strategy. This ensures an informed and coordinated approach to cyber risk management, while maintaining the flexibility for domain-specific approaches to implementation and execution. The FAA continues to develop a strong cybersecurity governance process and strengthen the synergy between its three operating domains: NAS, R&D, and Mission Support.

The FAA's mission critical systems, including administrative systems, air traffic control systems, and air safety systems are under constant threat of disruption and disablement. The nature of these threats changes rapidly, using increasingly sophisticated resources and technology. To address these threats, the ISS program plans and acts proactively to assess and invest in current and emerging protective technology. A single effective cybersecurity attack could cause aviation failures, loss or corruption of information, operational gaps, and a breakdown in public trust, with resultant loss of life and property. Maintaining a comprehensive ISS Program to prevent breaches that degrade or disrupt critical FAA systems requires ongoing resource and funding commitment.

The ISS Program delivers cybersecurity services that protect FAA information and information systems, inclusive of personally identifiable information (PII), and ensures the integrity, confidentiality and availability of more than 300 FAA critical information systems, networks, and infrastructure. ISS enhances safety and security between NAS and Non-NAS systems as they are connected to the Mission Support Domain. Exploitation of software, hardware and network infrastructure could disrupt services and impact the safety, security and efficiency of FAA systems.

The FAA is evolving its risk-based approach to computer network defense by integrating new technologies into the cybersecurity program. This includes participation in the CDM program, led by DHS, which is designed to support the organization's continuous monitoring strategy by centralizing inventory management and control, scanning and patching capabilities, and device monitoring and reporting.

The FAA is also transforming its Security Operations Center (SOC) to improve processes, communications and escalation, tooling, and analysis capability in order to continue to protect the FAA mission from cyber threats. The SOC is comprised of security technologies to provide effective, enterprise-focused cyber security services to its customers. The SOC is a 24x7x365 day operation that also represents the DOT as the single source provider of the cyber "big picture" when reporting to DHS. It is the central reporting point for all cyber events occurring within the FAA and DOT. At the Federal reporting level, the SOC holds seats on the National Cyber Response Coordination Group (NCRCG), the DHS-sponsored emergency action team, and the advisory council reporting directly to the White House.

The NAS Infrastructure Cyber Program provides services and capabilities for Air Traffic Control (ATC) to ensure the NAS remains secure and resilient. This includes enterprise security services for assessing and performing acquisition activities to implement services and NAS system integration to utilize the services. The NAS Cyber Program also supports mitigation solutions to address weaknesses in NAS F&E funded systems for POA&M Remediation. NAS Cyber also addresses evolving threats through continued development of system and enterprise NAS risk mitigation solutions as new cyber threats and mandates evolve.

What Does This Funding Level Support?

Funding provides cybersecurity services and enhancements required to maintain a high level of vigilance essential to the overall success of the FAA's mission, including the detections of alerts and attacks generated against the DOT infrastructure, mitigation of cyber events, and privacy breaches. Funding also enables compliance with Federal Information Security Management Act (FISMA) of 2014, Presidential Policy Directive-21 (PPD-21) and National Institute of Standards and Technology (NIST) regulations.

Funding supports a comprehensive and coordinated cybersecurity strategy implementation to enhance and refine the FAA cybersecurity structure. The effort helps to clarify cybersecurity roles and responsibilities, improve management security controls, fully incorporate NIST information security guidelines throughout the system life cycle, incorporate all areas of software development and life-cycle processes, and address the interdependencies between aircraft and air traffic systems.

Funding for the ISS Program provides cybersecurity products and services for FAA's three operating domains to protect FAA's information, information systems, and infrastructure from cyber terrorism and malicious activities. It provides the ability to:

- integrate information security efforts into all acquisition and operation phases to protect FAA people, buildings, and information
- support efforts to safeguard homeland security, in particular the FAA's component of the nation's critical infrastructure and industry

- provide continuous aviation information to external partners by monitoring, restoring, and directing the information systems and networks
- sustain facility operational availability at 99 percent, evaluate system operations, and implement solutions to increase operational readiness
- complete preventive maintenance activities, equipment modifications, service certifications, and restoration activities
- improve incident detection and cyber incident response within FAA systems and the NAS infrastructure environment.

Funding also supports the NAS Cyber Program with the ability to perform activities identified in the NAS Resiliency assessment conducted in the first quarter of FY 2015 and highlighted in the GAO cybersecurity audit report:

- Enhanced Data Flow Monitoring (Intelligent Traffic Monitoring): Planned Improvement & Enhancements related to the NAS Infrastructure aimed at improving the cyber security posture via increasing situational awareness for the operational NAS cyber security monitoring capability; enables full monitoring coverage of data flows (internal and external) through implementation of cyber security sensors throughout the NAS thereby enhancing modeling and detection of anomalous data flow activities. This supports a proactive versus reactive cyber security response, fostering actions geared to minimizing potential impacts to ATC operations. NAS Data Flow capture and processing infrastructure will be deployed at NAS operational facilities to provide this capability.
- NAS Remote Management Access Gateway (RMAG): A secure enterprise for authorized personnel to access NAS assets from external networks to meet the growing NAS remote system management requirements. The current NAS Enterprise Security Gateway (NESG) does not provide application services for NAS remote management.
- Centralized Software Management Security: Improve the cyber security posture of the NAS by providing a centralized capability for security patch and malicious code protection updates, establishing a standard secure method to access critical security configuration updates, and reducing the risk of security compromise. This will support a more reliable and resilient operating NAS infrastructure.
- Remediate High Priority System Vulnerabilities: Remediate all system level vulnerabilities and high-priority POAMs and evaluate solutions at the enterprise level for more efficient and cost effective approaches. Mitigates system security vulnerabilities through NAS system modification and integration with enterprise NAS security services.

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

The FAA mission is to ensure the safest and most efficient operation of aviation in the United States. We are undertaking multiple strategic and tactical initiatives to facilitate and support the development of a comprehensive and strategic framework to reduce cybersecurity risks to the national airspace system, civil aviation, and agency information systems.

The FAA is examining cybersecurity risks across the aviation ecosystem as the basis of a framework to strategically understand those risks, map them to impacts of safety and efficiency on the national airspace, and identify appropriate mitigation approaches that least impact aircraft, airlines, airports, ATC and actors, which include the flying public. This involves the identification of those public and private sector entities comprising the aviation ecosystem and the functions and responsibilities as they relate to the phases of flight. This effort facilitates identification of those cybersecurity risks that may impact safety and cause disruption to the efficient operation of the NAS. The results of this effort will be the identification of appropriate mitigation strategies to reduce cybersecurity risks across the aviation ecosystem. Execution of tasks in support of this effort requires collaboration across the aviation ecosystem, domestically and internationally, such as the International Civil Aviation Organization (ICAO).

As we strive to reach the next level of safety, efficiency, environmental responsibility and global leadership, the FAA is accountable to the American public and its stakeholders. Cybersecurity efforts protect critical data flows, privacy information, and navigation and communication channels. It is the foundation of the systems that enables Unmanned Aircraft Systems (UAS) to safely operate in national airspace. Strong relationships with external, commercial and government partners allow the aviation sector to safely evolve with emerging technology and meet the public's safety and service expectations.

Detailed Justification for - 3A06 System Approach for Safety Oversight (SASO)

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

FY 2018 – System Approach for Safety Oversight (SASO)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
System Approach for Safety Oversight (SASO)	$18,900	$17,200	$25,800	+$8,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Prime Mission Product	---	$14,500.0
b. Program Management	---	4,300.0
c. System and Business Process Re-Engineering	---	3,100.0
d. Change Management and Training	---	3,900.0
Total	Various	$25,800.0

For FY 2018, $25,800,000 is requested to continue the development of the Flight Standards Safety Assurance System (SAS) Phase IIB, Segment 1a.

System Approach for Safety Oversight Phase IIB

SASO Phase IIB is the second phase of SAS development and implementation and covers the years FY 2015 through FY 2027. During this phase, SAS functionality will be expanded to include all Title 14 Code of Federal Regulations (CFR) Parts regulated by the Flight Standards Service (AFS). Additionally, the remainder of the safety management system (SMS) components (safety policy, safety risk management, safety promotion) will be incorporated in AFS business processes. SASO Phase IIB, Segment 1a will implement the Phase IIB requirements associated with AFS' highest priorities, including safety oversight of aviation training schools and adding an interface with the Designee Management System. SAS functionality will also be enhanced in the areas of activity recording, office workload list, risk profile, and the Certificate Services Oversight Process. Segment 1a will also develop and implement efficiencies in the repair station assessment process. Finally, SASO Phase IIB, Segment 1a will develop SMS safety promotion educational materials and support systems to incorporate system safety and safety management principles for general aviation certificate holders. Follow-on Phase IIB segments will be prioritized to address remaining SASO program requirements.

During FY 2018, SASO Phase IIB, Segment 1a activities will continue system engineering efforts to tie software automation design to reengineered business rules. Following a series of element design reviews, a full system Critical Design Review (CDR) in the first quarter of FY 2018 will demonstrate that the maturity of the SAS design is appropriate to support Phase IIB, Segment 1a objectives. This triggers full scale software development, integration and test, and leads to Development Testing part 1 (DT1) in the third quarter of FY 2018. The final efforts in FY 2018 are preparations for Development Testing part 2 (DT2) scheduled for early FY 2019. FY 2018 funding also supports the initiation of a training development effort that will lead to training courses for workforce transition and general aviation certificate holders.

Funding in FY 2018 also supports the investment analysis for Phase IIB, Segment 1b as well as an analysis of the existing AFS information technology infrastructure and development of the requirements and business case for the potential consolidation/optimization. These analyses will define the next Segment, the future state of AFS business processes and systems, and establish a defensible plan for future AFS/SASO investment.

During FY 2016 and FY 2017, SASO Phase IIB Segment 1a achieved accomplishments in several areas. The program developed business process re-engineering "as-is" and "to-be" process maps defining new AFS oversight processes. The program held a series of Joint Application Design sessions that connected automation design to the new business processes. The program also completed critical design reviews for seven focus areas that capture all Phase IIB, Segment 1a requirements. Finally, the program started SAS Phase IIB, Segment 1a software development. All these efforts are guided by an overarching program management effort ensuring best practices such as comprehensive risk management and financial management processes are exercised, as well as a robust change management effort implemented according to a change management strategic plan.

What Is This Program And Why Is It Necessary?

The SASO program is one of several FAA initiatives to increase aviation safety and control cost by adopting International Civil Aviation Organization (ICAO) standards and recommended practices incorporating Safety Management System (SMS) principles. To accomplish this, 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. SASO is also a key element in the FAA Risk-Based Decision Making Strategic Initiative.

As the regulator of a major segment of the U.S. aviation industry, AFS must continually improve aviation safety. 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 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 allowing 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 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 the SAS, AFS expects to contribute to the FAA Organizational Success Increase (OSI) goal of 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 FY 2018. The flying public is the primary beneficiary of the safety oversight system that is rooted in safety management principles.

What Does This Funding Level Support?

The required funding supports continued SAS automation development, policy updates, training, and implementation to achieve the full oversight capabilities and benefits as envisioned during the Service Analysis and Strategic Planning phase of the program and approved in previous JRC investment decisions.

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 SMS principles, AFS oversight of the aviation industry will result in fewer accidents attributable to gaps or failures of FAA oversight. Standardization and consolidation of business processes and associated systems will lower information technology maintenance costs as well as increase efficiency of the AFS workforce. Increased efficiency of the AFS workforce will in turn reduce future requirements for staffing increases to meet the needs of an increasingly large and more complex civil aviation system in the United States.

Detailed Justification for - 3A07 Aviation Safety Knowledge Management Environment (ASKME) – Segment 2

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

FY 2018 – Aviation Safety Knowledge Management Environment (ASKME)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Aviation Safety Knowledge Management Environment (ASKME)	$7,500	$4,200	$4,000	-$200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
ASKME Segment 2		
a. Program – Level Technical Analysis and Engineering	---	$1,600.0
b. Application/Solution Design, Development and Testing	---	2,300.0
c. Certification and Accreditation (C&A)/Security Testing	---	100.0
Total	Various	$4,000.0

For FY 2018, ASKME Segment 2 is requesting $4,000,000 to fund the continued iterative Design, Development, Testing, and Production Releases for the ASKME Segment 2 Integrated Development Effort (IDE). Segment 2 IDE is an integrated system that will automate Air Certification Service (AIR) business functions: Airworthiness Directives Development (ADD), Compliance and Enforcement Actions (CEA), and Airworthiness Certification (AWC).

ASKME Sub-functions status of ongoing work:

- ADD – Completed detailed technical requirements for integrated system FY 2015. Iterative Development started FY 2015. Projected completion September 2019.
- CEA – Completed business requirements FY 2015. Completed detailed technical requirements for integrated system FY 2015. Iterative Development started FY 2015. Projected completionSeptember 2019.
- AC – Completed detailed technical requirements for integrated system FY 2015. Iterative Development to start FY 2016. Projected completion September2019.

What Is This Program And Why Is It Necessary?

The ASKME is a suite of Information Technology tools designed to support and enable the FAA Aircraft Certification Services (AIR) to automate business processes resulting in efficiencies 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.

ASKME deliverables will provide 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: design and production certification decision rationale, rule and policy interpretations, and aircraft industry manufacturers audits. 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. AIR technical staff can then 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.

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 historical 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 performance management, resource utilization, 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.

What Does This Funding Level Support?

The required funding allows FAA to complete the remaining ASKME Segment 2 baseline and provide users with enhancements to previously deployed functionality, in-service user training, and field implementation support.

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

The goal of ASKME is to improve the Aircraft Certification Service's (AIR) ability to fulfill its mission and, by extension, facilitate air travel accident prevention. The projected dollarized safety benefit was calculated for each ASKME sub-function. The safety benefits are derived from the economic value associated with the prevention of accidents, including fatalities, injuries, and equipment loss and damage.

Below is a summary of the ASKME Segment 2 sub-functions being implemented and the associated safety benefits projection (in constant-year FY 2011 dollars) through FY 2023:

Sub-Function	Safety Benefits (through FY 2023) in Constant Year ($000)
Airworthiness Directives Development (ADD)	$47,319
Compliance and Enforcement Actions (CEA)	$25,688
Airworthiness Certification (AC)	$18,357

All Segment 2 sub-functions support the FAA's Strategic Initiative for Risk-Based Decision Making.

Detailed Justification for - 3A08 Aerospace Medical Equipment Needs (AMEN)

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

**FY 2018 – Aerospace Medical Equipment Needs
($000)**

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Aerospace Medical Equipment Needs	$2,500	$3,000	$7,000	+$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Aeromedical and Human Factors Research Laboratory Equipment (AMEM II)	12	$3,000.0
B. Aerospace Medical Equipment and Infrastructure Needs (AMEIN) Wind and Wave Evacuation and Survival (WiWAVES) Facility	--1	4,000.0
Total	Various	$7,000.0

A. Aeromedical and Human Factors Research Laboratory Equipment (AMEN II)

For FY 2018, $3,000,000 is requested to continue the replacement of the Aerospace Medical Research Division's laboratory assets at the Civil Aerospace Medical Institute (CAMI). The AMEN II program includes the replacement of CAMI Human Factors Research Division old and obsolete research laboratory assets. AMEN II will replace 12 equipment items, all of which are Commercial-Off-The-Shelf (COTS) or modified-COTS products. The equipment includes: Five Flight Operations and Air Traffic Control Simulators; Two Biochemistry/Forensic Toxicology Testing Systems; Two Specialized Cameras; One Anthropometric Test Device; One Engineering Calibration Device; and One Data Acquisition and Processing System.

B. Wind and Wave Evacuation and Survival Facility (WiWaves)

For FY 2018, $4,000,000 is requested to enable the Wind and Wave Evacuation and Survival program to replace the aging Water Survival Research Facility (WSRF) at CAMI. To begin the process of building the new WiWAVES facility, the following actions will be required in FY 2018 as follows: (a) Award Architecture and Engineering Type A Design Development Drawings and Type B Construction Drawings contracts for WiWAVES facility; (b) Complete Engineering and Ground Studies; and (c) Complete Environmental Studies.

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. 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).

A. Aeromedical and Human Factors Research Laboratory Equipment (AMEN II)

CAMI in-house research personnel discover methods and recommend strategies to enhance the safety, security, health, and 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. This research will lead to a better understanding of disease, human performance, and environmental stress factors (alcohol, fatigue, hypoxia, g-forces) that concern medical certification decision-making processes; aeromedical education programs; accident investigation practices; certification of aircraft equipment and protective devices; and harmonization of standards. This research also 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. The AMEN investment supports CAMI research summarized as follows:

- **Aerospace Medical Systems Analysis:** Assessment of 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.
- **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.

The equipment that will be replaced by the AMEN II program will include legacy equipment that has exceeded its useful life, ranging from 5 to 31 years old, with an average life of 14 years. The advanced age of the equipment will result in a serious shortfall in system capability and efficiency of the aforementioned research.

B. Wind and Wave Evacuation and Survival (WiWAVES)

CAMI plans to construct a new Wind and Wave Evacuation and Survival (WiWAVES) Facility, to be located west of the CAMI building on the land designated by the MMAC Office of Facility Management (AMP-001). The WiWAVES facility will be approximately a 50,000 sq. ft. building that houses a water survival tank and a dry test area comprising a wind and wave chamber for escape and survival systems equipment studies, wind studies, research, education and testing. The tank and dry test area will be surrounded by structural and mechanical apparatus necessary to support: Fuselage placements; aircraft attachments for multiple escape slides; deployment of water survival inflatables; wind machines to emulate high-fidelity windstorm operating environments; and wave generating capability necessary to challenge the design and function of water safety and survival equipment and procedures. These upgrades are designed to facilitate the FAA's research and education activities that ensure aircraft passengers have the knowledge and equipment necessary for water survival during emergency situations.

WiWAVES is replacing the current WSRF, a water tank that was installed in 1967 and is deteriorating to the point of potential structural failure. The current WSRF failed structurally in 2012 and was out of service for several months. All activities involving the use of overhead cranes, aircraft escape slide attachments, fuselage dunking equipment, and emergency equipment repair/reconfiguration were not conducted during this period. The antiquated WSRF has been repaired with certain conditions and the remaining service life is less than three years.

What Does This Funding Level Support?

A. Aeromedical and Human Factors Research Laboratory Equipment (AMEN II)

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 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. Parts' obsolescence will increasingly cause higher costs for replacement parts when they can be found or fabricated.

B. Wind and Wave Evacuation and Survival (WiWAVES)

The current water survival research facility used by Aerospace Medical Education Division and the Aerospace Medical Research Division is old and becoming obsolete. The WiWAVES facility will be equipped with much needed upgrades not available at the current aging Water Survival Research Facility (WSRF). These upgrades will address significant operational safety issues of the WSRF, including, but not limited to: wave generation system, wind fan array system, a wet work room, ventilation system, floor drains, and lighting systems. These upgrades are designed to facilitate the FAA's research and education activities that ensure aircraft passengers have the knowledge and equipment necessary for water survival during emergency situations. 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 water survival tank exceed its expected life span of 20-25 years and is becoming more difficult to maintain at a level that is sufficient to serve CAMI's needs. If the WSRF structurally fails, this event will stop all water survival research and training activities of the FAA, including safety analyses of related equipment and emergency procedures. This will impede achieving AVS' aeromedical, flight standards (AFS), aircraft certification (AIR), and Accident Prevention and Investigation (AVP) safety goals relative to water survival and related emergency events. No other such capability currently exists within civil aviation industry.

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

These investments will allow for the continued performance of aerospace medical, human factors research, and continued performance of aerospace medical and cabin safety 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. Identifying survival factors in simulated studies is essential to prevent death and injury.

The beneficiaries of the research resulting from the use of the equipment sought by AMEN and WiWAVES 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 - 3A09 NextGen – System Safety Management Portfolio

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

FY 2018 – System Safety Management Portfolio
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
System Safety Management Portfolio	$17,000	$17,000	$16,200	-$800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Aviation Safety Information Analysis Sharing (ASIAS)	---	$15,200.0
B. System Safety Management Transformation (SSMT)	---	1,000.0
Total	Various	$16,200.0

For FY 2018, $16,200,000 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 assessments. In addition, safety analysis capabilities, tools and metrics will be developed to integrate safety data from a number of disparate sources into a suite of system level models. SSMT will deliver products that allow users to evaluate system safety performance in near-real-time. 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 National Airspace System (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)

For FY 2018, $15,200,000 is requested to provide the following:

- Transition non-protected ASIAS data to a FAA cloud-based architecture for improved data storage and analytical capabilities, and to provide limited data sharing and access to other ASIAS stakeholders
- Develop investigative tools to detect and explore trend anomalies for additional undesired aircraft states to provide automated alerting of anomalies on NAS-wide hot spots, and to detect new safety risk areas for previously unknown trends
- Transition Commercial Aviation Safety Team (CAST) metrics and dashboards utilizing fused data sources and new ASIAS communities

B. Systems Safety Management Transformation (SSMT)

For FY 2018, $1,000,000 is requested to provide the following:

- Produce integrated world-wide risk analyses through integration with the EUROCONTROL Risk model
- Produce monthly NAS-wide risk metrics, including Automatic Dependent Surveillance-Broadcast (ADSB) data in calculations, and reports including system baselines and operational impacts of NextGen changes

- Develop linkage from publicly available aviation accident data from the NTSB and ASIAS to ISAM data (manually)

What Is This Program And Why Is It Necessary?

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.

A. Aviation Safety Information Analysis and Sharing (ASIAS)

ASIAS is a collaborative government and industry initiative to share and analyze data to proactively discover safety concerns before accidents or incidents occur, leading to timely mitigation and prevention. The primary objective of ASIAS is to provide a 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, as available. 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. ASIAS supports risk based decision making, a core element of the Administrator's Strategic Initiative to make Aviation safer and smarter.

B. Systems Safety Management Transformation (SSMT)

SSMT enables safety assessments of proposed NextGen concepts, algorithms, and technologies and provides system knowledge to understand 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 in support of safety mitigations and future NextGen safety risks. It 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.

What Does This Funding Level Support?

A. Aviation Safety Information Analysis and Sharing (ASIAS)

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. Funding supports ASIAS in the ability to provide safety analyses to mitigate high-priority risks identified in the NAS, as authorized by the ASIAS Executive Board (AEB), to FAA organizations and ASIAS participants, as well as others in the aviation community (e.g., commercial, general aviation, helicopters, UAS, airport operators, airport authorities) and government agencies such as National Transportation Safety Board (NTSB), United States Department of Defense (DOD), and the National Aeronautics and Space Administration (NASA). Implemented changes will reduce the risk of would-be accidents.

B. Systems Safety Management Transformation (SSMT)

SSMT 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. 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. SSMT provides a range of risk-analysis outputs at varying levels of detail to support multiple FAA stakeholders.

Funding supports the integration of 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 its contributions to the reduction of the aviation accidents and fatalities across a broad range of aviation communities. ASIAS is discovering potential safety issues in the NAS and is supporting development of safety enhancements (SE) to mitigate risk, working with the Commercial Aviation Safety Team (CAST), the General Aviation Joint Steering Committee (GAJSC) and FAA lines of business to include the Performance Based Navigation (PBN) Programs, such as Metroplex.

B. Systems Safety Management Transformation (SSMT)

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, benefits are achieved by the FAA and its industry partners that they are able to monitor the effectiveness of implemented safety enhancements, establish baselines and trending capability for safety metrics, and identify emerging risks.

Integrated world-wide risk analyses through integration with the EUROCONTROL Risk model further support safety assessments of transatlantic air transportation, while quantification via linkages to accident data enable assessment of precursors and hazards within the ESDs and Fault Trees.

Detailed Justification for - 3A10 National Test Equipment Program (NTEP)

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

FY 2018 – National Test Equipment Program (NTEP)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
National Test Equipment Program (NTEP)	$4,000	$5,000	$4,000	-$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Replace Obsolete Test Equipment	---	$4,000.0

For FY 2018, $4,000,000 is requested to replace obsolete test equipment. The program will finalize the prioritization of test equipment requirements based on the facility need and equipment availability. Current requirements reflect critical need for communication test sets, universal data test sets and vector network analyzers.

- $2,080,000 is planned for the procurement of communication test sets
- $500,000 is planned for the procurement of universal data test sets
- $1,420,000 is planned for the procurement of vector network analyzers

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. This equipment is required to perform preventive and corrective maintenance, equipment installations, modifications, and service certifications in support of numerous National Airspace System (NAS) Platforms. Failure to achieve certification of critical NAS systems (at one the 27,000 FAA facilities) will result in the restriction of air traffic in the facility's air space and potentially cause major flight delays. Test equipment supports NAS systems on the following platforms: communication, automation, surveillance, power, navigation, and weather.

NTEP is responsible with procuring and maintaining test equipment. Ensuring the NAS is operating to optimal standards by troubleshooting, repairing, and re-certifying both new and legacy systems.

A large portion of the test equipment is either damaged or rife with supportability and maintenance issues. The problem impacts Mean-Time-To-Restore (MTTR), safety, maintenance cost, and inventory management for every system within the NAS. No other FAA program office or initiative currently addresses this problem.

What Does This Funding Level Support?

The 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 procuring and delivering functioning test equipment throughout the NAS. Failure to provide these services will have a dangerously negative effect on the NAS, posing a major safety risk to the technicians, as well as delaying the restoration of critical Air Traffic systems crucial for the protection of the flying public.

Detailed Justification for – 3A11 Mobile Assets Management Program

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

FY 2018 – Mobile Assets Management Program
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Mobile Assets Management Program	$4,800	$5,760	$3,600	-$2,160

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Acquire one Deployable Air Traffic Control Facility (DATCF)	1	$2,550.0
b. Continue Upgrade/Perform Technology Refresh to Existing Mobile Assets	---	1,050.0
Total	Various	$3,600.0

For FY 2018, $3,600,000 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 one DATCF
- Establish or supplement air traffic control for facilities that are damaged or destroyed by natural or man-made disasters
- Support emergency or special event requirements
- Continue establishment/outfitting of the Service Area Deployment Center(s)
- Support scheduled maintenance and modernization programs

What Is This Program And Why Is It Necessary?

The Mobile Asset Management Program (MAMP) provides transportable NAS equipment to restore certain operations during periods of extended equipment outages, to ensure continuity of NAS operations. Mobile NAS equipment provides for the continuity or restoral of air traffic control when an air traffic control tower (ATCT) or other NAS system is out of service due to a disaster or an extensive repair, modernization or upgrade.

The FAA's inventory of mobile assets is in a serious state of disrepair and is often incapable of providing its intended service without first undergoing significant maintenance or repair before the asset can be deployed. The near term priorities are to upgrade/replace eight obsolete large four-position MATCTs and prioritize and restore the remaining assets in the inventory to a full operational capability. Also, with an increase in the frequency of ATCT modernization projects, the requirements for the use of MATCT's and MATCT's with TRACON capability have also increased. The MAMP is currently developing an additional modular air traffic control tower type with the ability to incorporate TRACON positions and equipment. This new version, referred to as a Deployable Air Traffic Control Facility (DATCF), will be an Occupational Safety and Health Administration (OSHA)/Environmental and Occupational Safety and Health (EOSH) code compliant temporary facility designed specifically for longer term deployments of 12 months or more.

A National Mobile Asset Deployment Center (MADC) has been established in the Central Service Area. The MAMP is assisting the Eastern and Western Service Areas in the development of designs for their Mobile Asset Staging Areas (MASAs). The deployment centers/staging areas will arrange for transportation of the mobile assets to and from the event location, will verify inventory, and assess condition with the receiving custodian.

Efforts are underway to develop a set of requirements for all mobile assets. These requirements will be the basis for building an inventory of mobile assets that will enable the FAA to respond to planned and unplanned outages in the NAS.

What Does This Funding Level Support?

$3,600,000 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 efficient 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 facility renovation and system test projects including Van Nuys, CA; Paducah, KY; Nantucket, MA; Abilene, TX; Kinston, NC; and Jacksonville, FL.

Detailed Justification for - 3A12 Aerospace Medicine Safety Information System (AMSIS) Program

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

FY 2018 – Aerospace Medicine Safety Information System (AMSIS) Program
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Aerospace Medicine Safety Information System (AMSIS)	$3,000	$12,000	$14,000	+$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Prime Mission Product Development	---	$12,000.0
b. Program Management	---	1,000.0
c. System Engineering	---	1,000.0
Total	Various	$14,000.0

For FY 2018, $14,000,000 is requested for prime product software development, integration and testing, and system engineering and program management support. Software design and development will involve five function modules: Medical Certification (Airman) and Medical Clearance (Air Traffic Control Specialists (ATCS)); Industry Substance Abuse; Reporting and Data Services; Workflow Management; and Common Module Functionality. The AMSIS Segment 1 Final Investment Decision (FID) is planned for the third quarter of FY 2017. Award of a prime contract will immediately follow Segment 1 FID.

What Is This Program And Why Is It Necessary?

The Office of Aerospace Medicine (AAM) is responsible for advancing the field-of-study of aerospace medicine and for the medical certification of pilots, ATCS and other safety critical personnel. AAM processes approximately 450,000 medical applications annually and maintains records on millions of past examinations as part of AAM's role in the oversight of 600,000 pilots and approximately 15,000 ATCS.

Currently, all the coordination between FAA and the medical certification applicants is conducted through the United States Postal Service and is very labor intensive. In addition, the information systems that support the storage and record keeping for this information were originally developed in the 1990's, and while they have undergone several upgrades, the architecture of these systems are becoming unsupportable and will eventually become obsolete. The business processes that support the medical certification of airmen, and the other aviation safety programs, have changed and need to be re-engineered. The information technology must be aligned with Office of Management and Budget (OMB)/Department of Transportation (DOT)/FAA information systems architecture and security standards.

The AMSIS Program will eliminate the shortfall of the current labor-intensive process required by applicants today as well as align the new technology with industry architectural and security standards.

AMSIS will provide better data accessibility and a greater ability to analyze medical information and denial data to identify safety trends that could impact system safety.

Specifically AMSIS is necessary to:

- Improve safety for the public by reducing fraudulent certification

- Improve FAA's responsiveness to the individual/pilot
  - Provide better user experience: reduced turn-around times, enhanced ability to track status
  - Provide better user protection: secure Protected Health Information (PHI) and Identifying Info (PII)
  - Improve consistency with Pilot's Bill of Rights
- Share responsibility with employers of pilots
  - Improve visibility for airlines and other employers on the certification history of their pilots
- Deliver a better product for use by "front office"/AMEs and "back office"/FAA by
  - Improve automation for AMEs with "one-stop shopping" like experience
  - Support auditability of Pilot's Bill of Rights by back-office
  - Align to International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10), for front-office and back-office use
  - Reduce back-office staffing potential
- Reduce risk that is an exposure to the FAA as a whole
  - Reduce pilot accident(s) due to fraudulent certification and the press attention that might occur from such incidents
- Reduce the security risk
  - Prevent breaches of private, personally identifiable information (PII)
  - Prevent intrusions by insertion of harmful data

The AMSIS program received JRC approval on both the segmentation strategy and the Initial Investment Decision (IID) on December 17, 2014. The AMSIS program's preferred alternative for final investment analysis was approved by the JRC on September 16, 2015. The Segment 1 Final Investment Decision (FID) is planned for the third quarter of FY 2017; the Segment 2 FID is planned for the third quarter of FY 2018.

What Does This Funding Level Support?

$14,000,000 is required to begin prime product software development, integration and testing, as well as to provide system engineering and program management support. This work will modernize the tools and processes that are used to process medical certifications and maintain records of current and former airmen and air traffic controllers.

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

Cost Avoidance and Savings - AMSIS will provide the tools required to capture, exchange, evaluate, and analyze information with significant improvements in efficiency, accuracy, and detail. AMSIS will simplify current processes and eliminate wasted effort by incorporating current technical medical standards. In addition, the updated automated process will reduce operational cost while improving customer service.

Increased Data Security - 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. These systems will successfully and securely interface with approximately 4,250 health care providers designated by the FAA, known as AMEs, who perform pilot and ATCS medical examinations.

Safety - AMSIS will provide increased access to medical history and support earlier National Driver Register (NDR) checks to determine ineligible candidates more effectively. This will result in an improved ability to prevent pilots from flying while incapacitated by health conditions or substance abuse. For example, by performing a check against the NDR as soon as an applicant files a pilot certificate application, those airmen with driving under the influence (DUI/DWI) convictions will be prevented from being issued a certificate (currently a certificate is issued and then rescinded much later, after the NDR check results come in).

Detailed Justification for - 3A13 Tower Simulation System (TSS) Technology Refresh

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

FY 2018 – Tower Simulation System (TSS) Technology Refresh
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Tower Simulation System (TSS) Technology Refresh	$7,000	$3,000	$3,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Hardware and Equipment Purchase	10	$1,700.0
b. Software Operations and Maintenance	---	1,000.0
c. Contractor Support	---	300.0
Total	Various	$3,000.0

For FY 2018, $3,000,000 is requested to continue procurement and replacement of obsolete technology within the current Tower Simulation Systems (TSS) to decrease ongoing support demands and costs.

The TSS program will provide technology refresh of obsolete tower simulation equipment. The current system is over eight years old and is becoming expensive to operate and maintain. The projectors will be replaced with updated visual technology and the video processors will be replaced with current graphics and image processors to increase fidelity and processing power, and reduce maintenance costs. 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 releases its 10-year air traffic control workforce plan every 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. This program results in a more efficient training process, which accounts for producing CPCs in less time.

The TSS system provides an essential role within the NAS as well as satisfies the simulation training requirement identified in FAA JO 3120.4P, Air Traffic Technical Training. The TSS system is currently deployed at 40 sites and supports 171 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 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. A 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 to 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.

What Does This Funding Level Support?

FY 2018 funding will support installation for 10 locations and procure 9 mobile systems. 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 for 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.

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

TSS has been deployed at 40 operational locations in the NAS today. Initial data analysis indicates a decrease in On the Job training times ranging between 10 - 20 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 developmental controllers the opportunity to practice seldom-used skills and to take advantage of low traffic levels by practicing complex scenarios in the simulator

- Increasing flexibility in scheduling, more rapid response to facility staffing needs, and reduced stress on training resources, such as OJT instructors
- Enhancing simulation and inherent simulation capabilities also provide for more standardized instruction, unbiased assessment of performance, mitigation of weaknesses, and useful remedial and proficiency training
- Providing a functionally compatible and realistic simulation environment that closely duplicates traffic situations/conditions to teach and test required operational skills and procedures
- Providing 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
- Reducing (through enhanced voice recognition technology) remote pilot/pseudo pilot costs
- Re-creating procedures that may require recurrent training or communication of best practices in all facilities
- Identifying risk and mitigating hazards associated with new airport construction and development of new air traffic procedures
- Developing airport models that 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 2018 – Aeronautical Center Infrastructure Modernization
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Aeronautical Center Infrastructure Modernization	$15,200	$14,000	$14,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Multi-Purpose Building (Bldg 24) Renovation Construction for Seismic Wind Bracing, Replace Electrical Distribution, Fire Suppression, Lighting, Plumbing, Heating, Ventilation, Air Conditioning (HVAC)	1	$9,850.0
b. Contract Awards for Building System Replacement Renovation	---	200.0
c. Telecommunications Technology Refresh (routers, switches, fiber, security)	---	1,800.0
d. NAS Integration Support Svcs and Tech Support Construction Inspectors	---	2,150.0
Total	Various	$14,000.0

For FY 2018, $14,000,000 is requested for the following:

- $9,850,000 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 to add fire detection/suppression systems, asbestos abatement/removal, replacement of electrical distribution/lighting systems, mechanical systems (HVAC), boilers/chillers, telecom, plumbing, finishes replaced in tear out installation: interior doors, walls, ceilings, and floors. The building is the workplace for approximately 600 FAA employees and contractors.
- $200,000 is requested for major building system replacement that 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.
- $1,800,000 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 74 buildings. In FY 2018, replacement will be complete in 14 buildings. Tasks include security assessments, upgrades, disaster recovery testing, and installation of fiber/copper cable for network diversity
- $2,150,000 is requested to provide NAS Integration Support Services and Technical Support Services Construction inspectors

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 7,100 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.

What Does This Funding Level Support?

The Aeronautical Center is an aging facility of 133 leased and FAA owned buildings. There is a $50 million backlog of requirements to replace heating, ventilation, air conditioning, boilers/chillers, electrical/lighting, plumbing, interior finishes, exterior enclosures, roofs, interior construction, elevators, and stairs to prevent deterioration of building conditions. Seismic, wind bracing, and added fire protection is needed in some buildings. The backlog can be addressed with systematic funding to improve conditions and assure the aging infrastructure remains viable in future years. 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, 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.

Detailed Justification for - 3B02 Distance Learning

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

FY 2018 – Distance Learning
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Distance Learning	$1,500	$1,500	$1,000	-$500

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	---	$680.0
b. Purchase and Install DLPs	180	320.0
Total	Various	$1,000.0

For FY 2018, $1,000,000 is requested to fund contract services and DLP hardware procurement to replace 180 DLP's.

Major Components:

- Administer contract services to develop, maintain configuration control, and deploy DLP hardware to field sites
- Procure, configure, and deploy 180 DLPs to Air Traffic learning center field facilities; this action provides for the delivery 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.

Funding the Distance Learning program will provide for technology refresh of DLP (previously-Computer Based Instruction (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 all Technical Operations technicians and Air Traffic controllers (approximately

22,000). This program provides productivity improvements for Air Traffic Organization (ATO) employees by shortening the time to achieve full employee initial performance and certification. The training time reduction is based on overall reduced training and delivery time at the job site thus avoiding Academy or factory schools travel time.

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 220,000 course completions in FY 2015. 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 FAA Strategic Initiatives 2014-2018 "Workforce of the Future", "Sub-initiatives: Skills Development" by providing an environment for creating more effective training programs with the use of new technologies.

What Does This Funding Level Support?

$1,000,000 is required 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. Replacement of DLP's will prevent system degradation and/or Platform inoperability. Distance Learning will be able to continue providing field training to employees with decreased travel and per diem costs.

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 also 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 cost avoidance 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 avoided student travel costs.

Detailed Justification for - 4A01 System Engineering and Development Support

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

FY 2018 – System Engineering and Development Support
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
System Engineering and Development Support	$35,000	$35,000	$35,700	+$700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. System Engineering Support	---	$30,700.0
b. Program Evaluation	---	400.0
c. Computer Services	---	1,600.0
d. ATC/AFN Systems Support	---	3,000.0
Total	Various	$35,700.0

For FY 2018, $35,700,000 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 (National Airspace System).

The System Engineering and Development Support program supports the agency's goals of improving aviation safety, security, and efficiency. These objectives are achieved by delivering continuity, innovation, and cost effective techniques while increasing capacity and productivity.

a. System Engineering Support:

- Provides continuous critical support activities which complement NextGen Air Transportation System programs, which include Configuration Management, Infrastructure Roadmaps, Operation Planning, Requirements Engineering, System Engineering Services, Enterprise Integration Services, Forecast Analysis and Investment Planning and Analysis for the life of the NextGen Program.
- Supports 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.
- Provides portfolio of multiple prime contractors with large subcontracting teams who can provide support across a broad range of Research and Mission Analysis and System Engineering requirements thus reducing the need for new standalone contracts and contract vehicles which reduces overall costs and promotes efficiency.
- Supports the Office of Investment Planning and Analysis (IP&A) to conduct investment analysis and to support business case development and analyses. Investment analysis is conducted in the context of the FAA Enterprise Architecture and strategic goals and objectives. This work will provide decision makers with a clear picture of investment opportunities, risks and value.
- Supports the integration and development of corporate tools and processes to strengthen NextGen integration into the NAS.

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/AFN Systems Support:

- Supports technical analysis and oversight of acquisition programs goals and performance reporting

What Is This Program And Why Is It Necessary?

The required engineering support consists of disciplines ranging from systems requirements and system modeling to transition and supports corporate initiatives to mature NextGen resources and planning. 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. 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.

What Does This Funding Level Support?

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 and support tools to move forward the engineering and prototyping effort for 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 and contract administration, ensuring consistent application of the AMS (Acquisition Management System) policy.

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 2018 – Program Support Leases
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Program Support Leases	$46,700	$46,600	$47,000	+$400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Operational Leases	---	$47,000.0

For FY 2018, $47,000,000 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 approximately 2,800 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, easements providing ingress to and egress from leased facilities, and other leased restrictive 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 approximately 2,800 rentable real estate leases since the majority of its facilities reside either on leased land or in leased building space. The Program Support Leases 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.

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.

What Does This Funding Level Support?

$47,000,000 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. 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 FAA contractual obligations.

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

Sufficient funding to make rent payments in accordance with all real property leases for NAS operational facilities will prevent FAA from incurring significant costs associated with default on leases. 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 and effectively use tax payer dollars.

Detailed Justification for - 4A03 Logistics and Acquisition Support Services

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

FY 2018 – Logistics and Acquisition Support Services
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Logistics and Acquisition Support Services	$11,000	$11,000	$11,000	$0

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. Acquisition Support Services	---	2,420.0
Total	Various	$11,000.0

For FY 2018, $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 logistics and acquisition personnel at regions and centers manage real estate, acquisitions, and materiel for NAS modernization and capitalize agency assets as required by the agency's strategic plan. This includes acquiring real estate, awarding contracts to buy or upgrade equipment and construct facilities, and installing and commissioning modernized equipment and systems. Additionally, the FAA must adequately document the capital cost of FAA facilities, and comply with accounting standards set by the Government Accountability Office (GAO).

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

What Does This Funding Level Support?

The requested funding will continue to promote processing efficiencies within acquisition, real estate, and materiel management that have been made over the last several years since this contract was put in place. Funding for the LSS program enables FAA to track assets and requisite documentation for obtaining and maintaining a clean audit opinion.

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

LSS resources are 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. As a direct result of the LSS staffing support, these FAA assets were processed in a timely and accurate manner.

Detailed Justification for - 4A04 Mike Monroney Aeronautical Center Leases

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

FY 2018 – Mike Monroney Aeronautical Center Leases
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Mike Monroney Aeronautical Center Leases	$18,800	$19,300	$19,700	+$400

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	$14,300.0
b. Base Maintenance Building Renovation Construction	1	3,000.0
c. Add Water Meters, Systems Training Building Annex Renovation Design, Air Handling Units and Digital Controls in 3 buildings	1	1,400.0
d. Energy Conservation	1	1,000.0
Total	Various	$19,700.0

For FY 2018, $19,700,000 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 for 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: 2.7 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

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.

What Does This Funding Level Support?

$19,700,000 is required 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 provides benefits to the American Public by promoting transportation policies and investments that bring lasting and equitable economic benefits to the nation and its citizens. In combination with Aeronautical Center Infrastructure Modernization, this program benefits the American Public and NAS and by avoiding costs through the following:

- Lower lease and operating cost (includes utilities (gas, water, electric), janitorial, cleaning, security) costs than other alternatives when compared with Oklahoma City General Services Administration (GSA) leased facilities
- Allows 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
- Supports NAS operations/maintenance, current and future ATO initiatives
- Decreasws 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 2018 – Transition Engineering Support
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Transition Engineering Support	$19,200	$24,100	$19,900	-$4,200

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	---	$1,500.0
b. NISC Contract Management	---	12,800.0
Total	Various	$14,300.0
B. Configuration Management Automation (CMA)	---	$5,600.0

For FY 2018, $19,900,000 is requested for the following:

A. NISC

$14,300,000 is requested to support the modernization schedules for National Airspace System (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

$5,600,000 is requested to continue implementing the CMA system. The goal of FAA's Configuration Management (CM) is to record technical information, including system specifications and installation data, on all systems installed in FAA facilities. CM also requires documentation for all proposed and actual changes to these systems in order for maintenance workers and replacement programs to have accurate and up to date information for maintaining or replacing existing systems.

What Is This Program And Why Is It Necessary?

A. NISC

The NISC program 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 most effectively 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 and projects that are vital to managing the volume of diverse systems and equipment associated with NAS modernization.

B. CMA

The goal of FAA's Configuration Management (CM) is to record technical information, including system specifications and installation data, on all systems installed in FAA facilities. CM also requires documentation for all proposed and actual changes to these systems in order for maintenance workers and replacement programs to have accurate and up to date information for maintaining or replacing existing systems.

The CMA program will provide:

- An automated and integrated enterprise solution to support CM of FAA assets and investments;
- Functionality and data previously provided by legacy CM tools

What Does This Funding Level Support?

A. NISC

$14,300,000 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. CMA

$5,600,000 is required to execute the program implementation plan and schedule to include:

- Programing user interface (UI) database and software applications
- Migration of Legacy Data
- Deploy features to User Acceptance site, Conduct user acceptance testing plans, Execute test plans, Conduct user training
- Perform Information Systems Security (ISS)
- Deploy UI application and complete Joint Acceptance Inspection (JAI)

Develop the model for standard profile for Configuration Items and configure backend database to maintain CI profile:

- Assess library functionality necessary to support newly defined CI profile
- Continued Legacy data (REPCON) clean-up and mapping to new CI profile standards
- Develop Customization Plan for CM Database to map to UI workflows.

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

A. NISC

It affords the FAA the 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 the 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

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.

Detailed Justification for - 4A06 Technical Support Services Contract (TSSC)

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

FY 2018 – Technical Support Services Contract (TSSC)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
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	---	$13,500.0
b. Planning, Quality Control, Security, Safety	---	4,400.0
c. Award Fee	---	3,500.0
d. Program Management Support Contract	---	1,100.0
e. Defense Contract Audit Agency	---	500.0
Total	Various	$23,000.0

For FY 2018, $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 workforce 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 is 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 that 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 workers' compensation claims and increased insurance costs, and 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

What Does This Funding Level Support?

$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 workforce 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 is 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 improving the number of projects that are completed and the timeliness of their completion, decreasing costs, and 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 for the 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 2018 – Resource Tracking Program (RTP)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Resource Tracking Program (RTP)	$4,000	$6,000	$6,000	$0

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Program/Project Management	---	$6,000.0

For FY 2018, $6,000,000 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.

What Does This Funding Level Support?

$6,000,000 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 2018 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 2018 – Center for Advanced Aviation System Development (CAASD)
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Center for Advanced Aviation System Development (CAASD)	$60,000	$60,000	$57,000	-$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Center for Advanced Aviation System Development (CAASD)	---	$57,000.0

For FY 2018, $57,000,000 is requested to fund technical, engineering, as well as research and development support for the CAASD program. The FY 2018 funding will support approximately 208 MITRE staff years (SY) of research and systems engineering as well as technical and operational analyses. This staffing level is well below the Congressional annual ceiling of 600 SY.

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. 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. CAASD Outputs are aligned to one or more of the three NARP Principles and 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. 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.

What Does This Funding Level Support?

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.

FAA's 2016 assessment of FAA's core missions and its strategic initiatives and goals confirmed the CAASD FFRDC Base Sustainment level of 285 staff years (SY). This sustainment level is based on CAASD's ability to:

- Addresses FAA needs for unprecedented National Air Space (NAS) challenges, industry advancements, and NAS evolution that require unique research, skill sets, subject matter expertise, corporate history, proprietary data, and independent assessment capabilities
- Implement the Agency's strategic priorities as directed by the FFRDC Executive Board (FEB) such as Cyber, Operational Transition, Safety, and new entrants
- Maintain sufficient research and subject matter expertise to maximize efficiency in meeting the work requirements as specified in Base Outcomes and approved by the FEB

Since the FY 2013 sequestration, the CAASD Base budget has remained flat around $60 million. The required funding level will allow CAASD to fully support new Research and Development/Pre-implementation efforts that include:

- New Entrants to NAS operations such as Unmanned Aerial Vehicles and Commercial Space Activities
- NAS Cyber Security Research

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.

Detailed Justification for - 4A09 Aeronautical Information Management Program

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

FY 2018 – Aeronautical Information Management Program
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Aeronautical Information Management Program	$5,000	$10,400	$4,700	-$5,700

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. AIMM Segment 2		
a. Prime Mission Product	---	$1,275.7
b. Program Management	---	617.7
c. System Engineering	---	1,275.7
d. Test and Evaluation	---	852.7
e. Integrated Logistic Support	---	194.7
f. Site Implementation	---	382.7
g. Information System Security	---	100.8
Total Segment 2	Various	$4,700.0

For FY 2018, $4,700,000 is requested for the Aeronautical Information Management (AIM) Program. This funding supports finalizing the procurement of the Aeronautical Information Management Modernization Segment 2 (AIMM S2) Aeronautical Common Services (ACS).

Specifically, the funding is requested to continue development and implementation of the AIMM S2 program. AIMM S2 will provide AIM technologies and tools for Aeronautical Information exchange via the 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 delivered Release 1 of the ACS in the fourth quarter of CY 2015 and deemed Release 2 operational in the first quarter of CY 2017.

In FY 2018 AIMM S2 will complete:

- Release 3 Operational Test and Evaluation, and complete delivery of Federal Notices to Airman (NOTAMs) Service (FNS) information into NAS Automation
- Release 3 Operational and Final Operating Capability (FOC)
- Release 3 AIMM S2 In Service Decision

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 2018 funding will be used to complete 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 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 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), Terminal 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 Final Investment Decision (FID) approval on August 20, 2014. Contract award was made on October 29, 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. The capabilities 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.

What Does This Funding Level Support?

$4,700,000 is required to finalize development and implementation of Release 3 of the 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 NOTAMs, SAA and airport data and will deliver information across the NAS using standard SWIM compliant protocols.

The required funding will facilitate program execution to deliver all AIMM S2 capabilities on time.

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 ACS will deliver SAA schedules to NAS users. 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 Temporary Flight Restrictions (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, and modernize the NASR.

Capacity and efficiency will be enhanced as airplane operators will realize savings due to better information leading to improved flight planning and pilot briefing. Benchmarking and forecasting reduces departure and en route delays which will also contribute to realized savings. There will be Air Traffic Control (ATC) operational savings because of better information leading to improved traffic and flow management and the access to near-real-time NAS performance information.

The FAA will realize cost benefits through infrastructure enhancements and SWIM connectivity as well as reduced cost of aeronautical information gathering, management, and use across NAS enterprise.

Detailed Justification for - 4A10 Cross Agency NextGen Management

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

FY 2018 – Cross Agency NextGen Management
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Cross Agency NextGen Management	$3,000	$2,000	$1,000	-$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
a. Interagency Planning Office Activities	---	$700.0
b. Cross Agency Cost/Benefit Analyses/Systems Engineering Cyber Exercises	---	300.0
Total	Various	$1,000.0

The Interagency Planning Office (IPO) for NextGen conducts cross agency coordination of multi-agency activities on the future of the aviation transportation system through collaboration with agency partners on research and work plans, and facilitates development of emerging NextGen technologies, tools, and services.

For FY 2018, $1,000,000 of funding is requested to collaborate with partner agencies in supporting the following areas:

- Chair Integrated Core Cyber Team (ICCT) and propose high-priority multi-agency research solutions to mitigate gaps and vulnerabilities identified by the ICCT; Report results to the FAA's Cyber Steering Committee and the NextGen Executive Board.
- Systems Engineering support for Cross Agency initiatives including; development of cost/benefit analyses and engineering studies addressing high-priority cross agency activities (e.g., integration of UAS into the NAS)
- Develop the following reports: 2018 ICCT End-of-Year Report; progress reports to NextGen Executive Board; and an annual Executive Summary to the Senior Policy Committee.

What Is This Program And Why Is It Necessary?

The development of NextGen is a priority for the Administration and active participation by Federal Partner Agencies (e.g. Department of Defense (DOD) Department of Commerce (DOC), National Aeronautics and Space Administration (NASA), and Department of Homeland Security (DHS) is necessary for modernizing the air transportation system to safely meet the expected growth in air traffic. The 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. The IPO leads interagency collaboration to resolve complex challenges critical to NextGen. We leverage stakeholder expertise to identify research, coordinate, prioritize shared issues, and bring the appropriate resources together to advance NextGen.

What Does This Funding Level Support?

$1,000,000 is required to coordinate efforts between all Federal Partner Agencies whose decisions impact NextGen. These activities include proposing research solutions, identifying gaps, planning, analysis of special topic areas, and the conduct and participation in cybersecurity exercises involving other Federal partners and agencies.

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

This effort will ensure efficient coordination between all Federal Partners. A coordinated multi-agency approach to long-term research and development allows the Partners to align separate efforts to leverage resources and infrastructure resulting in improved coordination of NextGen initiatives.

Detailed Justification for – 5A01 Personnel and Related Expenses

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

FY 2018 – Personnel and Related Expenses
($000)

Activity/Component	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
Salaries and Benefits	$413,335	$423,732	$428,504	$4,772
Non-Pay	$56,714	$54,769	$55,296	$527
Total	**$470,049**	**$478,501**	**$483,800**	**$5,299**
FTP	2,648	2,698	2,687	-11
FTE	2,594	2,639	2,616	-23

For FY 2018 $483,800,000 and 2,687 FTP/2,616 FTE 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).

The request includes a base transfer of $3,065,000 and 19 FTP/FTE from NextGen (ANG) to the Air Traffic Organization (ATO) in support of the Flight Program Consolidation effort and includes a transfer of 35 FTP positions from ATO's F&E Reimbursable account to ATO F&E Activity 5 direct.

FY 2017 Annualized CR	**$478,501**
Adjustments to Salaries and Benefits	**$4,772**
FY 2017 Annualized Pay Raise	$2,225
FY 2018 Pay Raise	$6,038
Workforce Reduction Through Attrition (-46 FTP/-23 FTE)	-$3,491
Adjustments to Non-Pay	**$527**
Travel	$527
FY 2018 Request	**$483,800**

The FAA F&E Activity 5 workforce levels below reflect a combination of non-pay reductions and a workforce reduction through attrition. However, changes to the Administrator's initial policy, or to FAA's exemptions, could affect the actual staffing levels resulting from the effort. The F&E workforce includes: electronic, civil and mechanical engineers; electronics technicians; quality control and contract specialists; Ops research analysts, and safety inspector personnel.

The F&E workforce resides in Air Traffic, Aviation Safety, NextGen, and Finance and Management offices. Seventy-seven percent are located in the field. F&E personnel provide oversight and management of FAA's capital projects including the NextGen portfolio.

F&E personnel and related expenses are distributed across FAA Organizations as follows:

FTE

Organization	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
ATO	1,825	1,865	1,867	2
AVS	67	66	66	0
AFN	150	150	149	-1
ANG	552	558	534	-24
Total	2,594	2,639	2,616	-23

(Dollars in Thousands)

Organization	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference From FY 2017 Annualized CR
ATO	$326,647	$334,786	$341,509	$6,723
AVS	$12,413	$11,315	$11,450	$135
AFN	$38,497	$38,415	$38,844	$428
ANG	$92,492	$93,984	$91,997	-$1,987
Total	$470,049	$478,501	$483,800	$5,299

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 90 percent of the program covers FAA F&E workforce payroll costs; 10 percent of the program supports programmatic travel and related expenses of the workforce.

What Does This Funding Level Support?

Each year Congress appropriates over $2.5 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 $3.5 billion per year). 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. Major capital investments like System-Wide Information Management (SWIM), ADS-B NAS Wide Implementation, Data Communications (Data Comm) and Terminal Flight Data Manager (TFDM) are system-wide in scope and take years to fully implement. This budget line item provides FAA personnel with the long-term technical expertise necessary to oversee the design and implementation of new NAS systems as well as provide for the sustainment of core NAS Infrastructure such as radar, communication, automation, facilities, and navigation systems.

In support of the Agency's FY 2018 F&E requested level of $2.766 billion for capital improvements to the NAS, $483.8 million is required for the personnel and related expenses. This is a $5.3 million increase from the FY 2017 annualized CR level.

The request will support a staffing level of approximately 2,600 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.

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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, $150,000,000, to be derived from the Airport and Airway Trust Fund and to remain available until September 30, 2020: Provided, That there may be credited to this appropriation as offsetting collections, funds received from States, counties, municipalities, other public authorities, and private sources, which shall be available for expenses incurred for research, engineering, and development.

Note.—A full-year 2017 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Further Continuing Appropriations Act, 2017 (P.L. 114–254). The amounts included for 2017 reflect the annualized level provided by the continuing resolution.

PROGRAM AND FINANCING
($ in Millions)

Identification code: 69-8108-0-7-402	FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
Obligations by program activity:			
0011 Improve aviation safety	92	98	90
0012 Economic competitiveness	24	36	22
0013 Reduce environmental impact of aviation	40	32	36
0014 Improve the efficiency of mission support	5	5	5
0100 Subtotal, direct program	161	171	153
0799 Total direct obligations	161	171	153
0801 Research, Engineering & Development (Airport & Airway Trust Fund (Reimbursable)	1	3	3
0900 Total new obligations (total)	162	174	156
Budgetary resources available for obligation:			
1000 Unobligated balance brought forward, Oct 1	62	67	70
1021 Recoveries of prior year unpaid obligations	1	.....	.....
1050 Unobligated balance (total)	63	67	70
New budget authority (gross), detail:			
Appropriation, discretionary:			
1101 Appropriation (special or trust fund)	166	166	150
Spending authority from offsetting collections, discretionary:			
1700 collected	1	3	3
1900 Budget authority (total)	167	169	153
1930 Total budgetary resources available	230	236	215
Memorandum (non –add) entries:			
1940 Unobligated balance expiring	-1	.....	.....
1941 Unexpired Unobligated balance, end of year	67	62	59
Special and non-revolving trust funds:			
1950 Other balances withdrawn and returned to unappropriated receipts	2	.....	.....
1951 Unobligated balance expiring	1	.....	.....
1952 Expired Unobligated balance, start of year	5	7	7
1953 Expired Unobligated balance, end of year	4	7	7
1954 Unobligated balance canceling	2	.....	.....
Change in obligated balances:			
Unpaid obligations:			
3000 Unpaid obligations, brought forward, Oct 1 (gross)	140	139	128
3010 Obligations incurred, unexpired accounts	162	174	156
3020 Outlays (gross)	-161	-185	-181
3040 Recoveries of prior year unpaid obligations, unexpired	-1	.....	.....
3041 Recoveries of prior year unpaid obligations, expired	-1	.....	.....
3050 Unpaid obligations, end of year	139	128	103
Uncollected payments:			
3060 Uncollected payments, Federal Sources, brought forward, Oct 1	-4	-3	-3
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	136	136	125
3200 Obligated balance, end of year	136	125	100

Budget Authority and outlays, net:			
Discretionary:			
4000 Budget authority, gross	167	169	153
Outlays, gross:			

4010 Outlays from new discretionary authority	53	76	69
4011 Outlays from discretionary balances	108	109	112
4020 Outlays, gross (total)	161	185	181
Offsets against gross budget authority and outlays			
Offsetting collections (collected) from:			
4030 Federal sources	-1	-3	-3
4033 Non-Federal sources	-1	. . . . .	. . . . .
4040 Offsets against gross budget authority and outlays (total)	-2	-3	-3
Additional offsets against gross budget authority only:			
4052 Offsetting collections credited to expired accounts	1	. . . . .	. . . . .
4060 Additional offsets against gross budget authority only (total)	1	. . . . .	. . . . .
4070 Budget authority, net (discretionary)	166	166	150
4080 Outlays, net (discretionary)	159	182	178
4180 Budget authority, net (total)	166	166	150
4190 Outlays, net (total)	159	182	178

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 sustainability 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 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Direct obligations:			
	Personnel compensation			
11.1	Full-time permanent	27	30	31
12.1	Civilian personnel benefits	9	9	10
21.0	Travel and transportation of persons	1	2	2
25.1	Advisory and assistance services	23	25	21
25.2	Other services from non-Federal sources	45	47	40
25.3	Other goods and services from Federal sources	4	4	3
25.4	Operation and maintenance of facilities	1	1	1
25.5	Research and development contracts	18	19	17
25.7	Operation and maintenance of equipment	2	2	2
26.0	Supplies and materials	3	3	2
31.0	Equipment	2	2	1
41.0	Grants, subsidies, and contributions	26	27	23
99.0	Direct obligations	161	171	153
99.0	Reimbursable obligations	1	3	3
99.9	Total new obligations	162	174	156

Employment Summary

Identification code: 69-8108-0-7-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
1001	Direct civilian full-time equivalent employment	238	249	245

EXHIBIT III-1

RESEARCH, ENGINEERING & DEVELOPMENT
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	FY 2016 ACTUAL	FY 2017 Annualized CR	FY 2018 REQUEST	CHANGE FY 2017 - FY 2018
Improve Aviation Safety	95,969	97,783	88,752	(9,031)
Economic Competitiveness	22,589	20,550	18,232	(2,318)
Environmental Sustainability	41,897	41,817	37,648	(4,169)
Mission Support	5,545	5,534	5,368	(166)
TOTAL	**166,000**	**165,684**	**150,000**	**(15,684)**
FTEs				
Direct Funded	249	249	245	(4)
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 2017 TO FY 2018
Appropriations, Obligations, Limitations, and Exempt Obligations
($000)

ITEM		Change from FY 2017 to FY 2018 $000	Change from FY 2017 to FY 2018 FTE
FY 2017 Annualized CR	$	165,684	249
Administrative Adjustments to Base:	$	720	0
Annualization of FY 2017 FTE	$	-	
Annualization of FY 2017 Pay Raise	$	157	
FY 2018 Pay Raise	$	563	
GSA Rent	$	-	
Working Capital Fund	$	-	
Non-Pay Inflation	$	1,263	
etc.			
SUBTOTAL, ADJUSTMENTS TO BASE	**$**	**1,984**	**0**
PROGRAM REDUCTIONS			
Improve Aviation Safety	$	(10,272)	(4)
Economic Competeiveness	$	(2,538)	
Environmental Sustainability	$	(4,610)	
Mission Support	$	(249)	
SUBTOTAL, PROGRAM REDUCTIONS	**$**	**(17,668)**	**(4)**
NEW OR EXPANDED PROGRAMS:			
Improve Aviation Safety	$	-	
Economic Competeiveness	$	-	
Environmental Sustainability	$	-	
Mission Support	$	-	
SUBTOTAL, NEW OR EXPANDED PROGRAMS	**$**	**-**	**0**
FY 2018 REQUEST		**150,000**	**245**

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RESEARCH, ENGINEERING AND DEVELOPMENT (RE&D) PORTFOLIO OVERVIEW

The Research, Engineering and Development (RE&D) budget is formulated following a systematic process that considers agency strategic plans, program execution, and program evaluation. This process strengthens the alignment between the planning, programming, budgeting and execution of the RE&D program; increases the return on taxpayer investment; enhances productivity; and ensures the relevance, quality, and performance of the RE&D program.

Strategic planning supporting the agency's RE&D program is presented in the National Aviation Research Plan (NARP). Updated and published annually, the NARP presents a five year outlook of planned research projects and expected outcomes resulting from the investments in each of the research activities and programs detailed in this submission. The NARP also links current and proposed RE&D projects with broader strategic priorities specified in FAA and DOT strategic plans. The investments reflected in the RE&D portfolio are aimed at addressing the challenges to the continued operation of the safest, most efficient air transportation system in the world while building a foundation for the future.

Formulation of the RE&D portfolio is coordinated by the Research Executive Board (REB)—a cross agency executive body representing research needs sponsors and program performers. The REB oversees the development and review of the portfolio and approves its presentation to the FAA Joint Resources Council (JRC) for subsequent integration into the agency's budget submission. This framework ensures coordination at all levels for a well-balanced portfolio.

Research project execution and internal project evaluations are conducted by Program Planning Teams (PPTs) composed of program managers (performers) and sponsors to ensure research needs are satisfied. Independent program review is provided by the Research Engineering and Development Advisory Committee (REDAC). The REDAC is a chartered advisory committee performing in accordance with the Federal Advisory Committee Act (FACA); it brings industry and academia together to review the RE&D portfolio and provide independent advice to the FAA Administrator.

The requested funds provide for 22 separately funded programs each of which is aligned with one or more of three research activities that in turn align with agency and departmental strategic priorities. A fourth activity provides for cross-cutting mission support programs that enable development, coordination and management review of the RE&D portfolio and support the sustainment of laboratory facilities and equipment to perform critical research. A summary of each activity follows.

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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 2018 – Fire Research and Safety – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.a Fire Research and Safety	$6,000,000	$5,989,000	$7,044,000	+$1,055,000

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 and to improve survivability during a post-crash fire. 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 program supports the FAA's Office of Aviation Safety - which is responsible for issuing regulations, standards, and guidance material to ensure the highest level of safety in commercial aviation - and the FAA's Security and Hazardous Materials organization. Research efforts specific to hazardous material transport are completed in coordination with the Department of Transportation'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.

The benefit derived from this program will be the introduction of enabling technologies to prevent accidents caused by fire in freighter aircraft and hidden in-flight fires in passenger-carrying airplanes. In addition, the aviation industry is constantly introducing new technologies and materials to decrease weight and increase operating efficiency. Existing regulations often do not address the unique behavior of these new technologies. Research is needed to understand the fire safety implications and develop effective mitigation procedures and regulations. These new technologies of interest to the aircraft manufacturers and operators must be enabled in a fire-safe manner or prohibited, if warranted. The threat of lithium battery cargo fires is a continuing concern because of the unusual and severe hazards from lithium battery fires; and the increasing number, sizes and energy densities of batteries being shipped.

<u>Fire Hazards of New Sources of Aircraft Electrical Power</u>
As aircraft environmental and control systems become more complex, aircraft power requirements increase proportionately. New electrical power sources include non-rechargeable lithium and rechargeable lithium ion batteries and fuel cells.

Current lithium battery technology allows a significantly greater energy density in a given volume compared to previous battery technologies. The fire hazard introduced by this new technology includes a thermal runaway failure mechanism that results in a rapid release of heat, pressure, and flammable gases if the battery is subjected to physical abuse, manufacturing defects, or rapid charging or discharging. Thermal runaway events and battery fires have occurred with the main airplane and auxiliary power unit batteries. These incidents resulted in the grounding of the B-787 aircraft fleet until mitigation procedures were designed and implemented. Numerous other incidents of thermal runaway have occurred in smaller lithium batteries powering aircraft systems and in electronic equipment brought onboard by passengers and crewmembers. Research will be conducted on existing and emerging lithium and lithium ion battery manufacturing processes, chemistries, and systems to mitigate the effects of thermal runaway.

Another emerging source of aircraft electrical power involves fuel cell technology. This technology is being considered as replacements for emergency aircraft power sources such as ram air turbines and for existing aircraft batteries. Fuel cells can use gaseous hydrocarbon or hydrogen fuel to produce electricity and water. The use of compressed flammable gases to provide aircraft energy sources introduces potential fire safety implications not currently addressed in existing regulations, procedures, and certification guidance material. Compressed hydrogen is a particular concern because of its flammability, ease of ignition, and propensity to leak. Research will be conducted to better understand and document these new hazards and systems, and recommend new materials and procedures to mitigate these emerging fire hazards.

<u>Integrated Airplane Fire Protection System Criteria</u>

Current regulations require fire detection and/or fire suppression systems in specific areas in aircraft, such as cargo compartment, engines and APUs, and lavatories. Inaccessible areas above the cabin ceiling, below the cabin floor, behind sidewall panels, and in electronic accessory compartments generally do not require such systems. These areas contain electrical ignition sources and hidden in-flight fires in these areas have occurred. When fires in these areas do occur, the fire location is generally unknown and effective methods to suppress the fires are not readily available. In addition, incidents of smoke, fumes, or odors of unknown origin occur daily on aircraft in the US fleet. Research will be conducted to establish criteria for aircraft-based systems that can detect fires in hidden areas and to discriminate between actual fires and non-threatening sources of fumes and/or odors. With this information available, the flight crew can make more appropriate decisions based on the severity of the situation and the need to divert the aircraft. Existing systems, such as the fuel tank inerting nitrogen source and/or cargo compartment fire suppression systems could potentially be redirected to fires in areas not currently protected by fire suppression systems. The research will also establish criteria for the fire suppression capability of the integrated fire protection system.

<u>Hazardous Materials Fire Mitigation</u>
Research will be conducted to determine the effectiveness of cargo compartment fire detection and suppression systems on hazardous materials for both passenger aircraft and freighters. The testing will include both Halon 1301, the suppression agent used in existing passenger aircraft cargo compartments, and proposed replacements agents due to the impending phase-out of Halon as proposed by the International Civil Aviation Organization (ICAO). Research will also be conducted on the effectiveness of freighter aircraft cargo compartments that do not have total flood suppression systems. This research will be harmonized with recent Commercial Aviation Safety Team (CAST) safety enhancement studies on the transport of hazardous materials. The CAST studies generated extensive recommendations to conduct research to improve detection and suppression/containment for hazardous material fires. The research will include testing of both declared and properly packaged hazardous materials along with undeclared hazardous materials.

<u>New Structural and Cabin Material Impact on Accident Survivability</u>
Aircraft manufacturing is evolving beyond the use of traditional aluminum alloy fuselage structural materials and in materials used inside the passenger cabin. These materials include composites, new metallic alloys, and new seat structures. Existing flammability regulations do not address the potential effect on fire survivability due to differences in flame spread, heat transfer, and toxic gas production from these new materials. Full-scale testing will assess the impact on fire survivability. The testing will include both post-crash external fires and in-flight fire scenarios. Lab scale testing will follow the full scale testing when warranted to ensure that the existing high level of accident survivability and fire prevention has not been degraded. New flammability test standards may be developed to ensure required certification flammability test correlate to full-scale test results.

<u>Fire Research</u>
Computer modeling will be used to simulate in-flight fire hazards and identify mitigating strategies that would be prohibitively expensive or impossible to recreate in full-scale tests. Relevant fire hazards include heat transport and smoke movement in aircraft cabins and cargo compartments at cruise altitude; flame spread over materials in hidden areas; under-ventilated burning/smoldering of structural composites; and fire suppression in hidden areas. Numerical simulations will be used to support the FAA's long-range plan to certify by analysis. This includes emerging fire threats at cruise altitude as well as new materials, components, and cabin configurations. The flammability parameters and combustion toxicity of cabin materials with replacement flame-retardants will be assessed in small- and bench-scale tests to develop criteria to expedite recertification of materials. This is in response to the EPA ban on flame retardants commonly used in aircraft cabins.

Major Activities and Accomplishments Planned in FY 2018 Include:
<u>Aircraft Fire Safety</u>

- Evaluate systems, procedures, and materials to safely contain or mitigate the fire hazards from batteries and fuel cells installed in aircraft.
- Develop criteria for an integrated fire protection system combining both detection and suppression, including the entire aircraft volume where fires could potentially ignite.

- Evaluate new fire detection technologies for more effective detection of cargo compartment fires and for fires in hidden areas not currently required to have detection systems.
- Evaluate the effectiveness of current and proposed replacement fire suppression agents for passenger aircraft cargo compartments and suppression/containment systems on freighter aircraft on fires involving hazardous materials transported as cargo.
- Conduct full-scale aircraft fire testing to document the contribution to accident survivability and fire prevention of non-traditional aircraft structural and cabin materials.
- Incorporate fire parameters into computer simulations to represent material behavior in hidden area cabin fires.
- Assess the combustion toxicity of cabin materials with replacement flame-retardants in small and bench scale tests.

What does this Funding Level Support?

The 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. The fire research facilities and technical expertise developed through their use have continually demonstrated a high level of contribution to aviation safety due to the flexibility, quick response, and capability to effectively address newly emerging fire hazards. Thus, because of its expertise and facilities the international aviation community looks to the FAA for leadership in aircraft fire safety research and development. Research activities to increase aircraft fire safety include fire tests for interior materials, fire detection and suppression systems, fire-fighting procedures and guidance material, testing to validate Halon replacement suppression agents against minimum performance standards, and safeguards to protect against fires involving lithium batteries, fuel cells, and hazardous materials.

Goals for FY 2018 Funding:

- By 2022, develop the enabling technology to prevent accidents caused by in-flight fires in freighter (all cargo) and passenger carrying large transport aircraft by improving aircraft based detection and suppression capabilities.
- By 2022, enable the introduction of fire-safe new materials into commercial transport aircraft, such as lightweight composite structure, magnesium and other metallic alloys, lightweight cabin furnishing materials, and advanced electrical power sources, including lithium batteries and hydrogen-fueled fuel cells.
- By 2022, support and facilitate the evaluation and replacement of Halon fire extinguishing agents and halogenated cabin material flame-retardants with effective and practical alternatives.

The effectiveness of this program has been demonstrated by the continued low level of occurrences of aircraft accidents where fire was either a direct cause of the accident or a major contributor to fatalities during evacuations. Proactive research is proposed to mitigate emerging fire threats including the proliferation of high energy density batteries as both cargo and installed with aircraft equipment, and the increased use of composite fuselage structure replacing aluminum.

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 increasing survivability during a post-crash fire. The international aviation community has taken action regarding the shipment of lithium batteries, based on FAA test findings. Effective April 1, 2016, ICAO approved the prohibition of lithium ion battery shipments in passenger aircraft, a reduced state of charge for lithium ion batteries on freighter aircraft, and elimination of unrestricted small quantity undeclared shipments on freighter aircraft. In early 2015, United, American, Delta, Qantas, and Cathay Pacific airlines unilaterally banned the bulk shipment of lithium ion batteries, which are manufactured and shipped in far greater quantities than lithium metal batteries, in passenger aircraft. Moreover, in April 2015, Boeing and Airbus proposed to ICAO that bulk shipments of lithium ion batteries be banned in passenger aircraft because the current cargo compartment fire suppression systems were not designed to protect against the severe and unusual hazards of a lithium battery fire, until effective shipping packaging becomes available. These unilateral measures by the airlines have improved aircraft fire safety, but also underscore the need for the research proposed in this program to safely ship lithium batteries in both freighter and passenger aircraft cargo compartments. Hydrogen powered fuel cells are being proposed to provide electrical power for aircraft systems. Hydrogen is an extremely flammable gas and compressed hydrogen stored onboard aircraft is unprecedented with potential significant new fire hazard implications. These include both leakages during flight and potential contribution to a post-crash fire.

Research products from this program have been implemented in large passenger transport aircraft throughout the world to improve post-crash fire survivability. The probability of dying from a survivable post-crash fire has been reduced by a factor of three due in part to this past research. This is perhaps best demonstrated by the following recent accidents in which the aircraft was destroyed by a post-crash fire: Air France 340 (Toronto, 2005), Continental 737 (Denver, 2008), and Asiana 777 (San Francisco, 2013). There were 731 passengers and crewmembers in the three destroyed airplanes and zero fire fatalities. The introduction of new aircraft materials and technologies, and emerging fire threats increases the need for both in-flight and post-crash fire safety research.

Detailed Justification for
A11.b Propulsion and Fuel Systems

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – Propulsion and Fuel Systems – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.b Propulsion and Fuel Systems	$2,034,000	$2,030,000	$2,269,000	+$239,000

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 FAA's Office of Aviation Safety with the basis for new or revised engine certification and continued airworthiness standards. This research also supports preparation of Advisory Circulars (ACs) 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. DARWIN® is used by nearly all major engine manufacturers.

The Propulsion and Fuel Systems 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 worldwide on a yearly basis. Many eruptions impact heavily used airway routes. 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 to an engine. Although volcanic ash has caused severe engine damage and total power-loss, there have been no accidents resulting from a volcanic ash encounter. The International Civil Aviation Organization (ICAO) has issued guidance for airline operators when operating near volcanic ash contaminated airspace. U.S. airline operators are directly affected by these international standards, which require regulators to assess operators' safety risk assessments for flight near ash-contaminated airspace. Given the continued threat of eruptions, it is important to develop an understanding of the effects that volcanic ash has 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 2018 Include:
<u>Advanced Damage Tolerance and Risk Assessment Methods for Engine Life-Limited Parts (New Materials)</u>

- Develop and integrate into DARWIN, new fracture mechanics models to address cracks in turbine engine shafts and casings.
- Develop advanced algorithms to accommodate residual stress gradients that arise from surface enhancement techniques such as shot peening or cold hole expansion. This will extend DARWIN capabilities to higher fidelity bi-variant fracture mechanics solutions in DARWIN.
- Conduct a three-day tech transfer workshop to provide basic DARWIN training to engine OEMs and FAA certification staff. The training will provide a comprehensive introduction to the entire code and also focus on new features and capabilities developed during the program. The workshop will include hands-on training in execution of DARWIN.
- Release updated version of DARWIN.

What does this Funding Level Support?

Goals for FY 2018 Funding:

- By 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 2020, develop and release a DARWIN analysis mode that will support a proposed AC that addresses rotor turned surfaces.

Requested funding will 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 ACs will reduce the risk of failures of high-energy rotors and other life-limited engine components.

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

Research conducted will provide guidance and input to the FAA and the Aerospace Industries Association Rotor Integrity Subcommittee (RISC) in support of continued development of an enhanced life management process for high-energy rotors. It will facilitate the accurate and efficient implementation of current and future ACs by engine manufacturers and provide insight, experimental data, new analytical methods, and new software tools that will help engine manufacturers improve the accuracy and efficiency of their probabilistic damage tolerance design processes. Additionally, this research will provide greater insight and background data for the FAA in order to fulfill their oversight role during the certification process of new rotor designs and for continued airworthiness. Benefits of this research to the American public will be the reduction 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 reductions in fatalities, injuries, and aircraft damage. The research conducted under this program is critical to the FAA's ability to understand these challenges and to ensure that acceptable safety improvements are incorporated into the user community.

Detailed Justification for
A11.c Advanced Materials/Structural Safety

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – Advanced Materials/Structural Safety – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.c Advanced Materials/Structural Safety	$7,409,000	$7,395,000	$4,338,000	-$3,057,000

What is this Program and why is it Necessary?

The Advanced Materials and Structural Safety program conducts research to support the FAA safety and regulatory activities 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 Advanced Materials program investigates damage tolerance and fatigue issues of composite structures, including the assessment of impact damage (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 material for advanced composite materials and manufacturing processes for education of aviation workforces.

Over the last decade, there has been a rapid expansion of the use of composites in increasingly larger structures (e.g., transport Airplane Wing and Fuselage). Dominating the rapid expansion is the use of reinforced composites to provide lighter, more fuel-efficient airframe and engine components including full-fuselage barrels and wings. The current certification process for many advanced materials and structures was established for smaller, and in some cases, less critical components and service conditions. The difference in the structural characteristics, loading conditions, system interface issues, and increased scale of these components must be understood and incorporated into certification and operational plans to assure safety.

The Structural Safety program performs research to evaluate test and analysis 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, loading rates for emergency landing conditions including strain rates, typical material response rates at the component and system level, and occupant survivability. The program also identifies limitations associated with structural scale and boundary effects, and develops crashworthiness safety awareness training materials.

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' approval are major influences that shape research requirements. Additional requirements are developed from assessments of existing techniques, protocols, and service histories. These are examined to determine if modifications to certification compliance methods are required for novel materials, processes, and forms. The National Transportation Safety board review of accidents (e.g., AA587 http://www.ntsb.gov/investigations/AccidentReports/Pages/AAR0404.aspx, R22 https://www.atsb.gov.au/publications/investigation_reports/2007/aair/aair200701625.aspx involving these structures provides additional impetus for research required to understand these emerging technologies.

Major Activities and Accomplishments Planned in FY 2018 Include:

Advanced Materials

Damage Tolerance of Composite Structures:

- Study the effect of design variables (e.g., door cutouts and floor structures) to the extent and detectability of critical damage modes under High Energy, Wide Area, and Blunt Impact.
- Provide detailed documentation of agreed standards, background material for regulation and supplemental guidance for compliance, considering more realistic damage scenarios and real-time effects on composite rotorcraft components.

Composite Maintenance Practices:

- Gain consensus from industry and regulators from around the world on standard substantiation methodology for repair certification and continued airworthiness.
- Evaluate problems related unqualified materials and processes and reserved engineering practices in bonded repairs to provide detailed documentation of agreed standards, background material for regulation and supplemental guidance for compliance

Structural Integrity of Adhesive Joints

- Develop Guidelines and test standards on the long-term durability of composite bonded joints, including material and process conditions, and environmental effects.
- Document quality control and structural substantiation protocol for a reliable composite durability test and proof of structure analyses & tests.

Composite Materials Handbook 17 (CMH-17, formerly MIL-HDBK-17)

- Develop information update to Composite Material Handbook 17 (CMH-17) Volumes 1-6.
- Develop standard shared composite databases & matching material/process specification.

Continued Operational Safety and Certification Efficiency for Emerging Composite Technologies

- Investigate the effects of fire on structural failure analysis of composite procedures and methods.
- Characterize ignition sources from lightning strike in composite structure and develop appropriate assessment and detection techniques.
- Identify key characteristics of carbon fiber production, how they are controlled, and what testing needs to be performed in fiber line qualification.

Structural Safety

Transport Airplane Ditching

- Determine amount of acceptable airframe damage during ditching Determine most likely range of ditching conditions Demonstrate analytical tool applicability.

What does this Funding Level Support?

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 require an understanding of their unique response to the civil aircraft operational environment. Advisory Circular 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 2018 Funding:

- By 2018, identify needs for lightning strike criteria and policies specific to composite structures.
- By 2018, identify issues and limitations associated with structural scale and boundary effects on crash analysis.
- By 2018, develop preliminary basis for performance related crashworthiness certification requirements.
- By 2019, assess loading rates for emergency landing conditions at the component and system level including occupant survivability.
- By 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 2020, provide detailed background on the unique static, fatigue, environmental durability, and impact performance of advanced composite splicing concepts.
- By 2020, complete an evaluation of field bonded and bolted repair practices to update related guidance and training for composite aircraft structures.
- By 2020, develop information on the effect of environmental and heat exposure on structural properties and durability of composite structures.
- By 2020, provide documentation and background data for regulatory action to assure reliable processing of adhesively bonded structures.
- By 2022, Develop a handbook for failure analysis of structures subjected to a fire event after structural malfunction.

This program depends on a collaboration 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. 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?

Research funding 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. It also helps develop related industry guidelines, training and regulatory guidance materials to mitigate known safety risks and ensure safety awareness in the workforce that is expected to expand in dealing with increased composite applications.

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 that 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 benefit to the American public is a reduction in accidents related to the design and use of composite materials.

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 benefit to the American public is a reduction in fatalities and injuries in the event of a crash.

Detailed Justification for
A11.d Aircraft Icing/Digital System Safety/Aircraft Cyber

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – Aircraft Icing/Digital System Safety/Aircraft Cyber – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.d Aircraft Icing/Digital System Safety/Aircraft Cyber	$5,500,000	$5,490,000	$9,253,000	+$3,763,000

What is this Program and why is it Necessary?

The FAA establishes rules and regulations 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 safety inspectors on acceptable means for meeting these rules and regulations.

Aircraft Icing

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 Supercooled Large Droplet (SLD), mixed-phase, and ice crystal icing conditions. 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. In addition, the FAA will enhance icing simulation methods for means of compliance; and 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 research will provide new test methods and a 3-D ice accretion database to support validation of computer codes and means of compliance for certification.
Aircraft icing due to the freezing of supercooled water on aircraft surfaces is a continuing concern in all phases of flight: ground; takeoff; and cruise, holding, and landing. The FAA has identified over 175 turbine engine power loss and engine damage events caused by ice crystals between 1989 and 2015. 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 contributing to an airplane accident that occurred on June 1, 2009 in which there were 228 fatalities.

Digital System Safety

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 functions. Research is required to address the evolution of these highly complex architectures especially as they begin to integrate with ground systems and NextGen implementation. This will require a systems-level approach that focuses on system life cycle assurance in addition to development assurance at the software/digital level.

The FAA has taken a proactive approach to keep 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. The majority of operational software and electronic hardware issues are due to missing or incorrect requirements. Many of these issues can be attributed to system complexity and associated difficulty in requirements validation to ensure completeness and correctness. Research will be conducted to analyze and mitigate the issues and shortcomings associated with requirements and system integration processes, electromagnetic compatibility, single event effects, and automated test generation for complex systems. Modeling of software intensive systems may facilitate the early validation verification of complex requirements, thereby improving the timelines of NextGen implementation.

Outputs from Digital System Safety program research will be used to develop new or revised guidance and training material as well as to recommend best practices for the industry. These outputs will generate the following benefits:

Continuous improvement and risk management; and improved safety that could have potentially prevented incidents due to digital systems such as:

- The Malaysian Airlines Boeing 777 incident on August 1, 2005 (caused by a faulty accelerometer being processed by the air data inertial reference unit and used by the primary flight computer, autopilot and other aircraft systems), and
- The Qantas A330 incident on October 7, 2008 (Caused by an abrupt pitch down due to a faulty air data inertial reference unit sending incorrect data to the flight control system and caused partially by a single event upset in the digital equipment).

<u>Aircraft Cyber</u>
Aircraft network systems security is an increasing concern for current and future aircraft. Recently some of these concerns have also been documented by the Government Accountability Office (GAO), which released a report GAO-15-370 (published April 14, 2015) entitled *FAA Needs a More Comprehensive Approach to Address Cybersecurity as Agency Transitions to NextGen*. The future generations of aircraft will be increasingly network centric with expanded aircraft connectivity for improved safety, operations, and maintenance. The aircraft manufacturers and modifiers are installing avionic systems to allow increased connectivity within an aircraft, as well as to networks external to the aircraft, to take full advantage 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 introduce information security vulnerabilities. If this is exploited, it could impact safe aircraft operations and continued airworthiness. Examples of such external networks and services - referred to as apertures - include airline operation centers, airport gate links, aircraft software uploads and maintenance, electronic flight bags, flight information databases, etc.

These concerns, which encompass certification and continued operational safety, will be addressed through the Aircraft Systems Information Security/Protection (ASISP) initiative. The focus is on the aircraft itself and does not encompass the National Airspace System (NAS) but does include any aircraft connectivity to external links (also called access points or apertures). The research will explore where ASISP-related threats, risks, and common cause failures can compromise fail-safe mechanisms in the architecture, design, and operation of aircraft systems. Research activities planned for the near-term include defining and identifying the potential associated risks with access points or apertures, generating system level testing to test those risks for individual apertures, and determining how maintenance tools work to maintain airworthiness integrity in relation to ASISP risks. 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.

The technical data from the research will be used to develop policy, guidance, best practices, standards, regulations, and training procedures to address gaps, safety issues, and potential malicious intent from various cyber threats. In addition, the outputs will be used to enhance standardization and support timely certification for complex systems.

Major Activities and Accomplishments Planned in FY 2018 Include:
<u>Aircraft Icing</u>
Research on Ice Crystal and SLD (Appendix C Exceedance) Icing Conditions to Support Means of Compliance

- Using rotating rig, investigate drivers that cause internal engine ice accretions due to ice crystal icing conditions

Safe Operations and Take-off in Aircraft Ground Icing Conditions

- Complete Cold-Soaked Fuel Frost wind tunnel testing
- Analyze technical data on the correlation of indoor test results with snow machine and outdoor test results in natural snow conditions.

Simulation Methods Development, Validation to Support Appendix C Icing Certification and Continued Operational Safety

- Analyze data from test results for swept wing experiments
- Build a validation database of ice shapes and their aerodynamic effects on swept wings for computational fluid dynamics

SLD Engineering Tools Development and Validation

- Develop new methods for drop measurement and determination of drop impingement in SLD conditions in wind tunnels.

Digital System Safety

System Considerations for Complex Software Intensive Systems

- Analyze results of the consistency checks, safety analysis, fit analysis, and updated specifications for virtual integration models.
- Evaluate technical data on the effectiveness of the airplane concepts and architectural features to mitigate system development features.

Aircraft Cyber

Onboard Network Security and Integrity (Aircraft Systems Information Security)

- Based on risk assessment outputs from FY 16 and FY 17, develop mitigation techniques for use in generating policies and regulations.

What does this Funding Level Support?

The Aircraft Icing program develops and tests technologies that detect frozen contamination, predict anti-icing fluid failure, and ensure safe flight operations in atmospheric icing conditions. A major goal of the program is to reduce aviation's vulnerability to all in-flight icing hazards. The research will develop databases and test methods to improve guidance materials and technical standards. Current aircraft that are certificated for flight in icing conditions (based on Appendix C engineering standards in 14 Code of Federal Regulations (CFR) Part 25) can fly as long as they do not operate in conditions where the accumulation exceeds the capability of the deicing/anti-icing equipment. New regulations will change the operational criteria for operating in icing conditions. There are two additional appendices to 14 CFR Part 25, Appendix O (for SLD), and Appendix D (for ice crystals). The research team 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 and Aircraft Cyber programs support development of new guidelines for testing, evaluating, and approving digital systems for the certification and maintenance of aircraft and engines. This includes the 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 goals are to approve and maintain aircraft safety by taking a proactive approach to the ever-changing technological marketplace, 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, as well as 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 2018 Funding:

Aircraft Icing

- By 2019, complete study on the use of computational fluid dynamics analysis and of test methods and scaling for iced swept wings.

- By 2019, complete modeling study of compressor icing in high ice water content conditions using rotating rig.
- By 2020, develop engineering tools and icing test facilities for freezing drizzle and potentially freezing rain icing conditions.
- By 2021, develop data package of experimental, test, and analytical results that can be used for the development of guidance materials for means of compliance for certification in SLD conditions.

Digital System Safety

- By 2019, identify and analyze software digital system issues that could affect aircraft airworthiness.
- By 2020, determine an acceptable means to analyze, integrate, validate, and verify complex airborne digital systems and improve safety.
- By 2020, consider new policy statements to address the results from the integration of complex digital systems and automatic test generations research.

Aircraft Cyber

- By 2018, identify methodologies for analysis of security threats to aircraft safety in an airborne network environment.
- By 2020, reduce the specific ASISP risks being analyzed with new mitigation processes that encompass the Safety Risk Assessment framework.

The requested funding for aircraft icing will be used to address the reduction of risk of engine power and damage events in high ice water content conditions; safe takeoff in ice pellet mixed ground conditions; and development of database and methods for validation of numerical analysis methods for icing for certification.

The requested funding for digital systems and aircraft cyber will allow the FAA to evaluate emerging, highly complex aircraft systems implemented digitally, using hardware and software techniques. This allows 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.

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

The benefits to the public through the aircraft-icing request are continued and improved safety for 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 those issues being identified. The inflight-icing program is currently focusing on the threat of high ice water content conditions for turbine engines. In addition, this program supports improved atmospheric characterization of the ice crystal conditions for certification and simulation in test facilities for evaluation of engine designs.

The Digital System Safety research proactively looks into the safety issues of highly integrated systems and has the potential to prevent accidents/incidents and mitigate fatalities and injuries. While great strides have been made in the processes of developing and verifying individual components, developing and verifying the functionality and behavior of a system of complex components still contains many challenges to be resolved at both the component level and system level. Inadequate and misunderstood integration, validation, and verification techniques for complex components leave potential for faults to exist with failure manifestation at the aircraft level. Most standards and regulations address development and safety requirements for individual components. Little exists for complex, highly integrated components and resulting systems, particularly using commercial-off-the-shelf equipment developed for a non-aviation (non-safety) market. As technology continues to change and become more complex, the verification and validation processes must change to adequately assess systems for compliance to the regulations and to minimize risk to the public.

The aircraft cyber research will explore cyber-related threats and risks that can compromise fail-safe mechanisms in the architecture, design, and operation of aircraft systems, including specific ASISP-related risks that might lead to common cause failures. The implementation of a Cyber Safety Risk Assessment

(SRA) framework will establish confidence that every appropriate measure has been taken to ensure that the civilian aircraft will not experience a safety event due to a cyber vulnerability being exploited by a threat actor. The SRA framework will also leverage several government agencies working together with industry and academia to stay ahead of any potential threats to civilian airlines and aircraft so that the public can rest assured that they could safely travel in the aviation community.

Air transportation demands are expected to increase in the near future, which means capacity and efficiency needs to increase to avoid huge delays in civil aviation. One key enabling technology to improve the capacity and efficiency of the NAS is to allow future generations of aircraft to be network centric with advanced avionics systems that will allow for improved safety, operations, and maintenance. This can only occur if the aircraft avionics systems can ensure data integrity and reliability. The ASISP initiative will ensure that aircraft avionics systems are secure and provide the public benefit of timely and safe air transportation.

Detailed Justification for
A11.e Continued Airworthiness

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – Continued Airworthiness – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.e Continued Airworthiness	$8,987,000	$8,970,000	$10,437,000	+$1,467,000

What is this Program and why is it Necessary?

The Continued Airworthiness program's focus is on the continuing operational safety of all aircraft throughout their lifecycle. It is based on research requirements developed by the FAA's Office of Aviation Safety (AVS). 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, proposed inspection standards for the aviation industry, and technical data for rulemaking and advisory material.

Aircraft and aircraft engines are extraordinarily complex systems, operating in an unforgiving environment, with a long design service life. Continued operational safety is ensured in several phases; design and certification; operational maintenance; and timely discovery and repair of damage and unanticipated issues. The 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. The FAA uses this information to fine-tune these oversight instruments, continually increasing safety. However, as new technologies are introduced, the FAA must anticipate all potential problems without the benefit of historical operational data.

As aircraft products age, the probability of component and subsystem failures, 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 in support of those regulatory efforts that enable the current high level of safety of commercial aircraft.

New aircraft designs, metallic and composite materials, and fabrication techniques that have entered service in recent years will 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. Composite materials present an exceptionally difficult challenge in detecting impact damage. For example, unlike metallic structures, damage to the fuselage from ramp activities may not be apparent.

Research is necessary to address issues of continued operational safety and is 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.

In FY 2018, the planned research will focus on five technical areas: Flight Controls and Mechanical Systems (FCMS), Maintenance and Inspections (M&I), Electrical Systems (ES), Rotorcraft Systems (RS), 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

Within this project, research will continue on three initiatives:

1. Tire failure characteristics support the development of tire failure and burst models that can be used by industry and authorities to support improved application of safety standards.

2. Integrated Flight Path Control to address General Aviation Joint Steering Committee/FAA General Safety Interventions feeds the design and certification of an advanced flight path control system to enhance GA safety.

3. In addition one new effort will be initiated, which is the transfer of UAS Technology for Enhancement of GA Safety that will explore whether unmanned aircraft systems technologies, e.g., sensors, autopilots, and automation systems can quickly and affordably address loss of control accidents in GA.

Maintenance and Inspections

M&I research will support the FAA's safety mission by evaluating the reliability, robustness, and efficiency of current and emerging Non-Destructive Inspection (NDI) methods. This includes NDI of composites; specifically the ability of NDI to detect various forms of impact damage as well as to detect hidden damage to substructure such as frames and stringers. M&I inspection will study the sources of variability when inspection and repairs are made by technicians in the field and at repair depots. Additionally, an effort will be made to assess the performance of aged in-service composite and metallic component bonded repairs through the collection, inspection, and testing of documented parts. The information gathered in this program will support the development of training material, guidance, and revisions to Advisory Circulars (AC's) such as 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.

Electrical Systems

- 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.
- Investigate technology and processes to improve the safety aspects of lithium battery cell(s) in aerospace applications.
- Determine characteristics of safe aerospace rechargeable lithium battery installation techniques and provide technical data that supports new regulatory requirements for use and installation of these energy storage devices. All three research efforts will consider both safety and environmental issues.

Rotorcraft Systems

This research will address the mitigation of bird strikes either by visual/audio cues to divert birds or radar capable of informing the pilot of possible birds in the flight path and allow them to make corrective actions to avoid them.

Structural Integrity Metallic

SIM research will address both air 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, Additive Manufacturing (AM), as well as new and emerging alloys to be studied for inclusion in Metallic Materials Properties Development and Standardization (MMPDS). It also includes risk management methods to support the Aircraft Certification Services Monitor Safety/Analyze Data initiative, which is a data-driven, risk-based continued operational safety decision-making process.

Major Activities and Accomplishments Planned in FY 2018 include:
Flight Controls and Mechanical Systems
Tire Failure Characteristics:

- Collect and analyze the data collected from thrown tread tire tests and flailing strip tests of radial ply and bias ply tires and record the test parameters in accordance with FAA developed test plan.

Integrated Flight Path Control to Address GA Joint Steering Committee and FAA GA Safety Interventions:

- Identify issues not mitigated by current safety assessment processes for integrated systems and their operational use.

Transfer of UAS Technology for Enhancement of GA Safety:

- Investigating UAS sensors, autopilots, and automation systems to enhance GA safety.
- Identify UAS platforms and UAS systems for detailed evaluation that could be utilized to enhance GA safety.

Maintenance and Inspections:

- Inspection and Tear Down of Bonded Repairs
- Complete fragment testing
- Prepare final report

Electrical Systems:

- Rechargeable Lithium Batteries and Battery Systems for Aerospace Application
- Evaluate the feasibility of using non-flammable electrolytes for lithium battery systems for aerospace application while retaining or improving the current level of safety in commercial transport aircraft.
- Categorize and analyze the research data to determine feasibility of adding a requirement for thermal and lifecycle testing for lithium systems for aerospace application while retaining or improving the current level of safety in commercial transport aircraft.

Rotorcraft Systems (RS):

- Continued Operational Safety of Rotorcraft
- Provide data on bird strike mitigation techniques that center on visual and/or audio cues that deter birds from approaching the rotorcraft.
- Analyze pilot avoidance technologies/procedures that provide the pilot with knowledge of the birds in the aircraft vicinity and allow the pilot to alter the flight path as needed to avoid contact with the birds, e.g., radar or other similar technology.

Structural Integrity Metallic:

- Probabilistic Damage Tolerance Based Fleet Risk Management for Small Airplanes
- Collect data to determine distributions of random variables necessary for fatigue and damage tolerance analyses for small aircraft for safety management.
- Initiate development of methods to quantify and assess the risk of fatigue-related concerns for general aviation fleet based on wide range of input data.

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:

- In partnership with Bombardier, ALCOA, and Constellium, continue assessing emerging metallic structures technology through testing and analysis. Emphasis will be placed on full-scale testing of advanced fuselage panels using the FAA's Full-Scale Aircraft Structural Test Evaluation and Research (FASTER) Lab.
- In partnership with Boeing, continue efforts to assess bonded repair technology to generic beam structures (e.g. wings and stabilizers). Emphasis will be placed testing bonded repairs to wing-like structure using FAA's Airframe Beam Structure Test Lab.

Emerging Technology Active Flutter Suppression:

- Refine the FAA Active Flutter Suppression Research Plan. Continue efforts to obtain data and necessary technical information to enable the FAA to evaluate and assess active flutter suppression technologies for compliance with certification and continued airworthiness requirements.

What does this Funding Level Support?

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 2018 Funding:

- By 2018, develop an increased understanding of aged-bonded repairs for use in new and existing FAA guidance material.
- By 2019, develop process for establishing mechanical property standards for emerging process-intensive metallic materials, including metal additive manufacturing. Property standards 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 support of developing appropriate policy, guidance, standards, and rulemaking.
- By 2019, provide data relative to active flutter suppression to allow for the review of pertinent regulations and guidance material, and prepare recommendations for new, modified, or otherwise improved criteria.
- By 2020, develop technical data to evaluate non-flammable electrolyte lithium batteries and battery systems for aerospace applications.
- By 2020, develop technical data to evaluate the feasibility of using fuel cell systems for aerospace applications while retaining or improving the current level of safety in commercial transport aircraft.
- By 2020, provide data to assess additive manufacturing technologies in support of developing appropriate policy, guidance, standards, and rulemaking.
- By 2020, provide technical data for use in guidance material to mitigate risk of bird strikes to helicopter operators.

There is a risk profile associated with the life cycle of every aircraft type and every specific airframe. While newer aircraft tend to have a lower risk profile than older aircraft, newer aircraft types tend to have a higher risk profile than more mature designs. 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 in the same timeframe 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 the predictability of that risk.

The Continued Airworthiness 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 a collaboration 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 through funding, equipment, and labor.

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

The Continuing Airworthiness program provides increased safety for the public. Improved flight crew awareness of low airplane energy state through displays that are more effective and alerting will be a derived benefit from the FCMS Low Energy Alerting and Awareness Systems research. Thus, the output of the research is considered a mitigating factor to loss of control – inflight (LOC-I) events. In addition, recommendations and guidance for improving design requirements, architecture, & certification processes derived from the FCMS integrated flight path control research will assist in reducing general aviation LOC events.

Lithium batteries/battery systems are a new and novel technology that introduces new failure modes and effects on aircraft safety. Aircraft manufacturers will continue to employ lithium battery systems as an energy source given its efficiency and weight advantages. The FAA will use the output of this research to develop new rules and policy that will guide safe incorporation of this technology into airplanes. 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.

Technical data from the rotorcraft systems will yield to improved pilot operating procedures in known bird strike areas identified rotorcraft structural design improvements.

One of the primary benefits of the SIM 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.

Detailed Justification for
A11.f Aircraft Catastrophic Failure Prevention Research

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – Aircraft Catastrophic Failure Prevention Research – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.f Aircraft Catastrophic Failure Prevention Research	$1,433,000	$1,430,000	$1,570,000	+$140,000

What is this Program and why is it Necessary?

The Aircraft Catastrophic Failure Prevention Research program will develop, test, and analyze methods that produce publicly available tools to better predict aerospace engine impact events. FAA engineers need publicly available tools to standardize the analysis of engine 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 reduce workload and allow for the timely processing of applications.

The program is largely driven by accidents, incidents, National Transportation Safety Board safety 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 Aviation Rulemaking Advisory Committees, Aerospace Industry Association focus groups, Department of Defense (DoD), the National Aeronautics and Space Administration (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 materials.

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.

The majority of the LS-DYNA user community deals with relatively low-speed automotive crash. In commercial transport engine failure, rotating speeds of the engine are limited to roughly 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. Research is needed to address this unique speed range because the mode of failure changes with speed.

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 configuration that requires certification. 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. Research is necessary to improve analytical tools previously developed under the program to evaluate this new configuration.

The FAA has accepted an Australian Transportation Safety Bureau recommendation because of the Qantas Airlines uncontained engine failure on the Airbus A-380 aircraft that occurred in November 2010. Research is necessary to review and update the guidance in AC20-128 and Uncontained Engine Debris Damage Assessment Model (UEDDAM) code to address this safety recommendation.

The current engine and aircraft certification methods require full-scale destructive tests of an engine. There is a need for more robust and accurate non-destructive analytical methods and predictive tools to assess safety risks to the aircraft to minimize or replace non-destructive tests. Research is necessary to achieve and validate certification-by-analysis using analytical and predictive tools.

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 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.

A new challenge for this program is the move away from the traditional aluminum and into composite structures. This creates 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. Research is necessary to build on the recent success with metals, increase capability of computer platforms through parallel processing, and develop a new generation of predictive anisotropic models.

Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major Activities and Accomplishments Planned in FY 2018 Include:

<u>Advanced Analysis Methods for Impact of Composite Aircraft Materials in Rotor-Burst and Blade Release</u>

- Complete updated guidelines for metal impact to support development of tabulated failure models (i.e. MAT_224, MAT_224_GYS and MAT_264).
- Conduct evaluation of composite tabulated failure model MAT_213 for uniaxial composite T800/F3900
- Perform testing in support of metal and composite impact model development

What does this Funding Level Support?

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 and academia 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. Research plans are reviewed with industry and NASA to ensure FAA products are meeting the needs of all involved. A primary review takes place yearly during the FAA/NASA/Industry LS-DYNA Aerospace Working Group Meeting.

The program supports certification of new technologies in the form of means of compliance for open rotor Engines, the work performed to develop and test lightweight composite shielding for aircraft fuselages in 2014 and 2015 helped establish the equivalent safety of open rotor aircraft to existing ducted fan designs. This work is now the centerpiece of the FAA- NASA composite material development and will serve as a vital validation tool in the 2020 time frame.

The program also develops Rotor-burst Vulnerability Analysis (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 2018 Funding:

- By 2018, develop new metal material analysis guidance relating to LS-DYNA metal failure analysis.
- By 2018, complete Phase 3 development of a new anisotropic composite material model.
- By 2020, validate composite material models with associated guidance for certification.
- By 2020, maintain UEDDAM in conjunction with DoD, as a means of compliance for ducted and open rotor engines.

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, which is 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 reduce the cost of producing new engine and aircraft designs. Anisotropic composite materials are the current focal areas of interest in impact analysis; and the A-380 accident recommendation is the current focus of aircraft vulnerability analysis.

Today, certification of fan blade off requires a test that can cost upwards of $20 million. Predictive analysis will improve the design capability - allowing for a more thorough evaluation that improves safety of aircraft - and significantly reduce the cost of certification. The safety benefits from this research are a reduction in the number of accidents related to engine failures, and mitigation of fatalities and injuries if an accident occurs.

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 2018 – Flightdeck/Maintenance/System Integration Human Factors – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.g Flightdeck/Maintenance/ System Integration Human Factors	$5,000,000	$4,991,000	$6,825,000	+$1,834,000

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 (AC's), technical standards orders, 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 (HUD) 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. This 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 (GA). Current research is proactive in identifying error tendencies and thereby enhancing the safe and effective introduction of new technologies and procedures into the National Airspace System (NAS).

The FY 2018 research program will develop human factors scientific and technical information to support the development of standards, procedures, policy, and guidance material addressing human factors in safety-critical flight crew performance areas. Human factors efforts addressing new technologies, including avionics and advanced visions systems, is vital to supporting the forward momentum of enhancements in aviation while maintaining and improving safety. These evolving technologies have a dynamic impact on aviation safety and risk. Additionally, funding will provide for engineering, technical, and management support of research activities.

Major Activities and Accomplishments Planned in FY 2018 Include:

<u>Avionics and New Technologies</u>

- Report with results from the literature and accident analyses related to information automation (e.g., ADS-B/CDTI/Airport moving map) on pilot actions.
- Report compiling and comparing industry chart symbology and avionics display symbology sets.

<u>Advanced Vision Systems, Enhanced Flight Vision System (EFVS), Enhanced Vision System (EVS), Synthetic Vision System (SVS), and Combined Vision System (CVS), Head Up Display (HUD), Helmet Mounted Displays (HMD) Certification and Operational Approval Criteria</u>

- Complete a report with findings and recommendations on the following based on the use of Advanced Vision Systems:
  - Differences in pilot performance by display type and location (SVS HUD and SVS HDD), operational concept (SA CAT I, SA CAT II), decision height, and visibility,
  - Experimental conditions compared to baseline operations,
  - Approach and landing performance, and

  - Recommended operating conditions, limitations, mitigations, minimum training, recent flight experience, proficiency requirements, and the need for unique training.

- Quantify the contribution of HUD to pilot performance during a 150 foot Decision Height to touchdown on a Special Approval Category I approach that is flown using a HUD.

What does this Funding Level Support?

This program directly supports the engineers, test pilots, human factors specialists, and inspectors within FAA Aviation Safety who are responsible for approving flightdeck systems, equipment, procedures, and maintenance and 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.

A major goal of the program is to improve pilot, inspector, and maintenance technician task performance. Research results support enhanced methods for 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.

Goals for FY 2018 Funding:

- By 2020, increase safety, efficiency, capacity, and throughput during low visibility conditions using advanced vision systems, head-up displays, and head-mounted displays. Expanding the use of these technologies will enable more flight operations to occur in low visibility conditions with less ground infrastructure while maintaining an appropriate level of safety during approach, landing, taxi, and takeoff operations.
- By 2022, reduce human factors-related accidents/incidents by incorporating human factors best practices, early in the design process.
- By 2022, create comprehensive human factors guidelines that will assist certification and flight standards personnel. Examples include:
  - Create job aids and checklists to assist engineers and inspectors in the field
  - Collect empirical data for updating FAA guidance and industry standards
  - Streamline certification approval process.

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% of air carrier accidents. While many human error categories warrant research, this program has been scaled to address some of the most critical areas for flight safety based on new advancements in technology and proactive risk assessments. Recent accidents such as Asiana and Colgan emphasize the continuing need to address flight crew performance. Another will provide recommendations for updating regulatory and guidance material on the minimum safety requirements for operating aircraft using various advanced vision technologies. It will also explore the viability of expanding operational capabilities with some of these new technologies. These things directly affect the safety of the traveling public as well as the forward momentum and integration of advancing aviation technology.

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 2018 – System Safety Management / Terminal Area Safety – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.h System Safety Management/Terminal Area Safety	$6,063,000	$6,051,000	$4,149,000	-$1,902,000

What is this Program and Why is it Necessary?

System Safety Management

The System Safety Management (SSM) program is designed to improve safety through developing safety data collection methods, advanced safety data and risk analysis techniques, and prototypes of risk-based decision-making capabilities to identify and analyze emerging safety issues in a cooperative nature with the aviation stakeholders. The program provides an ability to analyze trends across the aviation community that is much more effective than monitoring individual certificated entities, e.g., air operators and air traffic facilities.

Through this program, the FAA developed an infrastructure and capability - called Aviation Safety Information and Analysis Sharing (ASIAS) - that enables the free sharing and analysis of de-identified safety information derived from government and industry sources. Research will be conducted 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 safety across the complex mix of helicopter mission segments and operational environments. Research will 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 and its various mission segments.
In FY 2018, the FAA will initiate research to examine current and legacy training requirements for flight maneuvers used by General Aviation (GA) and/or Rotorcraft. Research will assess the effectiveness training to mitigate risks to pilots during the Loss of Control In-Flight (LOC-I).

Through this program, the FAA developed methodologies and a concept of operations to improve its oversight of Air Traffic Organization (ATO) facilities. The program developed a methodology to determine risk at ATO facilities within the National Airspace System (NAS) by using safety indicators. The FAAs field and headquarter personnel can target available oversight resources towards facilities posing the highest risk to air traffic safety using this methodology. The program also developed a methodology and decision-making prototype tool to support the evaluation of risk controls that are proposed by the ATO to mitigate or eliminate potential hazards due to changes in NAS. The scope and capabilities of the decision-making prototype tool, identified as the Integrated Domain Safety Risk Evaluation Tool (ID-SRET), supports the evaluation of risk controls proposed by the ATO to mitigate or eliminate potential hazards due to changes in NAS. This will be expanded to include air traffic procedure changes.

The System Safety Management program addresses issues identified in several U.S. Government Accountability Office (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. In addition, the ID-SRET projects support the FAA commitment to the International Civil Aviation Organization's (ICAO) Global Aviation Safety Plan (GASP). The GASP establishes objectives for 'implementation of an effective safety oversight system' and 'full implementation of the ICAO State safety programme framework' by 2022, and establishment of an 'advanced safety oversight system including predictive risk management' by 2027. This program also promotes the FAA Risk-Based Decision Making Strategic Initiative.

Research projects in the System Safety Management program are necessary to supports the Administrator strategic initiative of improved risk-based decision-making. 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.

Terminal Area Safety
The Terminal Area Safety (TAS) program improves the safety of operations near or at an airport. Research projects in the program focus on developing training solutions and identifying effective technologies to mitigate key causes of fatal accidents such as the loss of control, runway excursions, and runway overruns. These are the leading causes of fatalities in the worldwide commercial jet fleet as indicated in the *Boeing Annual Summary of Commercial Jet Airplane Accidents* that is based on corresponding ICAO, NTSB, and Flight Safety Foundation (FSF) definition of accidents and events (*Statistical Summary of Commercial Jet Airplane Accidents Worldwide Operations 1959 – 2014*).

Through this program, the FAA recommends solutions to reduce fatal accidents in the terminal area through:

- Extending simulator models to allow for better upset training;
- Exploring alternatives to determine runway slipperiness;
- Developing motion criteria to minimize inappropriate simulator training;
- Improving flight crew response during upset and recovery with an effective indicator;
- Enabling safe helicopter approaches when using advanced vision systems, and
- Exploring consistent operational standards for a stable approach to reduce runway excursions.

These projects address the principal causes of fatalities in the commercial jet fleet but also fill aviation safety research gaps identified in NTSB's Safety Recommendations A-07-003, A-04-62, A-07-64, A-01-069, and A-96-094 available at https://www.ntsb.gov/_layouts/ntsb.recsearch/RecTabs.aspx. In FY 2018, research will address external recommendations regarding go-around safety from the Bureau d'Enquetes et d'Analyses, the Flight Safety Foundation, and the Commercial Aviation Safety Team (CAST). Studies have shown that one in ten go-around reports record a potentially hazardous go-around outcome such as exceeding aircraft performance limits or fuel endurance. This equates to about three to nine potentially hazardous go-arounds every day. The purpose of the research is to structure logical go-around training curriculum that mitigates the operational go-around problems that have arisen.

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 2018 Include:
System Safety Management
Integrated Domain Safety Risk Evaluation Tool

- Develop a concept of operations and model for integrating separation minima related systems and associated safety data.
- Develop guidance for evaluating Safety Risk Management Documents (SRMDs) related to air traffic control (ATC) procedure changes.

General Aviation Airman Certification Standards/Practical Test Standards for Maneuvers Training

- Review current maneuvers training for understanding and preventing Loss of Control conditions.
- Select candidate maneuvers for further evaluation to develop and quantify skills used for preventing Loss-of-Control occurrences.

Terminal Area Safety
Improving Go-Around Safety

- Conduct a survey of recent literature regarding go-around safety.
- Identify/assess novel training and technology solutions for go-around safety and select candidates for further evaluation.

What does this Funding Level Support?

The ID-SRET projects will improve AOV's ability to identify and analyze emerging safety issues in air traffic facilities, evaluate the safety impact of multiple NAS changes, and evaluate the effectiveness of safety controls in place to manage safety risks. An Office of Inspector General (OIG) audit, Report Number AV-2013-046, February 27, 2013, found that the increase in loss of separation events was due to an increase in actual ATC errors that contribute to the risk of collision. The OIG's analysis of separation data indicates that the number of loss of separation events increased threefold between February and September 2012 from 64 to 190 events.

The Airman Certification Standards/Practical Test Standards for maneuvering training research will assess the effectiveness of maneuvers trained and tested to mitigate the LOC-I risk to pilots in general aviation. The LOC-I remains the most frequent causal factor in general aviation accidents. In 2015, Loss of Control was at the top of the NTSB's most wanted list for safety improvements/recommendations. The recommendation states that 'over 40% of fixed-wing accidents occurred because of loss-of-control' and a revision of maneuver training to understand stalls and other upset phenomena in varying aircraft in order to avoid loss of control situations.

The Terminal Area Safety program improves continued operational safety. The go-around safety research will address the high rate of hazardous outcomes when executing go-arounds. A 2012 Boeing study on airline pilots' perspectives on training effectiveness concluded that go-arounds are 'regarded throughout industry as a safety issue because they are either poorly performed or not executed when they should be.' Reports by the Flight Safety Foundation, BAE, and CAST have also acknowledged the risks associated with go-arounds and have recommended that training and technology solutions be developed to mitigate the hazards associated with go-arounds. During FY 2018, the project will address this safety issue by surveying literature related to go-around risks and identifying training and technology solutions that can potentially reduce the rate of hazardous outcomes that occur during the execution of a go-around.

Goals for FY 2018 Funding:

<u>System Safety Management</u>

- By 2019, complete the ID-SRET prototype and demonstrate its application in supporting SRMD evaluation and safety impact analysis of NAS changes.
- By 2020, develop list of selected maneuvers and skills required for executing maneuvers effectively for preventing Loss-of-Control In-Flight occurrences.
- By 2022, provide risk-based decision-making support prototype tool to enhance AOV's oversight mission.

<u>Terminal Safety</u>

- By 2019, complete selection of novel training and technology solutions for further development that best meet go-around safety recommendations.
- By 2021, complete analysis of simulation results and provide training and technology recommendations to update go-around regulations and guidance.

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

The public will benefit from increased helicopter operational safety. Long-term fatal accident rates for rotorcraft remain at an unacceptable level. Rotorcraft accidents span a wide range of operations as well as geographic diversity, including air tour and heavy lift operations in Hawaii, emergency medical services operations in Kentucky and Missouri, training and private operations in Pennsylvania, and several others. While each accident may display different root causes, the inclusion of FDM research leading to more robust FDM programs will identify the precursors necessary to reduce accidents and incidents. The helicopter FDM data gathering and analysis project will enhance advanced analytical capabilities, methodologies, and data-sharing architecture leading to the identification of contributors and precursors to helicopter incidents and accidents. Cooperative efforts and guidance from industry-government teams will help reduce the helicopter accident rate.

The public will benefit from increased general aviation operational safety. The Airman Certification Standards/ Practical Test Standards for maneuvering training project will reduce the LOC-I risk to pilots in general aviation. Accidents resulting from LOC-I typically result in fatalities. Specifically, this project will determine those maneuvers that are appropriate, and what enhancements are required to practical test standards, advisory circulars, and other guidance material.

The ID-SRET projects will significantly improve NAS safety and reduce the risk of accidents and incidents associated with air traffic control. In particular, they will provide risk-based analysis capabilities that identify and assess emerging safety risk issues to support AOV's oversight mission. Many upcoming NAS changes affect airborne and ground-based systems as well as aircraft, airport, and air traffic procedures – elements that cross multiple FAA lines of business. The ID-SRET will help to ensure that proposed changes to the NAS do not increase risk associated with existing NAS systems or with other proposed changes.

The public will benefit from the TAS go-around research by reducing the risk of hazardous outcomes during go-arounds. For the pilot community, logical go-around training curriculum and guidance material will be developed to reduce the risk of exceeding aircraft performance limits.

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 2018 – Air Traffic Control / Technical Operations Human Factors – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.i Air Traffic Control/Technical Operations Human Factors	$5,410,000	$5,400,000	$5,196,000	-$204,000

What is this Program and why is it Necessary?

The Air Traffic Control/Technical Operations (ATC/TO) Human Factors program provides ATO technical sponsors with timely and appropriate R&D products and consultation services that focus on improving the safety and efficiency of complex ATC systems, by measuring and enhancing individual and team performance of air traffic controllers and technical operations specialists. The five human factors R&D focus areas are:

1. Development and update of human factors standards that the ATO Program Management Office uses in system acquisitions;
2. Efforts to optimize the controller and technical operations workforces;
3. Efforts to reduce air traffic controller and technician errors and improve safety;
4. Efforts to support integration of technology into the NAS, and
5. Development of recommendations and methods for enhancing human performance, including individual and team performance.

ATO human factors challenges currently center on evolution of the workforce and the advancing technologies and associated procedures that are expected to be implemented in the NAS over the next several years. For example, in the decade from 2016 to 2025, the ATO expects to hire, place, and train over 13,000 new air traffic controllers in airport traffic control towers, en route air traffic control centers, and terminal radar air traffic control facilities. As of the end of the second quarter of FY 2016, there are also nearly 4,500 controllers who are eligible to retire and another 3,600 who have yet to reach certification. On the technical operations side, there is currently a shortage of over 300 specialists, with another 800 who are eligible to retire. Funding in FY 2018 will enable us to help our ATO customers improve the efficiency with which they can recruit, hire, and train new aviation professionals, since over 40% of the new hires are planned for 2020 and beyond. Examples of R&D projects that address these workforce challenges include: developing a handbook and training for instructors who provide feedback to developmental controllers; and, providing the research data that enables the ATO Vice President for Technical Operations to attach job jeopardy to the entry-level technician-training course. This recent initiative is an excellent example of how human factors analysis will provide the necessary data to validate training course content. When validated, the Technical Operations organization will implement a new policy that will require new technicians to successfully complete the training course in Common Principles during their probationary period, or face termination from the FAA. There is a large potential benefit to the FAA and the flying public (and, indirectly, to the U.S. taxpayer) in identifying poor performers early, so that training resources can be allocated to those new hires who are most likely to succeed on the job. The human factors program also supports the Aviation Rulemaking Advisory Committee to provide recommendations on how the ATO can utilize external training providers for its new-hire air traffic controller-training program, which will explore the use of external training provider capabilities that would expose prospective air traffic controllers to the profession.

We are sharpening our R&D focus on improvements at 'keystone' facilities (such as the TRACONs and ARTCCs directly serving the Core 30 airports) based on our understanding of how specific facilities impact the NAS. An example is a well-received demonstration project for implementing controller training standards, improving the equality and culture of training at the New York TRACON (N90). We intend to get ahead of the human factors and training challenges through targeted research that yields understanding of human activity and limits contribution to facility-specific impacts, especially for high-impact facilities. Our researchers are developing performance assessment methods that can be used to assess trainee knowledge, skill, and performance to improve accuracy and reliability of those assessments. Also in the training domain, we are prepared to conduct research to evaluate the effectiveness of realistic simulation capabilities that will provide a medium for training complex task performance where ATC system safety depends on job task performance. Effective use of simulation may reduce the time required for controllers to reach certification.

We intend to focus on improving performance at the Core 30 airports, where traffic load has grown (and is forecast to grow) considerably faster than in the NAS generally. FY 2018 resources will be applied to address the notable increase in traffic loads at the Core 30 airport TRACONs in the 2020 timeframe – a load that will be more than 35% above the traffic level experienced in the year 2000. These initiatives will improve training efficiency and throughput, allowing the FAA to maintain necessary levels of qualified certified professional controllers and technical operations personnel.

In support of system acquisitions that are managed within the ATO Program Management Office, the R&D program addresses the integration of human considerations to enhance user-system design. Human performance is a key factor in total system performance, and enhancements to human performance will contribute to enhancing the total system's performance, reducing errors, and helping reduce life cycle ownership costs. The program, through the FAAs Program Management Office (PMO) coordination, strives to provide useful human factors research results that support the development and implementation of new technologies and procedures in the National Airspace System. The program works with offices in the ATO to further articulate and support implementation of the requirements in FAA Order 9550.8 *Human Factors Policy*, specifically, that 'human factors shall be systematically integrated into the planning and execution of the functions of all FAA elements and activities associated with system acquisitions and system operations. FAA endeavors shall emphasize human factors considerations to enhance system performance and capitalize upon the relative strengths of people and machines. These considerations shall be integrated at the earliest phases of FAA projects.' The program assures that the proper roles and responsibilities are assigned to the ATO workforce to assure that controller and technician capabilities are compatible with the advanced technology they use in their jobs, and that the resulting level of air traffic system performance meets operational requirements and fulfills the safety and efficiency objectives.

The ATC/TO Human Factors program includes the following research activities:

- Developing and evaluating improved training methods such as part-task and whole-task simulation, and implementing training performance standards. These efforts are intended to reduce the time and cost of training as well as to increase the probability of success for trainees in both initial academy training and field training.
- Providing direct laboratory support to acquisition program offices through rapid prototyping of candidate ATC displays, as well as Human-In-The-Loop (HITL) simulations of systems under consideration, and providing human factors expertise during the development process.
- Developing an air traffic control information display and control management design strategy that incorporates best practices and lessons learned from prior and current air traffic user team activities. This will result in guidance for human factors specialists who are supporting ATO acquisition programs.
- Developing recommendations for on-the-job training to increase the likelihood that controllers will succeed in field training and to ensure that trainees are not lost due to factors other than their ability to control air traffic.

Among the most complex and prevalent 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). The human factors program is responsible for proactively 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 five safety hazards in the NAS and improve the analysis of undesired events to understand the causal and contributing factors leading to such events. Efforts to enhance human performance and reduce the probability of human error in the NAS include initiatives requested by the operational community on human factors such as controller visual scanning, memory limitations, and information processing.

The program will continue to include development and updates for human factors standards that can be incorporated directly into the requirements documents and specifications of FAA acquisition programs, such as the new ATC Display Color Standard. Our human factors practitioners will review and provide input to formal FAA Acquisition Management System (AMS) policy and procedures that systematically incorporate human factors into agency acquisition activities. For FY 2018, following a recommendation from the Spring 2016 meeting of the Human Factors Subcommittee of the FAA's Research and Development Advisory Committee (REDAC), we will track human factors issues and their planned and proposed resolutions. This will enable our Human Factors Integration Lead to monitor and support ATO acquisition programs' efforts as they address key human factors considerations. The data will also provide a good source of lessons-learned that will enable us to develop and revise human factors standards and guidance that will mitigate recurrence of such issues on future acquisition programs. With the FY 2018 funding that is provided through this program, our headquarters human factors team will also continue to provide human factors subject matter expertise to the Joint Resources Council and will ensure that acquisitions have complied with human factors design requirements through the In-Service Decision review checklist process.

Major Activities and Accomplishments Planned in FY 2018 Include:

- Evaluate use of simulation in air traffic control and technical operations training and make recommendations for simulator fidelity requirements and a mix of simulation capabilities that will reduce training cost and time to achieve training standards (proficiency levels) at core 30 airports.
- Develop a technical operations 'talent acquisition process' including a computer-based knowledge and skill assessment test, to replace the current self-reporting of electronics competencies. Applicants will be tested using selection tools that can be tailored to the specifics of a given technical operations job.
- Identify opportunities for integration of data across ATC systems, including data presentation (e.g., data blocks), decision support tools, combined ATC positions, and new data sources that are available via System Wide Information Management (SWIM).

What does this Funding Level Support?

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 that:

- Develop and evaluate potential mitigations for human error, for use by safety and operational organizations;
- Improve OJT methods to reduce time and cost of training while increasing the probability of training success for ATCS;
- Develop recommendations for data block design that effectively provide necessary information to the controller, integrating the design decisions made in the ATC CHI development processes, and
- Recommend training research to practice, such as the use of simulators with various levels of operational fidelity, to improve performance and reduce cost and time to achieve proficiency in the operational ATC and Technical Operations communities.

Goals for FY 2018 Funding:

- By FY 2018, support ATO efforts to implement controller performance standards for field facility and academy training.
- By FY 2019, determine the success rate of CPC internal transfers from lower-level tower-only ATC facilities to higher-level combined Tower/TRACON facilities and report on how that success rate compares with the success rates of new hires at those facilities.

- By FY 2020, develop technical operations personnel selection tools based on national standardized assessment methods such as a pre-hire assessment tool.
- By FY 2020, based on a systematic evaluation of ATC information with metrics, provide human factors practitioners with additional guidance on information presentation, coding, placement, accessibility, and usability. Recommend measures of controller cognitive workload, scanning patterns, situation awareness, and error to be used to evaluate human/system performance.
- By FY 2021, for human factors personnel who support ATC system acquisition programs, provide strategies, and design guidance concerning information display and control management that incorporates best practices and lessons learned from prior and current air traffic user team activities.
- By FY 2021, develop a technical operations talent acquisition process, including selection tools for identifying applicant capabilities that match position-specific requirements, to support the ATO's technician workforce strategy goal of evolving the maintenance culture to align to the ATO's future maintenance operations concept.

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

The NAS is a human-centered enterprise. NAS safety and efficiency depend on well-designed, operated, and maintained systems. The Human Factors research program provides products to enhance the quality of this service through the successful integration of the human into the total system.

- Improved Efficiency: This research program provides products that are intended to increase the probability success in training, to make better use of FAA resources for training air traffic controllers and technical operations personnel.
- Better Safety: This program improves human performance by reducing the likelihood of human error and increasing the probability that controllers and maintainers will successfully recover from undesired events. 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 Five' safety concerns during recent years shows that all of the issues involve controller performance. This program provides the human factors research and expertise upon which FAA system development programs rely to ensure that FAA ATC/TO systems are accepted by the user community and utilized to achieve maximum operational benefit.

Detailed Justification for
A11.j Aeromedical Research

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – Aeromedical Research – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.j Aeromedical Research	$8,467,000	$8,451,000	$9,765,000	+$1,314,000

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 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 Aeromedical Research program is formulated to keep abreast of emerging human safety risk issues such as those brought by the aging pilot population and changes in their health condition, advances in pharmacology, therapeutic tools, and surgical procedures. Improved aircraft materials, equipment, cabin configurations, life support systems, and evacuation assistive devices all 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, 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.

Aeromedical research is performed by in-house personnel of the Aerospace Medical Research Division of CAMI. The division has two research branches; the Bioaeronautical Sciences Research and the Protection and Survival Research Laboratories. Bioaeronautical Sciences personnel perform research activities regarding pilot certification and performance, aircrew health, and other factors important to aerospace safety. For example, the Forensic Toxicology and Biochemistry research teams also serve as the primary national site for toxicology testing for federal agencies, including the FAA and the National Transportation Safety Board. The Functional Genomics research team is the pioneer in biomarker research pertinent to aviation safety, and the Knowledge Management research team supports all research efforts involving information technology. Protection and Survival personnel provide state-of-the-art information, procedures, and equipment evaluations relative to aircraft accident investigation, survivability, atmospheric and radiation risk data, health, and security of passengers and crewmembers during normal operations and emergency events. The Cabin Safety, Biodynamics, and Aerospace Physiology research teams are key contributors to the development of national and international aviation safety equipment standards and survival procedures. The Medical Research Team maintains numerous unique databases and information systems that facilitate the immediate aeromedical review of aircraft accidents; and the Numerical Sciences research team is the national source of expertise for cosmic radiation events of aeromedical concern. It also maintains the only repository of integrated civil aeromedical information that pre-dates safety management system concepts.

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.

Major Activities and Accomplishments Planned in FY 2018 include:
The following research areas as defined by the Office of Aviation Safety (AVS) aeromedical research sponsors and the FAA's Aeromedical (AM) and Rotorcraft Safety (RS) Technical Community Representative Groups:

<u>AM Aeromedical Systems Analysis</u>

- Truth in Reporting. Deliverable: Technical Report, 9/30/2019.

- Development of maps of ionizing radiation in the atmosphere. Deliverable: Software (SW), SW documentation, and Technical Report, 9/30/2018.
- Evaluation of Medical Transport by helicopter. Deliverable: Technical Report, 9/30/2019.

AM Aeromedical Accident Investigation and Prevention

- Development of a forensic toxicology laboratory methodology to perform analysis of designer drugs in postmortem fluids and tissues. Deliverable: Laboratory Methodology and Technical Report, 9/30/2018.
- Assessment of the potential for applying genetic risk scores associated with stroke to aeromedical review processes. Deliverable: Technical Report, 9/30/2018.
- Development of new analytical method for tetrahydrocannabinol (THC) and associated analogs. Deliverable: Laboratory Methodology and Technical Report, 9/30/2020.
- Biomarker comparison across multiple types of sleep deprivation. Deliverable: Technical Report, 9/30/2022.

AM Human Protection and Survival

- Evaluation of photo luminescent floor proximity escape path-marking systems. Deliverable: Technical Report, 3/31/2020.
- Evaluation of the characteristics of current production ATD pelvis assemblies. Deliverable: Technical Report, 9/30/2021.

RS Occupant Protection for Legacy Rotorcraft

- Evaluation of new technology relative to occupant protection rotorcraft equipment. Deliverable: Technical Reports, 9/30/2020 and 9/30/2022.

The requested Aeromedical Research program funding is necessary to perform the research and achieve the outcomes and deliverables specified above. This funding provides for scientific and other technical and administrative personnel, 50 Full Time Federal Employees (FTEs), including physicians, physiologists, chemists, physicist, mathematicians, toxicologists, engineers, geneticists, computer scientists, and cabin safety specialists. It also funds laboratory supplies/expendables and tools/devices, as well as the maintenance and sustainment of facilities, hardware, software, and other physical research assets at CAMI necessary to perform the research, including the following:

- High Performance Computing Research Facility
- Gas Chromatography Systems
- Mass Spectrometry Systems
- High-Performance Liquid Chromatography Systems
- Ultra Violet And Fluorescence Detection Systems
- Headspace Gas Chromatography Systems
- Flame Ionization Detector
- Toxicology and Forensic Case Management System
- Plate Reader/Washer System for Enzyme-Linked Immunosorbent Assay System
- Fluorescence Resonance and Bioluminescent Resonant Energy Transfer Systems
- Suspension Bead Array - Multiplex Protein Marker Discovery System
- Tissue Culture Systems
- Fluorescent Microscopy and Digital Imaging System
- Flow Cytometry Systems
- Gel and Western Blot Imaging System
- Nucleic Acid And Protein Qualitative Analysis System
- B-747 Aircraft Environment Research Facility
- Aircraft Cabin Research Facility
- Water Survival Research Facility
- Aircraft In-Flight Firefighting Research Facility

- Impact Sled – Horizontal Accelerator Facility
- Fabrication/Machine Shop
- Anthropometric Test Device Shop
- Normobaric Physiology Research Facility
- Hypobaric/Altitude Research Chamber Facility

What does this Funding Level Support?

The requested level of Aeromedical Research Program funding is necessary to achieve the research outcomes and deliverables by CAMI personnel in the facilities and/or with the equipment described above. Performance metrics that measure the level of success of the Aeromedical Research program are monitored through the AVS Quality Management System (QMS) procedures. These procedures are based on the International Organization for Standardization (ISO) Standard 9001:2015. Per the QMS, the program status, monitored by nine metrics, is reviewed on a quarterly basis. In addition, the research program is managed through numerous controls, which address:

- Program and projects' status (e.g., resources and schedule)
- Research project technical soundness and scientific merit
- Safety
- Employee competency
- Stakeholder satisfaction

Finally, the Subcommittee on Aviation Safety (SAS) of the FAA's Research, Engineering, and Development Advisory Committee (REDAC) reviews the aeromedical program on a periodic basis. The program remains successful as evidenced by the delivery of products and services within the provided budget and schedules. These include scientific publications, technical reports, advisory and regulatory language, laboratory methodologies, medical and engineering certification criteria, analytical software tools, affidavits/court testimony, aeromedical information systems, educational material, cabin safety and biodynamic assessment procedures, aeromedical accident and forensic toxicology reports, and technology evaluations.

Goals for FY 2018 Funding:

AM Aerospace Medical Systems Analysis

- Ionizing Maps: By 2018, provide improved access and visual representation of near-real time estimates of total cosmic ionizing radiation dose rates along flight routes.
- Class 3 Truth: By 2019, Develop logistic regression models to compare the commonly used measures of accident risk (flight time data) with calculated accident rates from medical certification records (airmen characteristics).
- Medical Transport: By 2019, increases the FAA's understanding of helicopter operations and provide insight as to the interplay of factors related to accidents involving the same, with a focus on aeromedical hazards.

AM Accident Investigation and Prevention

- Designer Drugs: By 2018, 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 designer drugs.
- THC: By 2018, develop a method that will be useful in effectively and efficiently analyzing THC and related analogs in various postmortem biological samples collected from aviators fatally injured in aviation accidents. This advancement will be helpful in expediting aviation accident investigations wherein use of marihuana is suspected.
- Stroke: By 2020, provide guidance regarding the incorporation of genetic risk scores relative to stroke into the aeromedical accident investigation processes, e.g., as confirmatory assessments for stroke in safety-sensitive positions.
- Sleep Deprivation: By 2022, identify biomarkers for time awake vs. markers for cognitive impairment to support the development of operational tests covering the spectrum of sleep deprivation.

AM Human Protection and Survival

- Path Markers: By 2020, Ensure the level of safety intended by regulations for commercial aircraft floor proximity escape path marking is maintained by new generation of photo luminescent systems.
- Pelvis: By 2021, provide consistent measurement of pelvis load and an accurate assessment of spinal injury risk. This approach will enhance aircraft certification processes and standards.

RS Fire and Cabin Safety Rotorcraft Safety

- Helicopter: By 2022, evaluate new safety equipment/technology that can be retrofitted onto legacy rotorcraft (four point harnesses, inflatable seatbelts and airbags, and dynamic seats/energy absorbers for occupants).

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 NAS 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. 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. On the other hand, the FAA's Aeromedical 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.

The results of aeromedical research benefit the American public by:

- Maximizing the strengths of the human link in the NAS and minimize inherent human weakness to prevent accidents and improve safety through evidence-based medicine.
- Enabling the development of aircraft accident and incident preventive strategies including language for proposed standards, regulations, educational materials, and policies.
- Supporting accident investigation, aircraft certification, flight standards, and medical certification processes to identify hazards and augment safety information systems towards an Aeromedical Safety Management System. This system in turn proactively addresses emerging safety risks to humans in the NAS by using consistent, data-informed approaches to make smarter, system-level, risk-based decisions.
- Providing criteria concerning equipment, technology, and procedures for human protection and survival from stressful environments and emergency events in civilian air operations.

Detailed Justification for
A11.k Weather Program

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – Weather Program – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.k Weather Program	$15,031,000	$15,002,000	$13,399,000	-$1,603,000

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 National Airspace System (NAS). This program mitigates weather related NAS safety and/or traffic flow efficiency issues with a line of sight to operational exploitations. The applied research also supports the evolution of legacy weather capabilities that meet the weather information needs of today's NAS users into the capabilities that are being developed and deployed as NextGen decision-support weather processes. This work is frequently conducted in collaboration with the FAA's designated weather provider, the National Weather Service (NWS).

Weather has been clearly identified as a having a significant impact on NAS efficiency and is a factor in GA 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. Weather is frequently cited as a primary or secondary cause for accidents and injuries. Per the National Transportation Safety Board, turbulence is the leading cause of inflight injuries and the GA fatality rate in weather related accidents, on average is 35% (GA accounts for 75% of weather related accidents). There were more than 382,000 air carrier delay hours in 2014 due to weather resulting in more than $300 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 ATM dispatchers and pilots to proactively select safe and optimal routes. Weather program initiatives whether benefitting commercial or GA, advancing science or facilitating integration into NAS decision support tools, are ultimately supporting the achievement of the NextGen weather vision.

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. The Weather Program is planning modeling, simulation, and other innovative techniques to answer performance requirements 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 National Oceanic Atmospheric Administration (NOAA) Earth System Research Laboratory, and the NOAA's National Centers for Environmental Prediction and the Environmental Modeling Center to develop high resolution; rapidly updating models that have and continue to be implemented into NOAA/NWS operations. These modeling efforts result in enhanced diagnosis and forecasts of weather hazardous to aviation, including 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 that 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 into NWS operations that are enhancing in-flight icing, turbulence, and convective weather forecast capabilities. The Weather Program in partnership with NSSL developed a multi-radar multi-sensor

(MRMS) capability that provides high-resolution three-dimensional radar grids for advanced weather detection and aviation forecast applications, running operationally at the NWS.

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 that provides icing and precipitation type information. This information is used by aircraft dispatchers and pilots to make ground anti-deicing decisions and takeoff and landing decisions, and by pilots, dispatchers, and controllers to make flow and route of flight decisions. These efforts are being coordinated and leveraged with radar technique development at the NOAA, the NSSL, as well as the NASA Glenn Research Center, Icing Remote Sensing System program. Weather Program turbulence research efforts have developed 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 turbulence capabilities globally in harmonization with International Civil Aviation organization (ICAO) requirements.

The Weather Program will continue to develop and enhance forecast capabilities and weather translation techniques to meet emerging NextGen requirements and operational improvements. This will include applied research in naturally occurring atmospheric hazards including turbulence, convective activity, icing, and restricted C&V. 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. Additionally, using much of the research outlined above, the FAA is coordinating and leveraging with NOAA and NWS to develop a consistent set of gridded weather information for use in evolving NextGen ATM decisions and decision support processes. FAA national and international partnerships will continue in addressing mitigation of ice crystal weather threats to aircraft turbine engines.

Major Activities and Accomplishments Planned in FY 2018 Include:

Aviation Weather Forecasting

In-Flight Icing:

- Transition CONUS in-flight icing forecast and analysis capability that includes liquid water content, drop-size distribution, and temperature, for implementation.

Model Development and Enhancement:

- Complete development of High Resolution Ensemble Forecast (HREF) weather forecast model (3km).

Turbulence:

- Commence evaluation of improved turbulence forecast capability, utilizing HRRR 3km enhanced grid structure.

Convective Weather:

- Update blending techniques for CIWS & CoSPA to improve storm location, timing, and intensity accuracy during transition from extrapolated to model forecast transition in the one to four hour period.

Ceiling and Visibility:

- Complete an evaluation of the Alaska Ceiling & Visibility analysis capability with satellite data to determine the increase in the accuracy of real-time depictions of visibility conditions.

Quality Assessment:

- Perform quality assessment of advanced ceiling and visibility, and global turbulence forecast capability; maintenance, and research of verification tools and methodologies.

Advanced Weather Radar Techniques:

- Transition OCONUS radar networks including the Caribbean and Alaska for implementation into operational MRMS.

Aviation Weather Demonstration and Evaluation Services:

- Conduct operational user assessments of new aviation weather concepts in collaboration with NWS' winter and summer 'experiments' that evaluate user feedback on new weather forecast capabilities and procedures aiding aviation forecasting and decision-making.

Aviation Safety Weather Research and Development

Mitigating the Ice Crystal Weather Threat to Aircraft Turbine Engines:

- Conduct flight campaign to evaluate airborne weather radar capability to detect engine ice crystal icing conditions.

Terminal Area Icing Weather Information for NextGen (TAIWIN):

- Perform flight test preparations to gather data to develop capability to detect/distinguish freezing drizzle from freezing rain aloft.

Safety-Driven Weather Requirements for Wake Mitigation:

- Develop and assess (safety and benefits) a Concept of Operation for Airport Wind-Based Dynamic Wake Separation System.

What does this Funding Level Support?

Funding the Weather Program at the requested level would enable it to move forward effectively and provide capabilities and guidance to enhance NAS safety and capacity in collaboration with the office of Aviation Weather Safety and the National Weather Service.

Goals for FY 2018 Funding:

- By 2018, transition CONUS in-flight icing forecast and analysis capability that includes liquid water content, drop-size distribution, and temperature, for implementation. This will improve aircraft specific icing forecasts and analyses.
- By 2018, transition North American Rapid Refresh Ensemble weather forecast model (13km) to the National Weather Service for operational implementation.
- By 2019, transition global-scale probabilistic convection guidance capability for implementation. This is anticipated to reduce aircraft encounters with convection worldwide in collaboration with World Area Forecast Centers.
- By 2020, transition High Resolution Rapid Refresh Ensemble weather forecast model (3km with 1km nests) to the National Weather Service for operational implementation. This will improve detection and forecast of aviation hazards in TRACON and Terminal Areas.
- By 2020, assess and validate data for TAIWIN from numerical weather prediction models and weather radars with research flight test data collected.
- By 2021, transition high-resolution ceiling and visibility analysis capability to National Weather Service for implementation into Helicopter Emergency Medical Services (HEMS) Tool. This will improve safety of operations in areas with limited observation capabilities.
- By 2022, transition Offshore Precipitation Capability for incorporation in the NextGen Weather Processor.

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 analysis and 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. FAA will either deploy these capabilities on new or existing platforms and systems or by transitioning them to NWS platforms or procedures through FAA regulations. 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 and improve efficiency of flights.
- Enhancements to turbulence analyses and forecasts to increase passenger comfort, safety of passengers and crew, safety of GA operations, and increased capacity in the NAS.
- 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 2018 – Unmanned Aircraft Systems Research – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.l Unmanned Aircraft Systems Research	$17,635,000	$17,601,000	$6,787,000	-$10,814,000

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 National Airspace System (NAS) and supporting the development of new and modified regulatory standards. 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. 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 into the NAS will potentially affect the entire NAS due to various sizes of UAS (less than a foot up to the size of a commercial jet), a wide range 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 Concept of Operations (CONOPS) integration requirements and meet UAS Roadmap goals.

FY 2018 funding will support the UAS program in conducting research on UAS technologies that directly impact the safety of the NAS. The FY 2018 portfolio of work will be focused on , control and communications, training devices, Detect and Avoid (DAA) and research that will support the safe, efficient, and timely integration of UAS in the NAS within the 14 Code of Federal Regulations (CFR) regulatory framework. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major Activities and Accomplishments Planned In FY 2018 Include:

This research supports the integration of UAS into the NAS by studying new operational concepts and technology, and providing information which supports the development of new rules and regulatory standards. Outcomes of this research may also lead the development of new procedures or modifications to NAS equipment.

UAS Training Device Qualification Criteria

- Review UAS flight training device capabilities and assess functional gaps/limitations of UAS simulators in their current form.
- Examination of the pilot training devices at the FAA WJHTC and industry partners based upon their current functional capabilities and limitations UAS training device assessment.

UAS Command and Control Link Compatibility

- Test and validate SATCOM CNPC Link compatibility and interoperability Assess and validate satellite CNPC Link performance characteristics Assess and validate satellite CNPC Link performance characteristics.

UAS Human Factors Control Station Design Standards

- Conduct experiments to develop minimum requirements and best practices to ensure that UAS Control Stations observe sound human factors principles and practices.
- Conduct experiments to evaluate potential safety and workload issues with the CS environment, develop appropriate minimum requirements.
- Conduct experiments to develop recommended crewmember training and certification requirements, to include pilots and other crewmembers.

UAS Detect and Avoid Minimum Standards

- Conduct experiments to further develop minimum standards and requirements for DAA technology to enable its use in integrating UAS into the NAS.

What does this Funding Level Support?

Research program plans beyond FY 2017 include the continued collection and analysis of UAS safety data from the test sites, completion of technical reports on multi-sensor surveillance data fusion, , technical reports on UAS ground and airborne hazards, development of detect and avoid requirements for small UAS Beyond Visual Line of Site (BVLOS) operations, surveillance requirements for UAS, Control and Non-Payload Communications (CNPC) radio link interoperability and compatibility, development and documentation of maintenance technician training and requirements, and continued collection and analysis of maintenance and maintenance-related accident and incident data.

Goals for FY 2018 Funding:

- By FY 2018, validation of CNPC L-Band radio compatibility with other terrestrial L-band links.
- By March of FY 2018, complete the evaluation of current and/or proposed standardized RNP/RNAV/instrument approach/departure procedures for UAS on two or more UAS types.
- By FY 2018, complete the analysis of potential safety and workload issues with the control station environment, develop appropriate minimum requirements and best practices to ensure that UAS control stations are safe for pilots and crew and enable the safe and efficient operation of the UAS.

Demand for NAS access is growing from multiple operators including the U.S. Department of Defense, 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. These research programs will help develop unmanned aircraft systems, training, technology, and procedures that increase the safety of UAS operations and increase the confidence of the American public that UAS flights can be safely and efficiently integrated into national airspace. The research will facilitate approval and use of systems that prevent midair and near midair collisions and help reduce the likelihood and severity of collisions with people or property on the ground. This research will also develop standards to mitigate human factor causes of incidents and accidents due to control station or pilot training design deficiencies.

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 2018 – NextGen – Alternative Fuels for General Aviation – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.m NextGen – Alternative Fuels for General Aviation	$7,000,000	$6,987,000	$5,924,000	-$1,063,000

What is this Program and why is it Necessary?

The primary focus of the alternative fuels for General Aviation (GA) program is to provide data to support the fleet wide authorization of unleaded aviation fuels. It also supports the Piston Aviation Fuels Initiative (PAFI) and support an ASTM Fuel Specification. This program is the proving ground for the feasibility of the use of unleaded replacement aviation gasoline fuels.

Approximately 167,000 GA aircraft in the U.S. and 230,000 worldwide rely on 100LL Aviation Gasoline (avgas) for safe operation. 100LL is also the only remaining transportation fuel in the U.S. 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. A drop-in fuel solution was not found. The impact on performance, operability, and compatibility with fuel system materials must be carefully evaluated before approving an alternative fuel. The use of replacement fuels with new compositions poses a significant challenge to maintaining the safety of the fleet.

Petitions and potential litigation from environmental organizations regarding avgas containing lead are pressuring the Environmental Protection Agency 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 (http://www.faa.gov/about/initiatives/avgas/archive/2012-10-05/). This report contains key recommendations to facilitate the transition to a fleet-wide replacement avgas such as the establishment of an FAA solicitation and selection process for candidate unleaded avgas for the centralized fuel testing program, centralized testing of candidate unleaded fuels at the FAA William J. Hughes Technical Center (WJHTC) funded by government and industry with in-kind contributions, establishment of a collaborative industry-government initiative referred to as the Piston Aviation Fuels Initiative (PAFI) to implement the UAT ARC recommendations to facilitate the development and deployment of an unleaded avgas with the least impact on the existing piston-engine aircraft fleet. Researchers at the Propulsion and Airpower Engineering and Research (POWER) Laboratories provide research data used to support FAA propulsion certification and rule making for fleet wide authorization; development and modification of fuel specifications; evaluation of novel liquid fuel components; emerging propulsive technologies; and a safe transition to more environmentally friendly fuels. This includes laboratory performance testing, rig simulations, ground based test beds, altitude simulations, and in-flight operations at state-of-the-art laboratories. To date, the FAA has released a fuel solicitation, has established the PAFI, and has completed centralized testing at the FAA WJHTC POWER Lab.

The PAFI process defines a framework to evaluate potential candidate fuels in two distinct phases, with each phase having a preparatory and a project stage. The initial phase involved laboratory, rig, fit-for-purpose, and initial engine testing, with the next phase involving engine and aircraft testing. The FAA executed a solicitation for fuel candidates, and initial testing at the FAA's WJHTC was completed on schedule. The testing included evaluation of the fuel cold flow ability, storage stability, fuel system dynamic rig performance, materials compatibility, emissions, toxicology, and initial engine performance. In March FY 2016, the results from the testing were used to select two fuels for engine and aircraft testing. Standardized engine and aircraft test methods for candidate test fuels will be developed and test support equipment will be established by the FAA's WJHTC to test the best candidate fuels. Standardized test plans for engine and aircraft evaluation in the areas of operability, performance, detonation, and cold and hot weather operation will be developed and approved by PAFI. In FY 2017, establishment of independent laboratory testing contract vehicles, establishment of test support equipment and support structures, and performance of engine and airframe testing will be conducted by the FAA's WHJTC on the best candidate fuels. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major Activities and Accomplishments Planned in FY 2018 Include:

- Establish contract and cooperative agreement awards for aircraft and engine testing
- Establish test facility/lab support equipment and structures for testing
- Complete most of the full-scale engine tests
- Complete most of the aircraft flight test activities.

What does this Funding Level Support?

The FAA funding requested in this program is 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 2018 Funding:

- By 2019, establish full-scale engine and aircraft test facility/lab support resources.
- By 2019, complete planned engine and aircraft flight test activities.

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

The FAA is the sole certification authority for the U.S. aviation community. This research program identifies, develops, and delivers safety research products and knowledge that respond to the regulatory and oversight needs of the 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 benefit 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 airborne lead from aviation sources and help sustain a vibrant segment of the Nation's economy.

Detailed Justification for
A11.n Commercial Space Transportation Safety

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – Commercial Space Transportation Safety – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A11.n Commercial Space Transportation Safety	$2,000,000	$1,996,000	$1,796,000	-$200,000

What is this Program and why is it Necessary?

The primary mission of the Office of Commercial Space Transportation (AST) is to ensure the safety of the public, property, and national security and foreign policy interests of the U.S. during commercial launch and reentry operations. AST's secondary mission is to encourage, facilitate, and promote commercial space launches and reentries. More recently, Congress tasked AST with promoting the continuous improvement of the safety of launch vehicles designed to carry humans. The AST Research and Development (R&D) program will optimize AST's mission execution through the development of improved regulations, safety assessment tools, and public safety technologies.

First, the R&D program supports the development of improved regulations and industry guidance material to address lessons learned and to keep pace with the dynamic commercial space transportation industry. R&D in this area helps provide industry with maximum flexibility to innovate by regulating only to the extent necessary and building a performance-based regulatory framework to the maximum extent feasible. AST plans research to improve regulations that govern launch and reentry sites, as well as industry guidance on ship and aircraft hazard areas, critical asset protection, toxic substances, distant focusing overpressure, crew rest, human factors, and explosive risk during pre-flight processing.

Second, R&D to improve safety analyses and other tools will facilitate the safe and efficient integration of space traffic through the NAS, a component of the FAA Administrator's Strategic Initiatives. ASTs research will advance this initiative by finding ways to safely reduce the amount of airspace closed to other stakeholders, develop timely response capabilities to off-nominal scenarios, and quickly release airspace that is no longer affected. These capabilities are critical to the FAA's ability to facilitate the integration of spaceports that are located in the vicinity of major airports or complex airspace, improve management of space vehicle trajectories and hazard areas for launch and re-entry to land-based sites, and leverage the results of collision avoidance analyses for more efficient launch and reentry planning and NAS integration. Analyses and other tools to assess the safety of commercial space operations will benefit from AST R&D activities. State-of-the-art theoretical, analytical, and computational investigations will result in improved assessment methods and results that are easier to understand, easier to execute, require fewer input data, and/or require data that are easier to collect and/or can be collected with less accuracy. Specific research efforts include an investigation into the potential to leverage data from DoD assets to identify in real-time the airspace within which debris would fall in the event of a malfunction.

Third, AST R&D will focus on advanced vehicle safety technologies and human spaceflight and physiological safety guidelines, providing direct benefit for the strategic needs of industry (e.g., improved preparation and operations, and ensuring safety of human spaceflight occupants). Specific areas of research include improvements to mission rules that may be implemented by autonomous flight safety systems, along with identification of mitigation factors to address potential vulnerabilities. An improved understanding of crew safety systems proposed for space flight vehicles, including systems such as smoke and fire detection in microgravity environments, to both monitor the safety of the cabin environment, and support necessary safety actions in the event of contingencies.

The multiple research activities included in the FY 2018 AST R&D program will be conducted with grants (primarily with the Center of Excellence for Commercial Space Transportation, (COE CST)) and contracts. AST has committed to funding the COE CST at a minimum level of $1,000,000 through FY 2020. The balance of the FY 2018 funds will be used to address other key areas for commercial space operations, guidelines, and regulation. Overall, the FY 2018 funding will continue the activities to meet AST's needs for an improved regulatory framework, safety assessment methods, and industry guidelines and technologies.

Research activities are grouped below according to their focus areas, 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.

Major Activities and Accomplishments Planned in FY 2018 Include:

Research to facilitate safe and efficient integration of increased commercial space transportation into the NAS

- Development of methods to automatically declare aircraft hazard areas in real-time during launch or re-entry. Assess the potential to supplement data derived from telemetry and other sensors with data from existing overhead assets to track launch/reentry vehicles, and to identify in real-time the airspace within which debris would fall in the event of a malfunction.

Advanced safety assessment methods

- In addition to recent improvements in the Multiple Probable Loss methodology, AST has identified additional research needed to improve ways to evaluate and mitigate property damage, including third party property on a launch site.

Advanced vehicle safety technologies

- Research in advanced vehicle safety technologies including improvements to mission rules that may be implemented by autonomous flight safety systems to prevent high consequence events.

Human spaceflight safety

- Identification of candidate recommended practices for crew human factors for suborbital winged commercial spaceflight vehicles to support licensing and permit evaluations.

What does this Funding Level Support?

Protecting the safety of the uninvolved public and their property from the potential consequences of commercial space launches and reentries demands that the FAA keep pace with the emerging technologies and operational concepts coming from a diverse and exponentially growing industry. The areas discussed above highlight critical topics that must be addressed for AST to achieve its statutory missions. Funding the program at the requested level will allow the FAA to continue to develop the portfolio of high-value research activities initiated by the program's 2016 request.

FY 2018 funding will support AST in conducting research on technologies addressing emerging safety issues. This important research will allow AST to keep pace with the dynamic commercial space transportation industry.

Goals for FY 2018 Funding:

- By 2019, identify draft recommended practices for crew human factors for suborbital winged commercial space flight vehicle.
- By 2019, demonstrate advanced surveillance technology, including cockpit displays, capable of improving airspace management during launch or reentry.
- By 2020, initiate rulemaking with improved means to evaluate and mitigate Maximum Probable Loss, including property damage.
- By 2020, identify draft recommended practices for automated flight safety systems.
- By 2021, develop improved models and methods to reduce over-conservatism applied to airspace keep-out areas used to protect against launch or re-entry failures

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, the complexity of operations. This 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
A12.a NextGen – Wake Turbulence

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

FY 2018 – NextGen - Wake Turbulence Program – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A12.a NextGen – Wake Turbulence	$8,541,000	$8,525,000	$6,831,000	-$1,694,000

What is this Program and why is it Necessary?

Prior to this research program, Air Traffic Control (ATC) procedures used to mitigate the wake encounter hazard were safe but reduced airport runway throughput capacity during periods of heavy demand, contributing to flight delays and aircraft operating costs. Based on the research from this program, wake separation procedures and standards have been safely modified by ATC Orders 7110.308A, 7110.316, 7110.659C, 7110.123 and prior versions to provide more peak runway throughput capacity at our nation's airports. The use of these orders has increased airport runway throughput capacity resulting in decreased departure runway queues, increased airport arrival rates, and cost savings by major air carriers. This research program is being continued to obtain additional throughput capacity gains by developing wake separation standards that adjust to the atmospheric conditions being encountered by the aircraft and the flight performance of the leading and following aircraft. These more complex technology-based dynamic ATC wake hazard mitigation solutions and associated decision support tools are expected to increase NAS runway throughput capacity another five to seven percent above what can be achieved with the simpler current static wake separation procedures that have been researched by the Wake Turbulence research program and further developed for implementation by the FAA's Wake Re-Categorization (RECAT) program. This research also provides ATC the wake hazard mitigation separations it needs to apply to new aircraft types being introduced into the National Airspace System (NAS). Other near term products produced by this program are ATC wake mitigation procedural solutions that help alleviate delays due to airport construction and runway maintenance projects that restrict airport operations.

Although increasing NAS throughput capacity is the major focus of this research program, it also supports the analyses required to determine that the program's products will not adversely NAS safety. Developing safe, capacity- efficient ATC wake hazard mitigation solutions requires measured wake decay and transport data to validate the analytical and probabilistic models used in evaluating proposed changes in wake hazard mitigation procedures. 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. Currently, the program has three wake data collection sites located close to major airports, using prototype LIDAR systems, to collect and compile measured tracks of aircraft-generated wakes. This program is also analyzing wake transport data collected in flight by the Canadian National Research Council and wake transport data collected by NASA and other research organizations. This collected data is being used to validate the outputs of wake transport and decay models being developed for evaluating proposed ATC wake hazard mitigation solutions and real-time application in ATC wake hazard mitigation decision support tools. Early, simple versions of these models are already contributing to safety case analyses for Paired Departures as well as proposed changes to intersection departure separations being included in the enhanced RECAT Phase II product.

Outputs of this research program that do not require any changes to the NAS infrastructure - such as wake hazard mitigation separation standards for new aircraft (A380, 747-8/9, 787) and the authorization for use of dependent staggered approaches for closely spaced parallel runways (FAA Order 7110.308) at sites such as SFO - go directly into operational use. Yearly, there are 25 to 100 new aircraft types recognized by International Civil Aviation Organization (ICAO) that the FAA must assess for wake turbulence categorization. While this must be done for all new aircraft types, The FAA has a special commitment to the National Transportation Safety Board to assess Super, heavy and upper large aircraft for wake turbulence separations (in front and behind) prior to their entry into service. These required assessments are accomplished by the NextGen – Wake Turbulence research program in partnership with the FAA Flight Standards Service. Other program outputs require follow-on F&E programs, such as RECAT, to translate the concepts of applying technology and wake science into subsystem components of ATC automation systems.

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 2018 Include:

- Develop FAA wake separations for the Embraer E-2 series aircraft and Boeing 777-8, 9 Series aircraft. The Boeing assessment will include modeling with the potential for Boeing to elect to perform wake measurement flight tests during Boeing's initial aircraft certification testing. This work will be incorporated into ATC Orders, and associated decision support automation.
- Initiate benefit and controller operability evaluations of controller decision support tool information display concepts for use in dynamically reducing the required wake separations between aircraft on instrument approaches to a single runway.
- In collaboration with the FAA's Flight Standards Service, continued large scale flight data recorder screenings of an aircraft series for potential medium to low-level wake encounter events. Potential events will be examined in detail to determine their inclusion into the statistical data base for assessing the safety of ATC procedure changes.
- Validation of en-route aircraft wake turbulence generation fast-time model for analysis of potential NAS air corridor ATC wake hazard mitigation procedure changes.

What does this Funding Level Support?

This research program addresses the needs of the FAA Air Traffic Organization and the Aviation Safety Organization to ensure new throughput capacity-increasing procedures and technology solutions are safe in terms of wake encounter risk. The program also provides the knowledge-based applied wake research, which has and will continue to enable incremental increases in airport and air corridor throughput capacity. It also provides analysis requested by airports (and associated air carriers) to determine if their runways can qualify for use of ATC wake mitigation procedures that would result in higher runway throughput capacity. 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 receiving direct benefit from this program include pilots, FAA ATC and Flight Standards organizations, air carriers, and airport operators. Stakeholders include the commercial pilot unions, FAA unions, other ICAO air navigation service providers, and aircraft manufacturers.

The NextGen – Wake Turbulence research program addresses both the FAA's near-term need (capacity-enhancing wake mitigation procedures and processes) for enhancing current operations and developing wake mitigation solutions that will be required as FAA transitions to trajectory-based and flexible terminal operations, which are being developed by the NextGen Separation Management and Improved Multiple Runway Operations portfolios. Products produced by this program's research and further developed (as required) by the FAA's F&E programs have provided the FAA's user community with benefits such as Delta Air Lines ascribing savings in the range of $14.5M to $38.5M in yearly operating costs, to the implementation of RECAT wake separation standards at the Hartsfield-Jackson Atlanta International Airport. The RECAT wake separation standards were developed from the research and analysis conducted by this program.

Goals for FY 2018 Funding:

- By 2021, develop feasible concepts including procedures, processes, and applications of NextGen-era capabilities that allow the safe relaxation of the ATC wake encounter hazard mitigation constraint on NAS throughput capacity.
- By 2021, maintain and enhance (if required) measurement, modeling and analysis capabilities to evaluate, in terms of wake hazard generated and capability of mitigating a wake encounter, new aircraft and design concepts.

- By 2023, make available algorithms for use by flight deck avionics and ground-based ATC decision support tools that will allow safe and throughput-efficient dynamically adjusted wake hazard mitigation separations and operations between aircraft.

What Benefits Will be provided to the American Public through this Request?

Investing in the NextGen - Wake Turbulence Program provides the NextGen research and development for advanced wake mitigation processes and solutions that will be required to gain increased airport runway and air corridor throughput capacity both in the near and far term (2020 and beyond). More airport and air corridor throughput capacity translates into lower operating costs for air carriers and the ability to expand their business without airports having to invest in difficult (public resistance) and costly runway construction projects. For passengers, more throughput capacity translates into reduced flight delays, especially a reduction in flight delays associated with weather events. More available throughput will encourage air carriers to schedule additional flights – widening the flight choices for passengers and potential reduction of fares due to increased competition between air carriers. The benefits can also be realized in terms of more direct flight paths and a corresponding reduction in emissions and noise.

The RECAT wake separation standards, based on the research and data collected by this program, implemented for ATC's use at multiple airports across the NAS, has resulted in up to a 15 percent increase in airport departure throughput capacity and up to a 10 percent increase in airport arrival throughput capacity (during instrument approach operations). The following are the benefits reported by Delta Air Lines concerning its Hartsfield-Jackson Atlanta International Airport (ATL) hub operations subsequent to the introduction of the RECAT Phase 1.5 at ATL in June 2014:

- Taxi times have reduced; varies from half a minute to two minutes.
- Aircraft spend less time in the terminal airspace – reduction varies from half a minute to one minute.
- These operating time reductions mean yearly cost savings in the Atlanta Hartsfield operations of $14.8 million (low side) to $38.1 million (high side). (Estimates are prior to 2015 fall in aviation fuel prices.)

The research by the NextGen – Wake Turbulence Program is now and will continue to provide necessary data and modeling results to drive the development of safe, more advanced throughput capacity efficient ATC wake mitigation solutions and standards that will add an additional five to seven percent throughput capacity to the NAS, with the resulting lessening of flight delays and decreases in flight costs, especially during weather and other events at an airport that cause ATC to switch to capacity constraining instrument flight rule operations.

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 2018 – NextGen - Air Ground Integration Human Factors – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A12.b NextGen – Air Ground Integration Human Factors	$8,000,000	$7,985,000	$6,757,000	-$1,228,000

What is this Program and Why is it Necessary?

The NextGen - Air Ground Integration Human Factors program provides a research foundation for FAA guidelines, handbooks, orders, Advisory Circulars (ACs), technical standards orders, and regulations that make the success of NextGen possible. NextGen involves the implementation of new complex systems, often simultaneously, that challenge the way that operators of the National Airspace System (NAS) do their jobs now. 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 research and resulting outcomes are important because there is a human component to all NextGen systems and if any part of the system is not compatible with the human component, the system will not operate as intended.

NextGen involves implementation of new complex systems and flight crew procedures. The NextGen - Air Ground Integration Human Factors program supports the FAA Aviation Safety 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 the research and development (R&D) program address advanced flight deck automation, as well as NextGen capabilities such as those derived from the use of Automatic Dependent Surveillance-Broadcast (ADS-B) and NextGen procedures such as Area Navigation (RNAV) and Required Navigation Performance (RNP).

The FY 2018 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 applications, Cockpit Displays of Traffic Information (CDTI), NextGen advanced instrument procedures, flight deck automation, and low visibility operations using advanced vision systems.

Planned human factors R&D efforts will address flight deck displays, message content, new and evolving avionic systems, advanced vision technologies, and flight crew error associated with automation functions and certification requirements. Specific research plans are developed in coordination with FAA stakeholders including those in the aviation safety line of business including Aircraft Certification, Flight Standards Service, and Air Traffic Organization program offices such as data communications, surveillance, and broadcast services, and offices within the NextGen organization.

Major Activities and Accomplishments Planned in FY 2018 Include:

<u>Human Error and Complex Systems</u>

- Research plan to gather data for evaluating candidate displays for indicating Airplane State Awareness
- Final report identifying decision making protocol for unexpected events
- Report identifying pilot performance effects of using complex flight deck systems

<u>Human Factors Guidelines for Advanced Instrument Procedure Design and Use</u>

- Research plan on the performance effects of different types of instrument flight procedure complexity on pilots use of those procedures

Procedures, Tasks, Skills and Training for NextGen Air Carrier Pilots and Dispatchers

- Research plan for evaluating effectiveness of pilot training and procedures for monitoring/attention management

- Report documenting commonly expected NextGen non-normal situations and analysis of similarities and differences between current day and NextGen non-normal situations with regard to pilot response and procedure support required

Flight Deck Systems-flight crew interfaces, installation, integration, and operations

- Report with recommendations for the design and evaluation of advanced flight controls (e.g., voice, haptic, touch, and gaze).

- Report examining the feasibility and operational acceptability of the integration of TSAS with interval management (IM) by flightcrews and controllers.

- Report examining impact of reduced airport infrastructure on taxiing in LVO/SMGCS conditions.

- Identify potential pilot performance and operational impacts associated with using HMD in place of HUD in low visibility operations and operations using advanced vision systems.

- Evaluate human factors and crew coordination aspects of dual HUD Category III to determine if specific monitoring skills improve crew performance over a baseline condition.

What does this Funding Level Support?

The NextGen Air/Ground Integration Human Factors program provides the research foundation for FAA guidelines, handbooks, orders, Advisory Circulars (ACs), technical standards orders, and regulations that help ensure the safety and efficiency of aircraft operations. This research directly supports development of policy, standards, and guidance required to design, approve, and operate NextGen equipment and procedures. To meet the requirements of new NextGen capabilities, human factors research is needed to update the standards for pilot certification and training. Additionally, this research will include integrated evaluations of NextGen procedures and equipment to identify and recommend mitigations for human factors challenges. In particular, these evaluations will address human performance aspects of multiple NextGen technologies, procedures, and capabilities operating at the same time. As an example: in 2018, Data link will have expanded in Europe and the U.S. and aircraft equipage and service levels will have increased throughout the NAT, Asia, Pacific, South American and African-Indian Ocean regions and Performance-Based Communication and Surveillance will have been fully implemented. These capabilities are enabling and continue to enable increases in airspace capacity and reductions in separations, and enhance ATM with new services, such as user preferred routes, initial trajectory-based operations, climb/descent procedures, and tailored arrivals (all of which impact efficiency). The experience gained from these implementation initiatives will call for additional HF research and validation to ensure that the changes in displays and procedures have no adverse operational consequences and that any training issues are identified and addressed.

Goals for FY 2018 Funding:

- By 2020, complete the update the PARC/CAST Flight Deck Automation working group accident analysis to better understand the role of pilot error for potential NextGen operations with advanced flight deck automation.
- By 2020, improve operational implementation of PBN-based airspace procedures, with reduced need for redesign after initial implementation.
- By 2020, see minimal pilot and dispatcher error rates due to new implementation of NextGen operations.
- By 2020, provide research inputs to inform efforts related to taxi operations in LVO/SMGCS conditions.

- By 2021, produce minimum requirements for more effective displays of autoflight system modes, status, and future state.
- By 2021, provide research-based information to support update of guidance material (Advisory Circular 20-175) that addresses evaluation of advanced flight controls.
- By 2022, provide recommendations for improving the improved design of standard operating procedures for flight deck.

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.

The NextGen - Air Ground Integration Human Factors program supports the Department of Transportation's 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 the FAA's Air Traffic Organization's service units for ensuring safe, efficient, and effective human system integration in transition of NextGen capabilities.

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

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 as much as 85% 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. Current FAA rules and guidance for pilots and dispatchers do not address the changes in roles, responsibilities, procedures, and job tasks that will be required as the core technologies of NextGen are sequentially introduced into the NAS. The FAA will need updated standards and guidance materials to oversee the safe transition, over time, of pilots and dispatchers to the NextGen end state. That is why the FAA Human Factors program is so important to the success of NextGen.

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 2018 – NextGen - Weather Technology in the Cockpit – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A12.c NextGen – Weather Technology in the Cockpit	$4,048,000	$4,040,000	$3,644,000	-$396,000

What is this Program and Why is it Necessary?

The NextGen - Weather Technology in the Cockpit (WTIC) program is tasked with developing recommendations for a minimum weather service[i] needed to support sound pilot decision making and cockpit decision support tools (such as the Flight Management System (FMS). The recommended meteorological (MET) information will be ready for direct integration with decision support tools and processes needed 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 (MinWxSvc). 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 pilot adverse weather decision making in current and NextGen operations. 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 Part 91 minimum weather service will also address shortfalls in training and will include training updates associated with minimum weather service recommendations.

Some specific NTSB facts and data demonstrating the need for this program include:

- Approximately 29% of all GA accidents are weather related
- Weather related events have one of the highest fatality rates
- Based on NTSB data, the overall accident rate for GA has decreased over the last few years, but it has increased approximately 20% for recreational/personal GA flights.
- Approximately 38% of Loss of Control accidents were weather related
- For Part 121 flights, approximately 37% of the 446 accidents reported over a recent 10 year span are weather related.
- For Part 121 flights, turbulence is the number one cause of serious passenger injuries accounting for approximately 71% of 446 reported accidents.
- Previous studies have shown that modest wind biases cause up to 25% of final approach separation violations in trajectory operations without Air Traffic Control (ATC) intervention. ATC intervention often causes excessive spacing and lost throughput.

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 and aircraft re-routing flexibility to avoid adverse weather, reducing safety risks to potentially lower the number of weather-related accidents and incidents, and reduction of emissions through lower fuel consumption from optimized routing and rerouting during adverse weather. In addition, WTIC will develop functional and performance requirements to support NextGen operational 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.

The WTIC program will work closely with RTCA and other industry and stakeholder committees to further the program objectives and develop standards based on WTIC MinWxSvc recommendations. Demonstrations and flight evaluations will verify minimum weather service recommendations for airworthiness standards or recommended practices. 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 include rendering recommendations to reduce the likelihood of interpretation errors and recommendations for pilot training on cockpit MET technology and information.

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/processes. This MET information will enable NextGen operations 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 recognized as 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. In addition, the WTIC program is providing enhanced training on the minimum weather service recommendations and evolving cockpit MET technology. This training will include providing new pilot exam questions to resolve a stakeholder identified gap of current test questions not comprehensively evaluating pilot weather knowledge.

The resolution or reduction of operational shortfalls attributable to gaps in MET information in the cockpit 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 accidents.

Specific gaps and operational shortfalls (current and NextGen) in cockpit MET information being addressed by research under the WTIC program include:

- 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 a lack of timely, quantifiable, and objective turbulence information in the cockpit.
- The stagnant and high GA accident rate attributed to inadvertent flight from visual flight rules into Instrument Meteorological Conditions (IMC) or to GA pilots not maintaining safe separation from adverse weather.
- Safety risks and inefficient adverse weather avoidance in oceanic and other remote regions attributable to the lack of MET information in the cockpit in these regions.
- MET information rendering gaps and shortfalls that are causal factors in pilot misinterpretation of MET information, blindness to changing weather conditions, and high workloads to monitor and avoid adverse weather in tactical encounters.
- Inefficiencies in flight operations in adverse wind conditions attributable to the lack of enhanced wind information in the cockpit or integrated with cockpit decision support tools such as the FMS, and the need for enhanced cockpit wind information to support future NextGen operations such as Advanced Flight Interval Management.

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 2018 Include:

- Develop MinWxSvc recommendations for incorporating the capability to vary the latency of weather information in flight trainers and the associated training curriculum that demonstrated benefits training pilots on the impacts of latent weather information.
- Conduct operational verification of the Mobile MET application MinWxSvc recommendations and develop updates based on verification results.
- Develop GA MinWxSvc recommendations for MET information rendering for resolution of change blindness gaps, adverse weather notifications, and Wx-information translation to enhance pilot decision making.
- Deliver final assessment of benefits of crowd sourcing and cloud technology to provide accurate ceiling and visibility information from web cameras to the cockpit in a low bandwidth format.
- Produce additional pilot written exam MET-related questions, and practice questions, to address updates in cockpit MET technology and MET information, and its use in NextGen operations.
- Gap analysis on special GA operations weather information and weather technology in the cockpit to identify weather related safety risks unique to special GA operations that will be resolved/reduced by the development WTIC MinWxSvc recommendations in the future.
- Trade studies on incorporating MET uncertainty information in GA and Part 121/135 cockpits to identify resolutions to identify MET information in the cockpit gaps and associated operational shortfalls.
- Develop MinWxSvc recommendations for cockpit tactical turbulence notification.
- Deliver assessment of Part 121/135 cockpit technology advancements role in NAS efficiency.
- Incorporate relevant WTIC MinWxSvc recommendations and deliver modified DO-358, Minimum Operational Performance Standards (MOPS) for Flight Information Services Broadcast data using Universal Access Transceiver, for six new aeronautical information and weather requirements changes.
- Incorporate relevant MinWxSvc recommendations and deliver Eddy Dissipation Rate (EDR) MOPS to define requirements for input parameters and computational methodologies to facilitate the calculation of EDR by various algorithms such that the outputs are operationally comparable.

What does this Funding Level Support?

Research will enable the development of policy, standards, and guidance needed to safely implement weather information and weather technologies in the cockpit to provide enhanced adverse weather situational awareness and to enable safer and more efficient adverse-weather related decisions. 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 2018 Funding:

- By FY 2018, complete service analyses on selected concepts to enhance MET information and technology in the cockpit.
- By FY 2018, produce additional MET-related questions for pilot practice questions and written exam to address updates in cockpit MET technology and MET information, and its use in NextGen operations.
- By FY 2019, complete assessment of impacts of MET automation on MET information in the cockpit and pilot decision making.
- By FY 2020, complete trade studies to resolve identified gaps of helicopter cockpit MET information and technology.
- By FY 2020, complete a functional analysis of the WTIC ConOps updated for Far-Term NextGen concepts.

- By FY 2021, complete operational verification of first release of WTIC GA MinWxSvc recommendations.
- By FY 2021, complete trade studies to resolve gaps in MET information in the cockpit associated with safety risks of unique GA operations (i.e. Alaska tourism flights into back country).
- By FY 2022, complete final assessment of recommendations for uncertainty information in Part 121/135 and Part 91 cockpits.
- By FY 2022, develop MinWxSv wind application recommendations to enable planned benefits of NextGen far term concept operations in selected wind profiles.

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. In addition, adverse weather contributes to inefficiencies in NAS operations for commercial airlines as well as inflight injuries such as those attributed to turbulence. 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.

Detailed Justification for
A12.d NextGen – Information Security

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – NextGen – Information Security Program– Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A12.d NextGen – Information Security	-	-	$1,000,000	$1,000,000

What is this Program and Why is it Necessary?

The purpose of this program is to conduct research to help prevent disruptive cyber incidents that affect the Air Traffic Control (ATC) mission and improve resiliency in the event an incident does occur. While the current measures in place for the information security for the National Airspace System (NAS) are robust, the rapidly evolving capabilities of our potential adversaries and sharply decreasing costs of exploits necessitates some prudent exploration of advanced detection and defense capabilities for the NAS systems.

The program directly supports the FAA's cybersecurity goals as outlined in the FAA Cybersecurity Strategy 2016-2021 – specifically, the FAA's overall cyber security capability development - by researching advanced tools, techniques and processes that can be adapted for use in the NAS. The program also directly supports the Executive Order (EO) 13636 *Improving Critical Infrastructure Cybersecurity* and the Presidential Policy Directive (PPD)-21 *Critical Infrastructure Security and Resilience*, which defines Transportation Systems Sector as one of the 16 critical infrastructure sectors and aviation as an essential sub-sector.

Multiple recent external reports including Government Accountability Office (GAO)-15-370 – 'FAA Needs a More Comprehensive Approach to Address Cybersecurity As Agency Transitions to NextGen, April 2015,' GAO-15-221 – 'FAA Needs to Address Weaknesses in Air Traffic Control Systems, Jan 2015' and the National Research Council report 'A Review of the Next Generation Air Transportation System: Implications and Importance of System Architecture (2015), April 2015' point to the urgency of additional work in the area of cybersecurity for the NAS. The FAA has responded to many of the recommendations in these reports but several of the accepted recommendations require additional investigation and the rapidly evolving nature of the cyber threat demands more proactive research in identifying, evaluating, modifying, and deploying capabilities to suit the unique nature of the ATC systems supporting the NAS.

This program is sponsored by the FAA's Cybersecurity Steering Committee (CSC). The CSC has members from the Chief Information Officer's office, the FAA's Air Traffic Organization, the FAA's NextGen Organization, the FAA's Office of Security and Hazardous Materials, FAA's Office of Aviation Safety and the U.S. Department of Transportation. It is chaired by the FAA Chief Information Security Officer. The committee is thus able to look at aspects of cybersecurity for ATC across all domains and maximize the investments to provide the highest benefit for the agency.

The program will follow the strategic guidance of the Federal Cybersecurity Research and Development Strategic Plan published by the National Science and Technology Council, February 2016 to support the specific FAA cybersecurity goals: *Protect and Defend FAA mission*; *Data Driven Risk Management*; and *Collaboration with external partners*.

Major Activities and Accomplishments Planned in FY 2018 Include:

- Identify enabling technologies to be further developed to diminish cyber-attack impacts on the NAS with resilient self-adaptive techniques.
- Initiate the development of big data analytical capabilities with visualization tools for aggregating and correlating current operational, behavioral, and environmental data with the express intent of understanding, predicting and responding to cyber events.
- Develop research roadmap, based on actual NextGen technology implementations, to improve the FAA's capability in operating a mixed-trust, massively interconnected network of systems and external domains of different levels of security pastures and controls.

- Enhance cyber testing capability of the FAA Cybersecurity Test Facility (CyTF) located at the William J. Hughes Technical Center (WJHTC) to help identify and quantify known risks.

What does this Funding Level Support?

The vast majority of the research effort in this area will be in adapting extremely useful foundational research on trustworthy systems - performed by partner agencies (i.e., Department of Defense, Department of Homeland Security, National Science Foundation) and other entities - to the unique needs of the FAA. The FAA has built out the cyber test facility for ATC at the WJHTC and has the ability to rapidly configure the test environments to verify and validate adapted systems to ensure that they meet FAA's needs.

Goals for FY 2018 Funding:

- By 2019, develop the enabling technology to diminish certain cyber-attack impacts on the NAS with resilient self-adaptive techniques.
- By 2019, continue the development of big data analytical capabilities for aggregating and correlating current operational, behavioral, and environmental data with the express intent of understanding, predicting and responding to cyber events.
- By 2019, continue enhancements of cyber testing capabilities that will support the NAS operational improvements (OIs) by helping identify and quantify known risks and keeping pace with the increase in cyber threats to the NAS.
- By 2020, update the research roadmap, based on research findings and actual NextGen technology implementations, to improve the FAA's capability in operating a mixed-trust, massively interconnected network of systems and external domains of different levels of security pastures and controls.

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

The NAS is an integral part of the nation's critical infrastructure as identified in PPD-21. Maintaining the continued operations of the nation's air traffic management systems and preventing interruptions of the NAS functions are essential to provide the most efficient air travel system for and to ensure the safety of both air traveling public and the citizens on the ground. This NextGen Information Security research will enable the FAA to provide the necessary protections of the air traffic control services and associated functions from potential disruptive cyber events, specifically as the IP-network based and SOA NextGen technologies are being implemented.

Detailed Justification for
A13.a Environment and Energy

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – Environment and Energy – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A13.a Environment and Energy	$16,074,000	$16,043,000	$14,497,000	-$1,546,000

What is this Program and Why is it Necessary?

The FAA is utilizing a comprehensive, five pillar environmental, and energy strategy to mitigate the environmental impacts of aviation to enable the sustainable growth of aviation. The strategy employs a holistic approach that builds on aviation's history of technological and operational innovation to develop:

- Improved scientific knowledge and integrated modeling;
- New aircraft technologies;
- Sustainable alternative aviation fuels;
- Air traffic management modernization and operational improvements; and
- Policies, environmental standards, and market based measures.

The Environment and Energy (E&E) Program is a key component of the FAA's environment and energy strategy. This Program is advancing our understanding of aviation noise and emissions at their source, how they propagate and are modified in the atmosphere, and their ultimate health and welfare impacts on the population – both near airports and much farther afield. This knowledge is then incorporated into an integrated aviation environmental tool suite that can be used to evaluate the full breadth of environmental mitigation solutions that are being developed. The aviation environmental tool suite is built upon a sound scientific understanding 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 technology development, alternative fuels, operational procedures, and policies 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 locally, regionally, and globally. While energy efficiency and local environmental issues have traditionally been primary drivers of aeronautics innovation, the current and projected effects of aviation emissions on our global climate are a serious long-term environmental issue of concern to 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 with new entrants such as unmanned aircraft systems and supersonic aircraft. Environmental impacts, especially aircraft noise, are often the number one cause of opposition to airport capacity expansion and airspace redesign. Community concerns regarding commercial aircraft noise are having an impact on the realization of NextGen. This Program is a key element of the FAA's efforts to address the public concerns regarding aviation noise including those related to the changes associated with NextGen.

Noise is the most immediately objectionable impact of aviation, and an impact demanding considerable Federal resources, (e.g., since 1982 the FAA has provided $10.5 billion for sound insulation of houses and schools around U.S. airports). Research that is several decades old underpins determinations of aircraft noise significance, land use compatibility guidelines, and federally funded noise mitigation programs. The E&E Program is supporting the FAA's noise research roadmap. The ongoing noise research is increasing our understanding of the public reaction and sensitivity to current air traffic and the changes that are coming with the introduction of NextGen; evaluating the impacts of aviation noise on annoyance, sleep, health and children's learning; guiding mitigation efforts at affected airport communities; and ensuring the U.S. response to aircraft noise keeps pace with the needs of NextGen, new entrants, and international efforts.

The FAA's Office of Environment and Energy is developing a comprehensive suite of software tools - known as the Aviation Environmental Tool Suite - to facilitate thorough consideration of aviation's environmental effects. The main goal of this effort is to develop a critically needed ability to characterize and quantify the interdependencies among aviation-related noise and emissions, impacts on health and welfare, and industry and consumer costs, under different policy, technology, operational, and market scenarios. The key to the tool suite is the Aviation Environmental Design Tool (AEDT), which can model the noise, fuel burn and exhaust emissions consequences that result from aircraft operations from the airport gate through ground movements, takeoff, climb out, cruise, approach, and landing to the aircraft's final destination. AEDT has replaced the FAA legacy tools for environmental compliance, Noise Integration Routing System (NIRS), Emission and Dispersion Modeling System (EDMS), and Integrated Noise Model (INM). The E&E 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.

The research funded by this program will ensure issues are identified, impacts are measured, and appropriate mitigation measures are instituted. There are also important interrelationships and trade-offs among impacts due to noise, emissions, and fuel use that need to be understood and quantified when developing environmental mitigation strategies. The development of an interdisciplinary approach that considers the interdependencies among fuel use, aircraft noise, and various air pollutant emissions is a key element for the E&E Program. The goal is to develop a more complete understanding of the complex interdependencies that exist among aircraft noise, fuel use, 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. This integrated environmental modeling framework will also provide the tools necessary to support further research to expand the future range of options.

Major Activities and Accomplishments Planned in FY 2018 Include:

- Advance the understanding of noise impacts on social welfare and health.
- Improve ability to model the air quality and climate impacts of aviation emissions.
- Enhance the aviation environmental tool suite to improve its ability to calculate environmental consequences and impacts of aviation.
- Analyze mitigation options for reducing environmental impacts including policy measures and standards being developed at the International Civil Aviation Organization Committee on Aviation Environmental Protection (ICAO CAEP).

What does this Funding Level Support?

The E&E Program is helping the FAA to achieve its overarching environmental performance goal of environmental protection that allows for sustained aviation growth. This Program provides the fundamental knowledge and tools that are not only helping the FAA achieve this goal but also to implement NextGen. The efforts within the E&E Program complement activities to reduce the environmental impacts of aviation through aircraft technology and alternative fuels that are being carried out in the NextGen – Environmental Research – Aircraft Technologies and Fuels Program.

Goals for FY 2018 Funding:

- By 2018, advance air quality modeling capabilities to capture global impacts of aviation emissions to inform decision-making and enable solution development.
- By 2018, release Aviation Environmental Design Tool (AEDT) Version 3 with improved noise, emissions, and fuel burn estimation methodologies.
- By 2018, provide quantitative analysis to support 2018 U.S. Aviation Green House Gas Emissions Reduction Plan (for submission to ICAO).
- By 2019, explore metrics for community exposure to aircraft noise.
- By 2019, develop improved analytical tools and methodologies for cost-benefit analysis of both domestic and international policy options and scenarios.

- By 2019, complete analyses to support the development of a new engine exhaust particulate matter standard in ICAO CAEP.
- By 2019, complete analyses to inform the development of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) within ICAO CAEP.
- By 2020, advance understanding of the public reaction to advanced supersonic airplanes to support the development of en-route noise standards for airplanes that exceed Mach 1.

The E&E Program funds activities that support the U.S. leadership position on international environmental negotiations for standard setting and policymaking. These include, but are not limited to, the development, release, and subsequent support of AEDT analysis for integrated noise, emissions, and fuel burn evaluation; analyses to inform the development of a global market based measure for international aviation; and testing and analyses to inform the development of an international standard for aircraft engine particulate matter emissions. This program also supports efforts to develop international standards for supersonic aircraft, including en-route standards that could enable supersonic flight over land.

This program also funds AEDT development to improve our ability to model noise associated with NextGen deployment such that we can develop better mitigation solutions. It also funds improvements in the ability of AEDT to calculate the fuel burn benefits associated with NextGen implementation. 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 improved metrics and 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 E&E 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 at http://ascent.aero. ASCENT is building on the success of the Partnership for AiR Transportation Noise and Emissions Reduction (PARTNER) Center of Excellence at http:// partner.aero/ as highlighted in their 10-year symposium found at http://web.mit.edu/aeroastro/partner/reports/public-symposium-2013.pdf.

The E&E Program has enabled the development of AEDT to quantify the integrated fuel burn, noise, and emissions consequences of aviation as well as the aviation portfolio management tool (APMT) to convert these consequences into impacts on the community. AEDT version 2c (AEDT2c) was publicly released in 2016 and is the FAA's standard noise and emissions model replacing the NIRS, INM, and EDMS at https://aedt.faa.gov/. AEDT2c is saving the government money by enabling noise, fuel burn and emissions to be run simultaneously using a single input file instead of having multiple programs, as was the practice before its release. AEDT also provides a standard platform that facilitates exchange and reuse of data and results, thus optimizing usage of resources. Funds from this program would ensure the continued improvement and development of AEDT.

These funds were instrumental to supporting the development of a new standardized particular matter emissions measurement system for gas turbine engines that is being used to develop the emissions database to create an international aircraft engine particulate matter standard. This new system was approved by ICAO CAEP in February 2016 to measure aircraft engine exhaust to ensure compliance with the existing international engine exhaust visibility requirements. The new measurement system can be used at the same time as gaseous emissions measurements, which are also required. This is instead of the old measurement process which was time consuming and had to be done separately from the gaseous emissions measurements. The end result is that the new standardized particulate matter emissions measurement standard reduces emissions certification time by half saving industry time and money while improving the quality of the emissions measurements.

During the ICAO CAEP/8, CAEP/9, and CAEP/10 meetings - which took place in 2010, 2013, and 2016, respectively - AEDT and APMT were used to inform the U.S. positions on the internationally negotiated nitrogen oxide, noise, and carbon dioxide standards. Continued funding for the E&E Program would ensure the U.S. has the scientific information to make informed decisions on a particulate matter standard and a global market based measure for aviation; both 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 and Fuels

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – NextGen – Environmental Research – Aircraft Technologies and Fuels Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A13.b NextGen – Environmental Research – Aircraft Technologies and Fuels	$25,823,000	$25,774,000	$23,151,000	-$2,623,000

What is this Program and Why is it Necessary?

The NextGen – Environmental Research – Aircraft Technologies and Fuels program is developing solutions to reduce the impacts associated with aviation noise and exhaust emissions, and increasing energy efficiency and availability. In partnership with industry, the program will accelerate the maturation of engine and airframe technologies to reduce aviation noise, fuel use, and emissions. It will also provide test data, analyses, 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 the faster realization of the accompanying economic development and environmental improvements that will come with this new industry. The NextGen – Environmental Research – Aircraft Technologies and Fuels program is providing the FAA with funding to accelerate the maturation of aircraft and engine technologies and develop alternative jet fuels.

The maturation of aircraft and engine technologies and development of alternative jet fuels are key components of the NextGen environmental & energy strategy to overcome the challenges environment and energy are presenting to aviation. The other components of the strategy include efforts to:

- Better understand the extent of the problem associated with aviation noise and emissions;
- Develop and field new operational enhancements, aircraft and air traffic management technologies; and
- Develop policies to achieve near-term and long-term solutions.

The vast majority of improvements in environmental performance over the last three decades have come from enhancements in engine and airframe design. It is expected that a combination of technologies, air traffic management, alternative jet fuels, and policy measures will be required to provide sufficient environmental protection to ensure sustained aviation growth.

The main focus of the NextGen – Environmental Research – Aircraft Technologies and Fuels Program is the Continuous Lower Energy, Emissions, and Noise (CLEEN) program. The CLEEN Program is focused on technology maturation to reduce current levels of aircraft noise, emissions that degrade air quality, greenhouse gas emissions, and energy use while also advancing alternative jet fuels for aviation use. Since its inception in 2010, the CLEEN Program has been successful in maturating technologies to enter into service sooner than what the industry had anticipated. For example, the low emissions engine combustor has met and exceeded the original CLEEN goal for nitrous oxide reductions. Other demonstrated CLEEN technologies have shown significant progress toward the fuel burn and noise reduction goals. This Program also provides funding for the alternative jet fuel testing and analysis efforts of the Aviation Sustainability Center (ASCENT), the FAA Center of Excellence (COE) for Alternative Jet Fuels and Environment, which is a leading aviation cooperative research organization co-led by Washington State University and Massachusetts Institute of Technology (http://ascent.aero). This Program also supports efforts of the Commercial Aviation Alternative Fuels Initiative (CAAFI) to focus the efforts of commercial aviation to engage with the emerging alternative fuels industry (http://caafi.org). The CLEEN Program, ASCENT and CAAFI are all contributing to the Farm to Fly 2.0 efforts, which are coordinated with industry, the U.S. Department of Agriculture, and the U.S. Department of Energy to support the development of jet biofuel production and use by the U.S. aviation enterprise.

All three of these programs, CLEEN, CAAFI and ASCENT, are conducted in partnership with a wide range of aviation stakeholders and are leveraging resources from the private sector. CLEEN is a public private partnership where industry contributes cost share that matches or exceeds that provided by the FAA. CAAFI is a coalition among the FAA, airlines, aircraft and engine manufacturers, and industry where each entity contributes staff resources to focus the efforts of commercial aviation to engage the emerging alternative fuels industry. The work of the FAA and industry in CAAFI to advance alternative jet fuels was highlighted as a model for public-private partnerships in the UN Secretary General's 2016 report on Sustainable Transport at https://sustainabledevelopment.un.org/topics/sustainabletransport/highleveladvisorygroup. ASCENT, like all of the FAA COEs, has a 100% cost share requirement from non-federal sources and it has an Advisory Committee that has robust participation from a wide range of aviation stakeholders, including industry.

In FY 2018, the NextGen – Environmental Research – Aircraft Technologies and Fuels 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 (CLEEN II). Alternative jet fuels activities will focus on testing, analysis and coordination. The testing aspect will focus on safety, operability, and performance assessments to support the existing American Society of Testing and Materials (ASTM) International approval process and to streamline the approval process to reduce the costs and time for new fuels to reach approval. The analysis aspect will utilize a supply-chain perspective to evaluate the environmental performance of these fuels and the barriers that need to be overcome to ensure their use. The coordination aspect will be directed to activities that bring together industry, governments and academia to facilitate fuel production.

Major Activities and Accomplishments Planned in FY 2018 Include:

- Continue the second round of CLEEN activities (CLEEN II) in year 4 to assess and demonstrate aircraft and engine technologies that can reduce energy use, emissions, and noise.
- Support the approval of additional alternative jet fuel pathways via ASTM International.
- Evaluate regional alternative jet fuel supply chains to identify the key barriers to the development and deployment of 'drop-in' alternative jet fuels.
- Support the evaluations of economic, environmental and social sustainability of alternative jet fuels for use by government, industry and academia.

What does this Funding Level Support?

The NextGen – Environmental Research – Aircraft Technologies and Fuels Program is helping the FAA achieve its overarching environmental performance goal of environmental protection that allows for sustained aviation growth. The program is focused on maturing aircraft technologies that can reduce aircraft noise, emissions that degrade air quality, greenhouse gas emissions, and fuel use and advancing alternative jet fuels.

The NextGen – Environmental Research – Aircraft Technologies and Fuels Program supports the Department of Transportation strategic goal of Environmental Sustainability by accelerating the maturation and subsequent use by industry of environmentally beneficial aircraft and engine technologies and developing alternative jet fuels.

Goals for FY 2018 Funding:

- By 2018, develop methods to streamline the ASTM approval process for alternative jet fuels.
- By 2019, advance the understanding of alternative jet fuel composition to enable fuels with lower emissions.
- By 2019, develop lifecycle greenhouse gas emissions values for alternative jet fuels for use by ICAO CAEP.
- Through 2020, conduct testing to support the approval of at least one alternative jet fuel type per year.
- Through 2020, demonstrate certifiable aircraft and engine technologies via CLEEN II.

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 technology maturation, the CLEEN Program, which is a key component of the NextGen – Environmental Research – Aircraft Technologies and Fuels 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.

There have been a number of technologies matured in the first phase of CLEEN. 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 (NOx) 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 ultrahigh bypass ratio geared turbofan architecture through continued fan model wind tunnel testing and upcoming engine testing which could provide noise, emissions and fuel burn benefits. CLEEN has also completed wind tunnel testing to mature the blade designs for open rotor engine architectures, which hold large fuel burn reduction potential. The second phase of the CLEEN Program is well underway with additional technologies to reduce engine noise, NOx emissions, and fuel burn (go to https://www.faa.gov/news/press_releases/news_story.cfm?newsId=19454). Successful maturation and demonstration efforts are moving each of these technologies closer to transition into commercial products that will provide environmental benefit in the fleet for many years to come.

In the area of alternative jet fuels, this program has directly contributed to the certification by ASTM International of five alternative jet fuels made using Fischer-Tropsch synthesis, the Hydro Processed Esters and Fatty Acids (HEFA) fuel, sugar fermentation processes and alcohol-to-jet fuel. There are an additional six fuels currently under testing and evaluation via FAA funded programs. It has also funded the development of research that quantified the life cycle greenhouse gas emissions benefit of alternative jet fuels made from these and other processes. This research was subsequently used by the Environmental Protection Agency as a part of their rulemaking to include HEFA fuels within their Renewable Fuel Standard program. Finally, this program also provides funding to the 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. Because of CAAFI, the alternative jet fuel industry has developed strong partnerships with not only the aviation industry and FAA, but also with other Federal agencies including the Departments of Agriculture, Energy and Defense, the EPA, NASA, Department of Commerce, National Science Foundation and State Department.

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

This Program will enable continued success in the CLEEN Program to mature aircraft and engine technologies. The technologies matured in the first five year period of CLEEN will reduce U.S. fleet-wide fuel burn by 2 percent from 2025 through 2050, representing a cumulative savings of 22 billion gallons of jet fuel. The CO2 savings are the equivalent of taking 1.7 million cars off of the road over the duration of this 25 year period. It will also save airlines 2.75 billion dollars in fuel costs per year for those 25 years. These benefits are in addition to substantial reductions in noise and emissions that degrade air quality (go to http://partner.mit.edu/projects/eds-capability-demonstration-assessing-cleen-program).

The CLEEN Program has enabled a low emissions combustor technology to enter service in 2016 in an engine with almost 8,000 orders already placed. The CLEEN Program also anticipates another CLEEN engine technology will have more than 4,000 orders placed after 2020. As additional new aircraft and engine products are announced by industry, there will be many more orders placed for products that were matured via the CLEEN Program. Additional details on the first phase of the CLEEN Program are available at http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=16814.

With continued funding, this program will enable the FAA, through the second phase of the CLEEN Program (CLEEN II), to partner with industry to mature technologies with the result being a fleet of aircraft with lower noise, emissions and fuel burn. Specifically, the technology goals of the second phase of the CLEEN Program are to develop and demonstrate certifiable engine technology that reduces:

- Noise levels by 32 decibels cumulative, relative to the Stage 4 standard.
- Aircraft fuel burn by 40% relative to year 2000 best-in-class in-service aircraft.
- LTO cycle, NOx emissions by 70% below the international civil aviation organization standard adopted in 2010.

The continuing work of CLEEN, CAAFI and ASCENT to develop alternative jet fuels via fuel testing, integrated analysis and coordination will help to ensure that aviation has sustainable energy options. Funding from this Program is supporting the inclusion of alternative jet fuels within the International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP). In the past year, researchers funded by this Program collaborated to conduct an analysis of the potential for alternative jet fuels to help the aviation industry meet its long-term goals to reduce CO_2 emissions. The funding also supported the development of a life cycle accounting methodology that will be used to include alternative jet fuels within the global market based measure for international aviation that is being developed by ICAO. Continued funding will ensure that the United States is able to exercise global leadership on how this internationally-accepted methodology is used to develop the actual emissions values that will be used to include alternative jet fuels within the global market based measure.

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.

The first alternative jet fuel production facility in the U.S. began deliveries of alternative jet fuel to United Airlines at Los Angeles International Airport in March 2016. United will purchase up to 15 million gallons from Altair Fuels over the next three years. Much of the current and planned alternative jet fuel production in the United States utilizes waste streams such as used cooking oil, byproducts from the livestock industry, municipal solid wastes, and residues from forestry and agriculture. The alternative jet fuel being used by United Airlines at Los Angeles International Airport is produced from tallow from livestock production. There are also multiple agreements signaling the intent of additional airlines to purchase planned jet fuel production from future U.S. based fuel producers. Some of this alternative jet fuel will likely be produced from cover crops that are 'intercropped' (i.e. grown between the harvest and planting of existing food crops) and that help to reduce soil and fertilizer runoff and preserve soil fertility. Preliminary work out of the University of Tennessee conducted through the ASCENT Center of Excellence suggests that the widespread production of this fuel could have nearly 20 billion dollars of total annual economic impact within the United States while generating nearly 75,000 jobs.

Detailed Justification for
A14.a System Planning and Resource Management

What is the Request and What Funds are Currently Spent on the Program?

FY 2018 – System Planning and Resource Management – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A14.a System Planning and Resource Management	$2,100,000	$2,096,000	$2,135,000	$39,000

What Is This Program And Why Is It Necessary?

The System Planning and Resource Management (SPRM) activity leads the planning, coordination, development, presentation and review of the FAA's research and development (R&D) portfolio. Its key programmatic outputs include the National Aviation Research Plan (NARP), the Annual Research and Development Review – both of which are annual statutory deliverables to Congress – and administration of the congressionally mandated (P.L. 100-591 Section 6 Advisory Committee) Research, Engineering and Development Advisory Committee (REDAC) and resultant reports. SPRM also provides program advocacy and outreach and maintains alignment with departmental R&D program planning and performance reporting guidance.

SPRM leads the portfolio planning, formulation, presentation and review activity to ensure the FAA meets the President's criteria for R&D, increases program efficiency, sustains and maintains management of the program within operating cost targets, and enables effective program review by the REDAC and the OST Office of Research and Technology.

Established pursuant to the Federal Advisory Committee Act (FACA), 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.

SPRM also develops program guidance and conducts compliance reviews to ensure that departmental R&D program planning and performance reporting requirements specified in the Fixing America's Surface Transportation (FAST) Act are satisfied. It also coordinates the establishment and administration of the Air Transportation Centers of Excellence (COE) Program and ensures compliance with related Financial Assistance and Grants Management departmental policy guidance.

Major Activities and Accomplishments Planned in FY 2018 Include:

R&D Portfolio Development

- Coordinate development, review and presentation of the NARP in accordance with statutory requirement.
- Coordinate development, review and presentation of the R&D Annual Review in accordance with statutory requirement.
- Conduct REDAC Portfolio Review in accordance with statutory requirement and FAA Policy Order.
- Complete and deliver Annual Federal Advisory Committee Act (FACA) Report as required by GSA Directive.
- Complete Annual Modal Research Plan as required by the FAST Act.

What does this Funding Level Support?

Goals for FY 2018 Funding:

Sustain and maintain program operation within specified operating cost targets as follows:

- Maintain an R,E&D management workforce of no more than 10 percent of the total R,E&D workforce, each year through FY 2019.
- Control expenditures of the REDAC to less than 1/10 of one percent of the total R,E&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 its annual R,E&D portfolio and submit the mandatory R&D planning documents 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 its portfolio. This results in a more effective research program that will benefit the public by making aviation safer and smarter and enhancing the U.S. 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 2018 – William J. Hughes Technical Center Laboratory Facility – Budget Request

Program Activity	FY 2016 Enacted	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
A14.b William J. Hughes Technical Center Laboratory Facility	$3,445,000	$3,438,000	$3,233,000	-$205,000

What is this Program and Why is it Necessary?

This program sustains research facilities located at the William J. Hughes Technical Center Laboratory (WJHTC) to support Research and Development (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 demonstrations and human-in-the-loop (HITL) simulations. The R&D laboratories are comprised of the Cockpit Simulation Facility (CSF), Target Generation Facility (TGF), and the Research Development and Human Factors laboratory (RDHFL).

R&D programs require specialized facilities to emulate and evaluate field conditions. Researchers measure baseline human performance using existing air traffic controller configurations and changes in performance when new systems or procedures are introduced to evaluate human factors (HF) issues. These laboratories include integrated cockpits and air traffic controller 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.

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 in order to support the R&D program goals.

<u>Simulation Facilities - (CSF & TGF)</u>
The Simulation Branch supports development and test programs at the WJHTC by generating realistic traffic for engineering, operational, and HF evaluations of National Airspace System (NAS) equipment, procedures, and operations. The TGF simulates air traffic equipment including the radar and inter-facility interfaces for end-to-end gate-to-gate configuration controlled test capability. Targets generated by the TGF 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 including B-737-800, A-321, Embraer 175 and General Aviation (GA) aircraft. All cockpit simulators are integrated with TGF and are capable of acting as interactive targets in NAS simulations.

<u>Concepts and Systems Integration – RDHFL</u>
The RDHFL conducts research to acquire a better understanding of the role 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 and airway facilities systems. The cost of funding HF research during the design and development phase of a project is offset by the significant reduction in cost during implementation.

The RDHFL has supported a number of legacy system and NextGen projects in many areas of research including NextGen Terminal Radar Approach Control (TRACON) (Human Factors Division), en Route data Communications, modular NextGen TRACON facilities, separation management , tower ground surveillance, UAS, wildlife Human Factors mitigation simulation, weather simulations, virtual reality demonstrations and many more. The RDHFL will continue to provide the resources to conduct robust and high fidelity HITL air traffic simulations.

Major Activities and Accomplishments Planned in FY 2018 Include:

Simulation Facilities

- Add a rotorcraft simulation capability to enable research in synthetic vision enhancement to all weather helicopter operations (CSF).
- Demonstrate TGF CONUS real-time HITL capability (TGF).

Concepts and Systems Integration – RDHFL

- Enhance the Virtual Reality laboratories capabilities to take advantage of the latest technology in 3D motion and interaction.

What does this Funding Level Support?

The WJHTC Laboratory Facility program supports research facilities located at the WJHTC. These facilities consist of the TGF, the Cockpit Simulation Facility and the RDHFL. The 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, R&D facility modifications and improvements, equipment and software hardware licenses for support tools.

Goals for FY 2018 Funding:

Simulation Facilities

- By 2019, implement agent-based En Route and Terminal controllers to TGF for CONUS simulations.
- By 2020, achieve an integrated weather and traffic simulation capability in the cockpit simulation facility. This will include capability for time constrained trajectory negotiation and management.
- By 2021, the capability for full flight plan exchange through data communications will exist in an integrated simulation environment.

Concepts and Systems Integration – RDHFL

- By 2020, develop and integrate new NAS capabilities into the laboratories baseline simulation infrastructure.

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.

Concepts and Systems Integration – RDHFL

The benefit of doing proactive HF 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)

(INCLUDING TRANSFER OF FUNDS)

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, $3,000,000,000, to be derived from the Airport and Airway Trust Fund and to remain available until expended: Provided, That none of the funds under this heading shall be available for the planning or execution of programs the obligations for which are in excess of $3,350,000,000 in fiscal year 2018, notwithstanding section 47117(g) of title 49, United States Code: Provided further, That none of the funds under this heading shall be available for the replacement of baggage conveyor systems, reconfiguration of terminal baggage areas, or other airport improvements that are necessary to install bulk explosive detection systems: Provided further, That notwithstanding any other provision of law, of funds limited under this heading, not more than $111,863,000 shall be obligated for administration, not less than $15,000,000 shall be available for the Airport Cooperative Research Program, and not less than $33,210,000 shall be available for Airport Technology Research.

Note.—A full-year 2017 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Further Continuing Appropriations Act, 2017 (P.L. 114–254). The amounts included for 2017 reflect the annualized level provided by the continuing resolution.

Program and Financing
(in millions of dollars)

Identification code: 69-8106-0-7-402	FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
Obligations by program activity:			
0001 Grants-in-aid for airports	3,339	3,186	3,190
0002 Personnel and related expenses	107	107	112
0003 Airport technology research	31	31	33
0005 Small community air service	6	5	. . . .
0006 Airport Cooperative Research	15	15	15
0100 Total direct program	3,498	3,344	3,350
0799 Total direct obligations	3,498	3,344	3,350
0801 Grants-in-aid for Airports (Airport and Airway Trust Fund) Reimbursable	. . . .	1	1
0900 Total new obligations, unexpired accounts	3,498	3,345	3,351
Budgetary Resources:			
Unobligated balance:			
1000 Unobligated balance carried forward, Oct 1	15	16	22
1001 Discretionary unobligated balance brought fwd, Oct 1	1	1	. . . .
1021 Recoveries of prior year unpaid obligations	147	. . . .	. . . .
1033 Recoveries of prior year paid obligations	2	. . . .	. . . .
1050 Unobligated balance (total)	164	16	22
Budget Authority:			
Appropriations, discretionary:			
1101 Appropriation (special or trust fund)	3,600	3,593	3,000
1137 Appropriation applied to liquidate contract authority	-3,600	-3,593	-3,000
Contract authority, mandatory:			
1600 Contract authority (Reauthorization)	3,350	3,350	3,350
Spending authority from offsetting coll., Discretionary:			
1700 Collected	. . . .	1	1
1900 Budget authority (total)	3,350	3,351	3,351
1930 Total Budgetary Resources Available	3,514	3,367	3,373
Memorandum (non-add) entries:			
1941 Unexpired unobligated balance, end of year	16	22	22
Change in obligated balances:			
Unpaid obligations:			
3000 Unpaid obligations, brought forward, Oct 1	5,418	5,642	5,573
3010 Obligations incurred, unexpired accounts	3,498	3,345	3,351
3020 Outlays (gross)	-3,127	-3,414	-3,480
3040 Recoveries of prior year unpaid obligations, unexpired	-147	. . . .	. . . .
3050 Unpaid obligations, end of year	5,642	5,573	5,444
Memorandum (non-add) entries:			
3100 Obligated balance, start of year	5,418	5,642	5,573
3200 Obligated balance, end of year	5,642	5,573	5,444
Budget authority and outlays, net:			
Discretionary:			
4000 Budget authority, gross	. . . .	1	1
Outlays, gross:			
4010 Outlays from new discretionary authority	252	445	450
4011 Outlays from discretionary balances	2,875	2,969	3,030
4020 Outlays, gross (total)	3,127	3,414	3,480
Offsets against gross budget authority and outlays:			
Offsetting collections (collected) from:			
4033 Non-federal sources	-2	-1	-1
Mandatory:			
Additional offsets against gross budget authority only:			

4053	Recoveries of prior year paid obligations, unexpired accounts	2	. . . .	. . . .
4080	Outlays, net (discretionary)	3,125	3,413	3,479
	Mandatory:			
4090	Budget authority, gross	3,350	3,350	3,350
4180	Budget authority, net (total)	3,350	3,350	3,350
4190	Outlays, net (total)	3,125	3,413	3,479
	Memorandum (non-add) entries:			
5052	Obligated balance, SOY: Contract authority	3,764	3,514	3,271
5053	Obligated balance, EOY: Contract authority	3,514	3,271	3,621
5061	Limitation on obligations (Transportation Trust Funds)	3,350	3,344	3,350

Subchapter I of chapter 471, title 49, U.S. Code provides for airport improvement grants, including those emphasizing capacity development, safety and security needs; and chapter 475 of title 49 provides for grants for aircraft noise compatibility planning and programs.

Object Classification
(in millions of dollars)

Identification code: 69-8106-0-7-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Direct obligations:			
	Personnel compensation			
11.1	Full-time permanent	67	71	69
11.3	Other than full-time permanent	1	1	1
11.5	Other personnel compensation	1	1	1
11.9	Total personnel compensation	69	73	71
12.1	Civilian personnel benefits	22	22	22
21.0	Travel and transportation of persons	3	3	3
23.2	Rental payments to others	1	1	1
25.1	Advisory and assistance services	25	22	24
25.2	Other services from non-Federal sources	4	3	3
25.3	Other services from Federal sources	21	21	30
25.7	Operation and maintenance of equipment	4	4	4
26.0	Supplies and materials	1	1	1
31.0	Equipment	1	1	1
32.0	Land and Structures	. . . .	1	. . . .
41.0	Grants, subsidies, and contributions	3,342	3,187	3,190
94.0	Financial Transfers	5	5	0
99.0	Direct obligations	3,498	3,344	3,350
99.0	Reimbursable obligations	. . . .	1	1
99.9	Total new obligations, unexpired accounts	3,498	3,345	3,351

Employment Summary

Identification code: 69-8106-0-7-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
1001	Direct: Civilian full-time equivalent employment	589	609	599
2001	Reimbursable: Civilian full-time equivalent employment	. . . .	1	1

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EXHIBIT III-1

GRANTS-IN-AID FOR AIRPORTS
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	FY 2016 ACTUAL	FY 2017 ANNUALIZED CR	FY 2018 REQUEST	CHANGE FY 2017-2018
Grants-in-Aid for Airports	3,191,900	3,185,832	3,189,927	4,095
Personnel & Related Expenses	107,100	106,896	111,863	4,967
Airport Technology Research	31,000	30,941	33,210	2,269
Airport Cooperative Research	15,000	14,972	15,000	28
Small Community Air Service	5,000	4,990	-	(4,990)
TOTAL	$ 3,350,000	$ 3,343,631	$ 3,350,000	$ 6,369
FTEs				
Direct Funded	589	609	599	-10
Reimbursable, allocated, other	0	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 2017 TO FY 2018
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

ITEM	Change from FY 2017 to FY 2018 $000	Change from FY 2017 to FY 2018 FTE
FY 2017 ANNUALIZED CR	3,343,631	609
Administrative Adjustments to Base:		
Annualization of FY 2017 FTE	0	
Annualization of FY 2017 Pay Raise	480	
FY 2018 Pay Raise	1,303	
Working Capital Fund	-9	
Non-Pay Inflation	614	
SUBTOTAL, ADJUSTMENTS TO BASE	**2,388**	**-**
PROGRAM REDUCTIONS		
Reduction to Airport Cooperatvie Research Program to offset inflationary costs	-123	
Workforce reduction of 1 non-exempt position (.5 FTE) in Airports Technology Research Program through attrition	-75	-0.5
Reduction of 19 non-exempt positions (9.5 FTE) in Personnel and Related Expenses Program through attrition with targeted hiring for safety inspectors	-1,425	-9.5
Reduction to SCASDP Program	-4,990	
SUBTOTAL, PROGRAM REDUCTIONS	**-6,613**	**-10**
NEW OR EXPANDED PROGRAMS:		
Program increase in the Personnel and Related Expenses Program for development and upgrade of the airports's national data systems	4,500	
Increase to Grants program	4,095	
Program increase for Airports Technology Research Program for Pavement Advanced Materials testing	2,000	
SUBTOTAL, NEW OR EXPANDED PROGRAMS	**10,595**	**0**
FY 2018 REQUEST	**3,350,000**	**599**

Executive Summary: Grants-in-Aid for Airports

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

For FY 2018, FAA requests $3.35 billion to fund the Grants-in-Aid for Airports program, also known as the Airport Improvement Program (AIP). The budget will enable the FAA to continue providing capital funding to help airports preserve and maintain critical airport infrastructure. The grants-in-aid program enables FAA to advance important safety, capacity and efficiency projects, 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 AIP also helps airports address environmental concerns for neighboring communities, which may otherwise oppose or delay airport modernization projects.

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 issues.

The FAA identifies public-use airports for the national transportation system and the National Plan of Integrated Airport Systems (NPIAS). These public use airports support scheduled air carrier service at more than 500 commercial service airports. In addition to the scheduled passenger and cargo service, the airport system serves a diverse range of functions at approximately 2,800 general aviation airports that support emergency medical services and disaster response, flight training, law enforcement support, agricultural activities, and business/corporate activities.

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

Every two years, as required by statute, the FAA publishes a report that looks five years into the future, identifying AIP-eligible development needs in the NPIAS. The latest NPIAS report, which was published in September 2016, identified over $32.5 billion in capital needs over the 5-year period from 2017-2021. The FAA funds capital projects that support system safety, capacity, and environmental projects and the highest priority needs in the NPIAS.

What Benefits will be Provided to the American Public Through This Request?

The investment of AIP funds in the national system of airports is critical to helping maintain and improve the safety, capacity and efficiency of the U.S. system of airports. The FAA works 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 reduction in environmental and community impacts. Through the AIP, the FAA helps ensure there is a safe and reliable system of airports to support the needs of the traveling public, the airlines and other aeronautical users, 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.

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GRANTS-IN-AID FOR AIRPORTS

Grants-in-Aid for Airports (AATF)

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2017 Annualized CR	**3,185,832**	**0**	**0**
Adjustments to Base	**0**	**0**	**0**
Program Level			
1. Grants-in-Aid for Airports	4,095		
Increases/Decreases	**4,095**	**0**	**0**
FY 2018 Request	**3,189,927**	**0**	**0**

Detailed Justification for Grants-in-Aid for Airports

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

FY 2017 Grants-in-Aid for Airports Budget Request ($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses				
Program Costs	3,191,900	3,185,832	3,189,927	4,095
Total	**$ 3,191,900**	**$ 3,185,832**	**$ 3,189,927**	**4,095**
FTE	**0**	**0**	**0**	**0**

For FY 2018, FAA requests $3.19 billion to fund the Grants-in-Aid for Airports program (AIP). This is an increase of $4.1 million from the FY 2017 annualized CR level.

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 514 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 request allows the FAA to continue supporting the following key initiatives:

- Continue to preserve and enhance critical airfield infrastructure, supporting safety, capacity and efficiency for airports of all categories nationwide;
- 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;
- Support airports that choose to implement Safety Management Systems;
- Mitigate the environmental impacts of aviation including noise mitigation, land use compatibility planning and air and water quality improvements;
- Support airport planning efforts;
- Continue to support research and development in airport technology;
- Improve Runway Safety Areas (RSA) that do not conform to FAA standards, and
- Continue to support airport security improvements where applicable.

The FAA continues to award AIP grants that enable airports to conform to Federal safety standards, which are designed to protect the traveling public as well as to minimize financial risk to airlines and other aeronautical users (as well as the airports themselves). Many of the nation's airports (and particularly the airfield facilities) were originally built decades ago, before modern jets were prevalent in the fleet. The agency's long-term goal is to eliminate outmoded airport conditions that contribute to accidents, and enhance the margin of operating safety by ensuring that airport safety standards are met wherever possible. Having completed the multi-year program aimed at improving airport-related aspects of nonstandard Runway Safety Areas (RSAs), the FAA has now initiated an effort to reduce runway incursions by eliminating complex geometry and implementing mitigation measures where possible through the Runway Incursion Mitigation (RIM) program.

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 or rehabilitation of runways, runway extensions, and airfield reconfigurations. We will also strive to increase the safety, security, and capacity of the global civil aerospace system, and address environmental issues that are necessary to address community concerns and allow airport infrastructure improvements to proceed in a timely manner.

AIP funds will continue supporting reducing and mitigating airport environmental impacts, including impacts to local communities:

- Land use compatibility planning;
- Property acquisition;
- Residential and school sound insulation programs;
- Airport air quality improvement projects;
- Water quality improvement projects including wetlands mitigation and drainage improvements such as glycol containment and treatment systems where required.
- Energy efficiency projects; and
- Recycling, waste reduction, and reuse plans.

The Office of Airports (ARP) will also continue to implement environmental streamlining as part of its standard practice to expedite environmental reviews and associated permitting. The FAA is also able to provide AIP funding specifically to help airports complete the environmental process in a timely manner.

Security projects required by statute or regulation carry a high priority for AIP funding, particularly those related to protecting the airport's "secured area." This includes airport perimeter fencing, security gates, lighting and closed circuit television cameras as part of access control to the secured area. AIP eligibility is far more limited in the terminal area, partly due to statutory provisions limiting AIP to projects required by Part 1542 and partly due to budget augmentation concerns. However, there are some things FAA can do—such as supporting infrastructure and facility modifications that allow the Transportation Security Administration (TSA) to optimize the layout and functionality of public screening areas. FAA continues to work with TSA to consider other capital needs as they arise, and to determine whether AIP can support any aspect of those needs.

Funding in FY 2018 will support the following key outputs and outcomes:

- 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;
- 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;
- Continue to support research and development in airport technology; and,
- Air quality improvement and noise mitigation projects that reduce air and noise pollution.

What Is This Program and Why is it Necessary?

The Grants-in-Aid for Airports program is crucial to help maintain airport infrastructure in good condition. The program also supports safety through our efforts to reduce transportation-related injuries and fatalities.

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, the AIP helps ensure that at least 93 percent of runways at more than 3,332 NPIAS airports are maintained in excellent, good or fair condition.

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 quality.

The AIP also supports the safety 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.

By funding airport infrastructure projects that provide access to the national air transportation 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.

AIP also helps reduce transportation-related impacts to air and water ecosystems and to reduce noise pollution. For example, the AIP supports projects to improve air quality in designated nonattainment areas 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 initiatives that can help reduce community opposition to airport operations.

Anticipated accomplishments for the AIP grant program in 2018 include:

- Construction or rehabilitate runways, taxiways, aprons, drainage facilities and other critical infrastructure;
- Reconfigure taxiways, perimeter service roads and other facilities to reduce the risk of runway incursions;
- Fund infrastructure development projects to meet airport safety and design standards;
- Fund 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 airport air quality programs;
- Fund eligible energy efficiency projects; and,
- 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 584,000 active pilots, 210,000 general aviation aircraft, and more than 7,000 air carrier aircraft 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 November 2016. It states that, in 2014, aviation accounted for 5.1% of our gross domestic product (GDP), contributed $1.6 trillion in total economic activity, and supported 10.6 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.

The 61 Large and Medium hub airports account for about 88 percent of all passenger enplanements (although fully a quarter of those enplanements involve trips that start or end at smaller airports). 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 important part of efforts to improve the operational efficiency of the NAS. Since 2000, infrastructure projects at 23 major airports have provided the capability to accommodate more than 2 million additional annual operations each year.

AIP also 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.

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. As a result, airports routinely have to break projects into smaller phases (which can increase overall costs while also delaying delivery of key safety and capacity benefits), or defer them into a future year until funding can be identified. The latest NPIAS, published in September 2016, identified $32.5 billion in estimated capital needs over the 5-year period from 2017-2021.

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 has been to maintain at least 93 percent of the paved 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 and efficiency.

The investment of AIP funds in the NAS has direct benefits, improving the safety and capacity of the system. The AIP program also helps airports reduce the impacts of airport operations on their neighboring communities.

Safety

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 NPIAS. Periodic maintenance of runways, particularly resurfacing, has proven a cost effective way to delay the need for major runway rehabilitation. 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 eleven successful overrun arrestments with minimal or no damage to the aircraft, and no injuries to over 282 total occupants. The latest arrestment came at LaGuardia, in New York in October 2016 when a Boeing 737 was safely stopped with vice presidential candidate Mike Pence.

Capacity, Efficiency, Access, and Connectivity

The ability of the U.S. to effectively compete in a global economy requires air transportation services that operate efficiently and reliably to sustain economic opportunity throughout the Nation.

Airports are generally located to make air transportation as convenient and accessible as possible. Ninety-eight percent of the U.S. population lives within 20 miles of an airport in NPIAS. Additionally, AIP funding has been provided for infrastructure projects at 23 major U.S. airports providing them with the capability to accommodate more than 2 million additional operations each year.

Economic Competitiveness

The U.S. air transportation network is a key factor in increasing the nation's economic productivity and prosperity. It supports the U.S. economy by providing access to markets beyond the local community. From personal vacations to business meetings, from overnight delivery of time sensitive goods to emergency medical flights — civil aviation is an essential part of everyday life and commerce in the U.S. Air transportation provides a foundation for connecting manufacturing and businesses opportunities for customers and service providers along with high-value and time-critical delivery services.

Environmental Considerations

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 Voluntary Airport Low Emissions (VALE) Program addresses air quality by reducing airport emissions from mobile and stationary ground sources. The FAA has invested $196 million in VALE clean airport technology, funding 92 VALE projects through the AIP program from 2005 through 2016. VALE initiatives reduce ozone emissions by approximately 840 tons per year, which is equivalent to removing over 46,912 cars and trucks from the road annually. The Zero Emissions Vehicle (ZEV) program provides air quality benefits by funding the purchase of zero emission vehicles.

These types of programs can help address community concerns and opposition to airport operations and/or modernization.

Explanation of Funding Changes for Grants-in-Aid for Airports

	Dollars ($000)	FTE
Grants-in-aid for Airports (Net change from FY 2017 annualized CR)	**4,095**	**0**
Overview: For FY 2018, the Associate Administrator for Airports requests $3.190 billion to meet the mission of planning and developing a safe and efficient national airport system. This represents an increase of $4.095 million from the FY 2017 annualized CR budget.		
Discretionary Adjustments		
Grants-in-Aid for Airports The $3.35 billion requested for AIP will enable FAA to meet all national priorities for safety, security, capacity, and environmental mitigation across all size airports.	4,095	0

GRANTS-IN-AID FOR AIRPORTS

Personnel and Related Expenses

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2017 Annualized CR	**106,896**	**583**	**583.0**
Adjustments to Base			
1. Annualization of FY 2017 pay raise	460		
2. Pay Inflation	1,248		
3. Non-pay Inflation	193		
5. WCF Increase	-9		
Total Adjustments to Base	**1,892**	**0**	**0.0**
Other Adjustments			
Discretionary decrease to PC&B costs through attrition with targeted hiring of security inspectors	-1,425	-19	-9.5
Total Other Adjustments	**-1,425**	**-19**	**-9.5**
New or Expanded Programs			
Additional contracts dollars to upgrade national data systems	4,500		
Total Discretionary Increases	**4,500**	**0**	**0**
FY 2018 Request	**111,863**	**564**	**573.5**

Detailed Justification for Personnel and Related Expenses

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

FY 2017 Personnel and Related Expenses Budget Request ($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	85,168	87,601	87,884	283
Program Costs	21,932	19,295	23,979	4,684
Total	**$ 107,100**	**$ 106,896**	**$ 111,863**	**$ 4,967**
FTE	**565**	**583**	**564**	**(19)**

For FY 2018, the Associate Administrator for Airports requests $111.8 million, 564 positions and 573.5 FTEs to cover the administrative expenses for the ARP, an increase of $4.9 million over the FY 2017 annualized CR level. The request allows ARP to fulfill its mission of leadership in planning and developing a safe and efficient national airport system to satisfy the needs of the aviation interests of the United States, with consideration for economics, environmental compatibility, local proprietary rights, and safeguarding the public investment.

Eight additional safety inspector positions are requested in FY 2018 to fulfill regulatory oversight requirements ensuring airport compliance with safety regulations, as well as will support integration of Unmanned Aerial Systems (UAS) into airports through policy development and outreach. This would represent the first increase in inspectors in many years as the inspections have become more complex. Safety processes involving wildlife, snow and ice control plans, safety management systems, and training have required additional inspector time and effort.

$4.5 million is requested for development and upgrade to the Office of Airports' national data systems. Efforts will include hardware and software upgrades, enabling interfaces between systems, enhancement of analytical tools, and critical O&M support.

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 maintaining a high percentage of airport runways in excellent, good, or fair condition; safety (through the reduction in transportation related injuries and fatalities), airports impact on economic development (maximizing economic returns on transportation policies and investments and a competitive air transportation system responsive to consumer needs); and reduction of environmental impacts.

ARP is responsible for the regulatory oversight and inspection of certificated commercial service airports. In FY 2018, 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. 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 2018, 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. We will also strive to increase the safety, security, and capacity of the global civil aerospace system in an environmentally sound manner.

Anticipated 2018 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 up to 6 Advisory Circular (AC) updates;
- Continue reconfiguring taxiways to reduce runway incursions as part of the RIM program;
- 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 Airports Geographic Information System (Airports GIS);
- Manage and execute Part 139 Airport Safety Certification program;
- Meet Part 16 compliance schedules;
- Assist with integration of Unmanned Arial Systems (UAS) into the NAS, to include training, guidance, detection, and mitigation.
- Integrate SMS into FAA airport planning and environmental processes and guidance;
- Support 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;
- Maximize the return on AIP investments by increasing the disbursement rate for AIP grants; and
- 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 2018 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. We analyzed confusing taxiway geometry, prioritized hotspots, and are developing cost estimates for mitigating confusing geometry.

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 these metrics to and evaluate external factors that may affect 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. Serious Vehicle Pedestrian Deviations (VPDs) have remained flat the past two years, and remains the only type of serious runway incursion that has not increased. We believe this continued focus on VPDs has contributed to preventing their numbers from rising. VPDs occur when a vehicle or pedestrian incorrectly enters a runway, which represents a major hazard to the safety of aviation during takeoff and landing. 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 2017)	**3,075**	**-9.5**
Overview: For FY 2018, the Associate Administrator for Airports requests $111.8 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. Additional funds are being requested to support 8 new safety positons, and $4.5 million for development and upgrades to the airports' national data system. This request represents an increase of $3.07 million from the FY 2017 annualized CR.		
Adjustments to Base		
Annualization of the FY 2017 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2016 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 2.1 percent.	460	
FY 2018 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 1.9 percent.	1,248	
FY 2018 Non-Pay Inflation: This increase is for the FY 2018 percent GDP price index (year over year) of 1 percent. This is based on the most recent economic assumptions.	193	
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.	-9	
Other Changes		
Workforce reduction through attrition: Assuming reduced non-exempt hiring in FY 2018 with targeted hiring of security inspectors, resulting in savings through attrition.	-1,425	
Increase to contract support: Requesting funding for development and enhancement to the airports' national data system to enable interfaces and enhanced analytical tools for use with airports data.	4,500	

GRANTS-IN-AID FOR AIRPORTS

Airport Technology Research

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2017 Annualized CR	**30,941**	**24**	**24.0**
Adjustments to Base			
1. Annualization of FY 2017 Hiring	0		
2. Annualization of FY 2017 Pay Raises	19		
3. Pay Inflation	52		
4. Non-pay Inflation	273		
Total Adjustments to Base	**344**	**0**	**0.0**
Discretionary Increases/ Decreases			
Program increase for pavement advanced materials testing	2,000		
Workforce reduction through attrition	-75	-1	-0.5
Total Discretionary Adjustments	**1,925**	**-1**	**-0.5**
FY 2018 Request	**33,210**	**23**	**23.5**

Detailed Justification for Airport Technology Research

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

FY 2017 Airport Technology Research Budget Request ($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2016 Enacted
Salaries and Expenses	3,864	3,675	3,672	(3)
Program Costs	27,136	27,266	29,538	2,272
Total	**$ 31,000**	**$ 30,941**	**$ 33,210**	**$ 2,269**
FTE	**24**	**24**	**23**	**-0.5**

For FY 2018, the Associate Administrator for Airports requests $33.2 million, 23 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 19 research program areas (RPA's) and more than 125 on-going complex projects.

The RPA activities will support research in airport planning and design, analysis of airport safety data, airport rescue and firefighting, wildlife hazard mitigation, visual guidance, runway surface technology, airport surveillance sensors, aircraft noise issues around airport, airport pavement design, airport pavement long-term performance, and unmanned aircraft systems (UAS) integration at airports.

The results of the Airport Technology Research branch (ATR) research are used in updating Advisory Circulars, manuals, and technical specifications that airports rely on when expending AIP grant funds.

Critical highlights of the ATR research program for FY 2018 are presented below:

In the airport pavement research area, ATR will continue to use its facilities to test and conduct research on new pavement design and materials. In particular, the use of warm mix asphalts (WMA's) is becoming prevalent with the design of highway pavements, and ATR has been studying and testing the applications of WMA's at airports. FAA advisory circulars currently lack guidance on WMA's and other similar sustainable, environmentally friendly, recycled, and newer materials. In FY 2018, new cycles of full-scale testing of WMA's and other materials will take place at the National Airport Pavements and Materials Research Center.

With new pavement materials, such as warm mix asphalts, entering the airport markets at an increasing rate, the FAA is in need of a new state-of-the-art material testing laboratory fully equipped lab capable of performing material characterization tests and materials research. Providing realistic material properties and specifications through this material research and testing as design inputs will improve the pavement thickness design procedure and pavement life predictions thus reducing costs and increasing pavement life. In order to support these new efforts in pavement materials testing, ATR will proceed in FY 2018 with the construction of a new advanced airport pavement materials testing laboratory. The cost for the advanced pavement materials laboratory has been estimated at $2 million.

Beginning in FY 2018, ATR will initiate a multi-year research project to investigate the reduction or elimination of PFC's and other chemicals, which may pose either health or environmental hazards. Over the years there has been a growing concern about the potential health and environmental impact that aqueous film-forming foams (AFFF) used by aircraft rescue and firefighting (ARFF) departments can have at airports and surrounding communities. The main concern is that the EPA and other organizations have found that certain PFC's are toxic and have accumulated in land and water around airports. This research will help test new kinds of AFFF for effectiveness without the harmful PFC's. In order to support this multi-year critical research, ATR will, in FY 2018, investigate the construction of a fire testing facility dedicated to this issue of eliminating PFCs in firefighting agents.

The ATR branch also manages a number of research databases. In FY 2018, integration and support of the databases (bird strike, FOD detection, Airport Pavement management systems) into one location will continue. This will ensure compliance with FAA standards, to improve the overall functionality of the databases, and promote public access and sharing of the data.

In FY 2018, the ATR Branch will continue to research ways airports can reduce noise impacts near airports. Research projects include the continuation of creating enhanced conceptual procedure layouts for performance based navigation (PBN) operations and evaluating and improving the accuracy of noise level reduction testing by analyzing and validating fixed decibel adjustment values. Public demand for a quieter 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 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.

The introduction of UAS's in the airspace system constitutes a challenge for airports, but the use of UAS's can also be very beneficial for airports. In FY 2018, work will continue in the detection areas, UAS opportunities will be defined, and concepts of operations will be developed. The UAS research program area (UAS RPA) is new and this program includes a request of 500k to support this effort in FY 2018.

The table below summarizes the research program areas funded by this request

Airport Planning and Design	3,300
Airport Safety Data Mining	500
Airport Rescue and Fire Fighting	2,100
Wildlife Hazard Mitigation	1,400
Visual Guidance	1,950
Runway Surface Technology and Aircraft Braking	1,800
Airport Safety and Surveillance Sensors	600
Noise Programs	2,100
Airport Research Taxiway	100
National Airport Pavement Test Facility	3,500
National Airport Pavement Materials Research Center	1,500
Field Instrumentation & Testing	825
Improved Paving Materials	1,150
Pavement Design and Evaulation	1,150
NDT Technology	900
Software Programs	1,060
Extending Pavement Life	775
Airport Environmental Research	400
UAS Integration at Airports	500
Facilities	3,500
Subtotal--Contracts	**29,110**
FTE's/Other Misc	4,100
TOTAL	**33,210**

What Is The Program and Why Is It Necessary?

Airport 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, snow and ice mitigation and unmanned aircraft system detection and integration at airports, some examples of the research include:

- **Unmanned Aircraft Systems (UAS)** research is focused on evaluating various types of technologies that can detect, track, and identify small unmanned aircraft systems, on or near airports; therefore, protecting the flying public and critical infrastructure. In addition, this research includes evaluating how UAS can be used by airport personnel for: airfield inspections, infrastructure inspections, wildlife deterrents, emergency response, and perimeter security surveillance.

- **Foreign Object Debris (FOD)** detection research efforts will be conducted to evaluate new detection technologies, develop a national FOD database that can be used to track safety issues related to FOD.

- **Taxiway Centerline Deviation** research efforts will assist with updating airport design standards that may allow the ability of larger aircraft to operate on existing smaller design group taxiways, therefor increasing capacity and airport utilization.

- **Trapezoidal Grooving** research is an effort to evaluate the performance of trapezoidal shaped runway grooving in comparison with FAA Standard square runway grooving for preventing aircraft tire hydroplaning during braking on wetted runways. A trapezoidal grooving test bed will be constructed on ACY Runway 4/22, including both trapezoidal shaped and FAA Standard shaped runway grooving (full depth and half depth). Testing will be conducted with the instrumented FAA B727 Aircraft, applying maximum braking while traveling through the test bed, under a heavily wetted runway condition.

- **In-Pavement Light Fixture** research is an effort to conduct testing for evaluating the strength limitations of In-Pavement Light Fixture Assemblies based on resisting externally applied horizontal shear forces (simulating aircraft tire forces) and assembly bolt clamping forces. The research effort objective is to complete an evaluation of current FAA criteria relating to In-pavement Light Fixtures and to determine necessary changes based on an analysis of test results.

- **Wildlife Mitigation and Detection** research is focused on mitigating wildlife hazards on or near airports. This research is categorized into three research areas: 1) airport wildlife management – research, evaluate, and communicate the effectiveness of various habitat management and wildlife control techniques for minimizing wildlife strikes with aircraft at and away from all airports nationwide; 2) wildlife strike data collection/analysis – manage and update the FAA's Wildlife Strike Database and Website, which 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; 3) technology surveillance and deterrence – evaluate emerging and adapted technologies, to detect and deter birds and provide timely alerts to airport personnel regarding hazardous bird activity.

- **The FAA's Research Taxiway** is a state-of-the-art research test bed that is located at the Cape May county Airport, near the FAA Technical Center. This test bed provides researchers with a single site to design, install, test, monitor, and report on the performance of state-of-the-art technologies.

- **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.

- **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.

Past research also led to the development of Engineered Materials Arresting Systems (EMAS) which have also shown to be effective in safely stopping aircraft when they overrun the runway. EMAS installations have already enabled eleven successful overrun arrestments with minimal or no damage to the aircraft, and no injuries to over 282 total occupants. The latest arrestment came at LaGuardia Airport in New York City in October 2016 when an overrunning Boeing 737 was safely stopped with then Vice Presidential Candidate Mike Pence and his staff on board. There are new proposed designs in the EMAS area, and the FAA will continue to evaluate the new concepts and demonstrations proposed by these new entrants.

Airport Pavements

The pavement research leads to updates in pavement design and constructions standards and improvements in pavement maintenance techniques that keep airport runways and taxiways in good or better condition.

The research conducted is producing significant benefits in increased safety and potential cost savings. In support of capacity, the research results from the National Airport Pavement Test Facility (NAPTF) and the National Airport Pavement Materials and Research Center (NAPMRC) are providing technical data needed to validate new material specifications and 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** 3.0 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.

- **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.

- **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 (RAP) mixes and asphalt mixes with recycled asphalt shingles as well as using recycled products in unbound base courses. The results will offer long-lasting and low-cost pavements.

Airport Noise and Airport Environmental Research

Aircraft noise and its perception near airports continue to be a major concern for the public. This research focuses on noise research near airports and includes two of the largest US noise studies in history, aircraft noise annoyance and aircraft sleep disturbance. Results from these studies will help in the development of national aviation noise policy, determinations of community noise impacts, land-use guidelines around airports, and mitigation funding through several follow-on research projects.

Through the development of modern tools and processes, the airport environmental research improves the performance of airports in reducing their environmental impacts while responding to community needs for transportation services. Airport environmental research topics for the few years to come will come from a 10-year Environmental Research Framework Plan (currently under development). These topics may include air quality, geospatial data sharing, new entrants into the NAS, and NEPA requirements for airport planning.

Anticipated 2018 accomplishments include:

- Continue researching technologies to detect, track, and identify UAS threats on or near airports;

- Initiate a research effort on how UAS can be integrated into the airport environment, for use by airport personnel;

- Continue to maintain the airport safety database and conduct quarterly and annual analysis reports to identify trends in occurrences in support of risk-based decision-making.

- Complete evaluation of Trapezoidal Shaped Runway Grooving as a technically suitable alternative to FAA Standard square grooving for preventing aircraft tire hydroplaning during braking on wetted runway conditions;

- Continue the development of tools and guidance for use in airport planning.

- Continue the Runway Incursion Mitigation program to reduce the number of runway incursions at US airports;

- Initiate evaluation to determine the effectiveness of current firefighting agents on aviation biofuels;

- Initiate evaluation of compressed air foam firefighting systems including small and large scale live fire testing;
- Complete the evaluation of alternative clean firefighting agent (NOVEC 1230)
- Complete the performance evaluation of foam proportioner testing for ARFF;
- Continue to provide improved Aircraft Rescue and Fire Fighting (ARFF) training material for firefighting tactics for the unique characteristics of cargo aircraft fires;
- Continue research to investigate state-of-the-art firefighting technologies, including high pressure and ultra-high pressure firefighting systems;
- Continue evaluation of proposed new lighting technologies utilizing the Airport Technology Research Taxiway;
- Complete evaluation of new electrical infrastructure for LED lighting circuits;
- 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:
- Complete testing of In-Pavement Light Fixtures and determine necessary changes to FAA Advisory Circulars and Engineering Brief 83.
- Initiate an evaluation study of AeroMACS system at Boston Logan International Airport;
- Evaluate new sensor technologies to determine airport applicability for improving safety;
- Complete testing of Construction Cycle 8, concrete pavement test sections, at NAPTF;
- Start the construction of Construction Cycle 9, asphalt pavement test section, at NAPTF;
- Complete sixth round of full-scale tests of crack mitigating layer on reflective cracking test rig at the NAPTF
- Complete the second round of testing for warm mix asphalts using the National Airport Pavement and Materials Research Center (NAPMRC);
- Continue full scale testing of "green" paving materials with Accelerated Pavement Test (APT) machine at NAPMRC
- Complete construction of concrete slabs with asphalt concrete overlay at NAPMRC for full-scale testing to augment results obtained from reflective cracking rig
- 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;
- Development and release of FAA PAVEAIR 3.0, with improved Prediction Modeling, Condition Analysis, and Maintenance and Repair capabilities;

- Development and release of an updated version of ProFAA;
- Construct an advanced Pavement Materials Laboratory
- Development of a new airport pavement roughness index based on data collected from pilot crew evaluations and accelerometer values at the Mike Monroney Aeronautical Center.
- 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 updated dose-response curves for aircraft noise annoyance.
- Continue airport noise research to support noise mitigation and land-use planning
- Continue airport environmental research for airport infrastructure resiliency, and initiate projects identified in a 10-year plan (under way in FY-17).

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 2018. 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 quality 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 2017)	**1,925**	**-.5**
Overview: For FY 2018, the Associate Administrator for Airports requests $33.2 million, 23 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 2017 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2016 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 2.1 percent.	19	
FY 2018 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 1.9 percent.	52	
FY 2018 Non-Pay Inflation: This increase is for the FY 2018 percent GDP price index (year over year) of 1 percent. This is based on the most recent economic assumptions.	273	
Other Changes		
Workforce reduction through attrition: Assuming reduced non-exempt hiring in FY 2018, resulting in savings through attrition. Positions will be reduced by 1, FTE will be reduced by .5 in FY 2018.	-75	
Increase to contract support: Requesting funding for advanced pavement materials research.	2,000	

GRANTS-IN-AID FOR AIRPORTS

Airport Cooperative Research

($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2017 Annualized CR	**14,972**	**2**	**2.0**
Adjustments to Base			
1. Annualization of FY 2017 Pay Raises	1		
2. Pay Inflation	2		
3. Non-pay Inflation	148		
Total Adjustments to Base	**151**	**0**	**0.0**
Discretionary Increases/ Decreases			
1. Decrease in contracts	-123		
Total Discretionary Adjustments	**-123**	**0**	**0.0**
FY 2017 Request	**15,000**	**2**	**2.0**

Detailed Justification for Airport Cooperative Research Program

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

FY 2018 Airport Cooperative Research Program ($000)

Program Activity	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request	Difference from FY 2017
Salaries and Expenses	165	167	170	3
Program Costs	14,835	14,805	14,830	25
Total	**$ 15,000**	**$ 14,972**	**$ 15,000**	**$ 28**
FTE	**1**	**2**	**2**	**0**

For FY 2018, the FAA requests $15 million. Pay inflation will be absorbed within the requested level.

Funding in FY 2018 will support the following key outputs and outcomes:

- Airport Cooperative Research Program (ACRP) will select approximately 30 research topics to fund in FY 2018. 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 quality, and airport planning.

What Is The Program and Why is it Necessary?

This program supports safety (Reduction in transportation-related injuries and fatalities), airports impact on economic development (Maximum economic returns on transportation policies and investments), and a reduction on environmental impacts (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 2016 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 environmental quality, and airport planning. Recent ACRP reports published included such studies as:

- Guidebook for Preparing Public Notification Programs at Airports
- Improving Stakeholder Engagement in Aircraft Accident Response Planning
- Improved Models for Risk Assessment of Runway Safety Areas
- Interpreting the Results of Airport Water Monitoring: A Guidebook
- Guidebook for Developing Ramp Control Facilities
- Guidebook for Selecting Methods to Monitor Airport and Aircraft Deicing Materials
- Clean Water Act Requirements for Airports
- Generating Revenue from Commercial Development of a NO_X Chemistry Module for EDMS/AEDT to Predict NO_2 Concentrations on or Adjacent to Airports
- Moving Customers, Cost-Savings and Energy Reduction in the Right Direction
- Improving Customer Experience at Airport Restroom Facilities

Anticipated FY 2018 accomplishments include:

- ACRP Board of Governors will meet to select projects to fund in 2018;
- TRB will appoint project technical panels for new projects selected in FY 2018; and
- ACRP will award contracts for the topics selected for funding in FY 2018.

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 2017)	**0**	
Overview: For FY 2018, we maintain the Airport Cooperative Research Program at the FY 2016 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 2017 Pay Raise: This increase is required to provide for the remaining quarter of the FY 2017 government-wide pay raise of 2.1 percent. The factor used is (0.25) of 2.1 percent.	1	
FY 2018 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 1.9 percent.	2	
FY 2018 Non-Pay Inflation: This increase is for the FY 2018 percent GDP price index (year over year) of 1.0 percent. This is based on the most recent economic assumptions.	148	
Discretionary Adjustments		
ACRP Discretionary Decrease in contracts: There is a discretionary reduction in contracts to offset inflationary costs. Because of the reduction under the CR in FY 2017, this is the amount that is needed to offset the inflationary increases.	-123	

AIRPORT IMPROVEMENT PROGRAM
Grants-in-Aid to Airports Planned Distribution
$000

	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Budget Request
Formula Grants			
Primary Airports	832,383	860,667	701,385
Cargo Service Airports	111,717	111,504	111,647
Alaska	21,345	21,345	21,345
States (General Aviation)	638,380	637,166	637,985
Carryover (from Formula Grants)	680,652	727,846	707,450
Subtotal, Formula Grants	2,284,477	2,358,529	2,179,813
Discretionary Grants			
Discretionary Set-Aside: Noise Compatibility	141,077	107,474	300,000
Discretionary Set-Aside: Reliever	2,660	2,027	5,803
Discretionary Set-Aside: Military Airport Program	16,123	12,283	35,169
C/S/S/N (Capacity/Safety/Security/Noise)	182,412	138,964	403,689
Discretionary -- AATF	60,804	46,321	134,563
Subtotal, Discretionary Grants	403,076	307,069	879,224
Small Airport Fund	504,347	520,234	130,890
Total Grants	**3,191,900**	**3,185,832**	**3,189,927**

Passenger Facility Charge (PFC) Approved Locations
As of March 17, 2017
(Whole Dollars)
PFC APPROVED LOCATIONS

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
Anchorage	AK	Ted Stevens Anchorage Int'l	ANC	M	$3.00	10/1/2000	4/1/2030	116,243,173
Fairbanks	AK	Fairbanks International	FAI	S	$3.00	10/1/2000	4/1/2004	
Fairbanks	AK	Fairbanks International	FAI	S	$4.50	4/1/2004	10/1/2026	38,413,252
Juneau	AK	Juneau International	JNU	S	$3.00	10/1/1998	2/1/2001	
Juneau	AK	Juneau International	JNU	S	$4.50	8/1/2001	3/1/2027	17,070,444
Ketchikan	AK	Ketchikan International	KTN	N	$3.00	2/1/1999	8/1/2001	
Ketchikan	AK	Ketchikan International	KTN	N	$4.50	8/1/2001	4/1/2018	6,644,400
Sitka	AK	Sitka Rocky Gutierrez	SIT	N	$4.50	7/1/2007	9/1/2013	1,375,000
Birmingham	AL	Birmingham - Shuttlesworth International	BHM	S	$3.00	8/1/1997	11/1/2003	
Birmingham	AL	Birmingham - Shuttlesworth International	BHM	S	$3.00	12/1/2003	10/1/2008	
Birmingham	AL	Birmingham - Shuttlesworth International	BHM	S	$4.50	10/1/2008	2/1/2031	212,563,127
Dothan	AL	Dothan Regional	DHN	N	$3.00	2/1/1998	8/1/2001	
Dothan	AL	Dothan Regional	DHN	N	$4.50	8/1/2001	12/1/2020	5,515,948
Huntsville	AL	Huntsville International - Carl T. Jones Field	HSV	S	$3.00	6/1/1992	9/1/2004	
Huntsville	AL	Huntsville International - Carl T. Jones Field	HSV	S	$4.50	9/1/2004	8/1/2024	59,377,639
Mobile	AL	Mobile Regional	MOB	N	$3.00	12/1/1997	7/1/2004	
Mobile	AL	Mobile Regional	MOB	N	$3.00	3/1/2005	5/1/2013	
Mobile	AL	Mobile Regional	MOB	N	$3.00	6/1/2013	2/1/2018	16,579,121
Montgomery	AL	Montgomery Regional (Dannelly Field)	MGM	N	$4.50	5/1/2005	1/1/2027	28,599,933
Muscle Shoals	AL	Northwest Alabama Regional	MSL	GA	$3.00	6/1/1992	10/1/2003	
Muscle Shoals	AL	Northwest Alabama Regional	MSL	GA	$3.00	12/1/2004	4/1/2009	
Muscle Shoals	AL	Northwest Alabama Regional	MSL	GA	$4.50	4/1/2009	7/1/2027	583,538
Bentonville	AR	Northwest Arkansas Regional	XNA	S	$3.00	12/1/1998	4/1/2001	
Bentonville	AR	Northwest Arkansas Regional	XNA	S	$4.50	4/1/2001	6/1/2040	125,025,221
Fayetteville	AR	Drake Field	FYV	GA	$3.00	1/1/1996	1/1/2001	2,221,887
Fort Smith	AR	Fort Smith Regional	FSM	N	$3.00	8/1/1994	2/1/2008	
Fort Smith	AR	Fort Smith Regional	FSM	N	$4.50	2/1/2008	12/1/2019	7,734,286
Little Rock	AR	Bill and Hillary Clinton National/ Adams Field	LIT	S	$3.00	5/1/1995	9/1/2001	
Little Rock	AR	Bill and Hillary Clinton National/ Adams Field	LIT	S	$4.50	9/1/2001	4/1/2020	114,146,711
Texarkana	AR	Texarkana Regional-Webb Field	TXK	N	$3.00	2/1/1995	9/1/2001	
Texarkana	AR	Texarkana Regional-Webb Field	TXK	N	$4.50	9/1/2001	3/1/2005	
Texarkana	AR	Texarkana Regional-Webb Field	TXK	N	$4.50	7/1/2008	5/1/2014	
Texarkana	AR	Texarkana Regional-Webb Field	TXK	N	$4.50	4/1/2015	11/1/2017	2,173,538
Pago Pago	AS	Pago Pago International	PPG	N	$3.00	7/1/1995	6/1/2000	
Pago Pago	AS	Pago Pago International	PPG	N	$4.50	9/1/2001	9/1/2005	
Pago Pago	AS	Pago Pago International	PPG	N	$4.50	6/1/2006	12/1/2020	7,563,954
Bullhead City	AZ	Laughlin/Bullhead International	IFP	N	$2.00	5/1/2008	10/1/2012	

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
Bullhead City	AZ	Laughlin/Bullhead International	IFP	N	$2.00	1/1/2014	1/1/2025	2,951,578
Flagstaff	AZ	Flagstaff Pulliam	FLG	N	$3.00	12/1/1992	9/1/2012	
Flagstaff	AZ	Flagstaff Pulliam	FLG	N	$4.50	9/1/2012	11/1/2017	3,572,998
Mesa	AZ	Phoenix-Mesa Gateway	IWA	S	$4.50	11/1/2008	7/1/2026	64,004,450
Peach Springs	AZ	Grand Canyon West	1G4	N	$3.00	9/1/2004	9/1/2006	
Peach Springs	AZ	Grand Canyon West	1G4	N	$3.00	6/1/2008	1/1/2024	9,922,946
Phoenix	AZ	Phoenix Sky Harbor International	PHX	L	$3.00	4/1/1996	4/1/2002	
Phoenix	AZ	Phoenix Sky Harbor International	PHX	L	$4.50	7/1/2002	12/1/2035	2,929,773,835
Tucson	AZ	Tucson International	TUS	S	$3.00	2/1/1998	10/1/2006	
Tucson	AZ	Tucson International	TUS	S	$4.50	10/1/2006	9/1/2017	144,656,372
Yuma	AZ	Yuma MCAS/Yuma International	NYL	N	$3.00	12/1/1993	10/1/2005	
Yuma	AZ	Yuma MCAS/Yuma International	NYL	N	$4.50	10/1/2005	4/1/2007	
Yuma	AZ	Yuma MCAS/Yuma International	NYL	N	$4.50	11/1/2007	1/1/2023	5,886,828
Arcata/Eureka	CA	Arcata	ACV	N	$3.00	2/1/1993	3/1/1994	
Arcata/Eureka	CA	Arcata	ACV	N	$3.00	11/1/1994	11/1/1997	
Arcata/Eureka	CA	Arcata	ACV	N	$3.00	4/1/1998	6/1/2003	
Arcata/Eureka	CA	Arcata	ACV	N	$4.50	6/1/2003	3/1/2005	
Arcata/Eureka	CA	Arcata	ACV	N	$4.50	7/1/2005	10/1/2005	
Arcata/Eureka	CA	Arcata	ACV	N	$4.50	12/1/2005	8/1/2011	
Arcata/Eureka	CA	Arcata	ACV	N	$4.50	10/1/2011	5/1/2022	7,073,764
Bakersfield	CA	Meadows Field	BFL	N	$3.00	6/1/1995	5/1/2002	
Bakersfield	CA	Meadows Field	BFL	N	$4.50	5/1/2002	1/1/2021	12,089,390
Burbank	CA	Bob Hope	BUR	S	$3.00	9/1/1994	4/1/2003	
Burbank	CA	Bob Hope	BUR	S	$4.50	4/1/2003	8/1/2017	
Burbank	CA	Bob Hope	BUR	S	$3.00	8/1/2017	3/1/2020	
Burbank	CA	Bob Hope	BUR	S	$4.50	3/1/2020	9/1/2021	239,220,396
Carlsbad	CA	McCellan-Palomar	CRQ	N	$4.50	1/1/2009	2/1/2043	4,947,065
Chico	CA	Chico Municipal	CIC	GA	$3.00	12/1/1993	9/1/1998	
Chico	CA	Chico Municipal	CIC	GA	$3.00	6/1/1999	2/1/2001	
Chico	CA	Chico Municipal	CIC	GA	$3.00	11/1/2001	12/1/2009	
Chico	CA	Chico Municipal	CIC	GA	$4.50	12/1/2010	12/1/2014	707,290
Crescent City	CA	Jack McNamara Field	CEC	CS	$3.00	9/1/1998	6/1/2000	
Crescent City	CA	Jack McNamara Field	CEC	CS	$3.00	1/1/2001	6/1/2003	
Crescent City	CA	Jack McNamara Field	CEC	CS	$4.50	6/1/2003	10/1/2014	
Crescent City	CA	Jack McNamara Field	CEC	CS	$4.50	12/1/2014	2/1/2021	899,295
Fresno	CA	Fresno Yosemite International	FAT	S	$3.00	12/1/1996	12/1/2004	
Fresno	CA	Fresno Yosemite International	FAT	S	$4.50	12/1/2004	4/1/2021	55,125,253
Imperial	CA	Imperial County	IPL	GA	$4.50	4/1/2003	4/1/2030	892,781
Inyokern	CA	Inyokern	IYK	GA	$3.00	3/1/1993	3/1/2003	
Inyokern	CA	Inyokern	IYK	GA	$3.00	4/1/2004	10/1/2004	
Inyokern	CA	Inyokern	IYK	GA	$4.50	9/1/2006	2/1/2009	
Inyokern	CA	Inyokern	IYK	GA	$4.50	3/1/2009	3/1/2019	994,460
Long Beach	CA	Long Beach/Daugherty Field	LGB	S	$3.00	8/1/2003	5/1/2008	
Long Beach	CA	Long Beach/Daugherty Field	LGB	S	$4.50	5/1/2008	4/1/2034	178,418,777
Los Angeles	CA	Los Angeles International	LAX	L	$3.00	7/1/1993	1/1/1996	
Los Angeles	CA	Los Angeles International	LAX	L	$3.00	2/1/1998	7/1/2003	
Los Angeles	CA	Los Angeles International	LAX	L	$4.50	7/1/2003	3/1/2019	
Los Angeles	CA	Los Angeles International	LAX	L	$3.00	3/1/2019	10/1/2019	
Los Angeles	CA	Los Angeles International	LAX	L	$4.50	10/1/2019	10/1/2023	3,095,759,661
Mammoth Lakes	CA	Mammoth Yosemite	MMH	N	$3.00	9/1/1995	9/1/2005	
Mammoth Lakes	CA	Mammoth Yosemite	MMH	N	$4.50	11/1/2009	10/1/2018	892,455
Modesto	CA	Modesto City County-Harry Sham Field	MOD	GA	$3.00	8/1/1994	3/1/2005	
Modesto	CA	Modesto City County-Harry	MOD	GA	$4.50	8/1/2008	12/1/2015	1,034,802

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
		Sham Field						
Monterey	CA	Monterey Regional	MRY	N	$3.00	1/1/1994	7/1/2003	
Monterey	CA	Monterey Regional	MRY	N	$4.50	7/1/2003	4/1/2006	
Monterey	CA	Monterey Regional	MRY	N	$4.50	5/1/2006	6/1/2018	16,950,180
Oakland	CA	Metropolitan Oakland International	OAK	M	$3.00	9/1/1992	6/1/1999	
Oakland	CA	Metropolitan Oakland International	OAK	M	$3.00	9/1/1999	5/1/2003	
Oakland	CA	Metropolitan Oakland International	OAK	M	$4.50	5/1/2003	1/1/2027	
Oakland	CA	Metropolitan Oakland International	OAK	M	$3.00	1/1/2027	12/1/2035	907,425,991
Ontario	CA	Ontario International	ONT	M	$3.00	7/1/1993	12/1/1996	
Ontario	CA	Ontario International	ONT	M	$3.00	7/1/1998	11/1/2007	
Ontario	CA	Ontario International	ONT	M	$4.50	11/1/2007	1/1/2013	
Ontario	CA	Ontario International	ONT	M	$2.00	1/1/2013	4/1/2016	
Ontario	CA	Ontario International	ONT	M	$4.50	4/1/2016	11/1/2024	291,622,635
Oxnard	CA	Oxnard	OXR	GA	$4.50	1/1/2002	3/1/2011	631,115
Palm Springs	CA	Palm Springs International	PSP	S	$3.00	9/1/1992	1/1/2002	
Palm Springs	CA	Palm Springs International	PSP	S	$4.50	1/1/2002	7/1/2029	88,415,656
Redding	CA	Redding Municipal	RDD	N	$3.00	4/1/1997	4/1/2002	
Redding	CA	Redding Municipal	RDD	N	$4.50	4/1/2002	4/1/2007	
Redding	CA	Redding Municipal	RDD	N	$4.50	8/1/2007	2/1/2025	4,719,848
Sacramento	CA	Sacramento International	SMF	M	$3.00	4/1/1993	1/1/2002	
Sacramento	CA	Sacramento International	SMF	M	$4.50	1/1/2002	2/1/2003	
Sacramento	CA	Sacramento International	SMF	M	$3.00	2/1/2003	9/1/2003	
Sacramento	CA	Sacramento International	SMF	M	$4.50	9/1/2003	11/1/2034	953,252,732
San Diego	CA	San Diego International	SAN	L	$3.00	10/1/1995	8/1/2003	
San Diego	CA	San Diego International	SAN	L	$4.50	8/1/2003	3/1/2039	1,549,293,933
San Francisco	CA	San Francisco International	SFO	L	$4.50	10/1/2001	3/1/2026	1,715,963,018
San Jose	CA	Norman Y. Mineta San Jose International	SJC	M	$3.00	9/1/1992	4/1/2001	
San Jose	CA	Norman Y. Mineta San Jose International	SJC	M	$4.50	4/1/2001	5/1/2029	1,067,932,847
San Luis Obispo	CA	San Luis County Regional	SBP	N	$3.00	2/1/1993	2/1/1995	
San Luis Obispo	CA	San Luis County Regional	SBP	N	$3.00	6/1/1995	9/1/2002	
San Luis Obispo	CA	San Luis County Regional	SBP	N	$4.50	9/1/2002	6/1/2011	
San Luis Obispo	CA	San Luis County Regional	SBP	N	$3.00	6/1/2011	6/1/2014	
San Luis Obispo	CA	San Luis County Regional	SBP	N	$4.50	6/1/2014	2/1/2019	12,864,091
Santa Ana	CA	John Wayne Airport -Orange County	SNA	M	$4.50	7/1/2006	1/1/2022	311,602,130
Santa Barbara	CA	Santa Barbara Municipal	SBA	N	$3.00	1/1/1998	11/1/2003	
Santa Barbara	CA	Santa Barbara Municipal	SBA	N	$4.50	11/1/2003	7/1/2039	36,388,365
Santa Maria	CA	Santa Maria Public/Capt G Allan Hancock Field	SMX	N	$4.50	10/1/2007	10/1/2028	5,380,346
Santa Rosa	CA	Charles M. Schultz - Sonoma County	STS	N	$3.00	5/1/1993	4/1/2001	
Santa Rosa	CA	Charles M. Schultz - Sonoma County	STS	N	$4.50	4/1/2001	4/1/2005	
Santa Rosa	CA	Charles M. Schultz - Sonoma County	STS	N	$4.50	5/1/2008	4/1/2013	
Santa Rosa	CA	Charles M. Schultz - Sonoma County	STS	N	$4.50	7/1/2013	4/1/2026	10,494,854
South Lake Tahoe	CA	Lake Tahoe	TVL	GA	$3.00	8/1/1992	3/1/2007	169,838
Stockton	CA	Stockton Metropolitan	SCK	N	$4.50	2/1/2007	8/1/2009	
Stockton	CA	Stockton Metropolitan	SCK	N	$4.50	9/1/2009	9/1/2012	
Stockton	CA	Stockton Metropolitan	SCK	N	$4.50	9/1/2013	8/1/2020	3,534,761

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
Alamosa	CO	San Luis Valley Regional/Bergman Field	ALS	CS	$3.00	3/1/1997	7/1/2016	
Alamosa	CO	San Luis Valley Regional/Bergman Field	ALS	CS	$4.50	7/1/2016	7/1/2034	714,140
Aspen	CO	Aspen-Pitkin County/Sardy Field	ASE	N	$3.00	7/1/1995	5/1/2003	
Aspen	CO	Aspen-Pitkin County/Sardy Field	ASE	N	$4.50	5/1/2003	8/1/2004	
Aspen	CO	Aspen-Pitkin County/Sardy Field	ASE	N	$4.50	1/1/2005	6/1/2019	15,323,529
Colorado Springs	CO	City of Colorado Springs Municipal	COS	S	$3.00	3/1/1993	8/1/2016	
Colorado Springs	CO	City of Colorado Springs Municipal	COS	S	$4.50	8/1/2016	7/1/2020	84,317,148
Cortez	CO	Cortez Municipal	CEZ	CS	$3.00	11/1/1999	3/1/2008	
Cortez	CO	Cortez Municipal	CEZ	CS	$4.50	3/1/2008	12/1/2025	539,150
Denver	CO	Denver International	DEN	L	$3.00	7/1/1992	4/1/2001	
Denver	CO	Denver International	DEN	L	$4.50	4/1/2001	2/1/2029	3,217,485,200
Durango	CO	Durango-La Plata County	DRO	N	$3.00	2/1/1995	8/1/1997	
Durango	CO	Durango-La Plata County	DRO	N	$3.00	9/1/1997	3/1/2003	
Durango	CO	Durango-La Plata County	DRO	N	$4.50	6/1/2005	4/1/2011	
Durango	CO	Durango-La Plata County	DRO	N	$4.50	11/1/2011	8/1/2012	
Durango	CO	Durango-La Plata County	DRO	N	$4.50	9/1/2013	7/1/2025	16,065,189
Eagle	CO	Eagle County Regional	EGE	N	$3.00	9/1/1993	4/1/2001	
Eagle	CO	Eagle County Regional	EGE	N	$4.50	4/1/2001	6/1/2009	
Eagle	CO	Eagle County Regional	EGE	N	$3.00	6/1/2009	7/1/2009	
Eagle	CO	Eagle County Regional	EGE	N	$4.50	7/1/2009	7/1/2024	22,869,216
Fort Collins-Loveland	CO	Fort Collins-Loveland Municipal	FNL	CS	$3.00	10/1/1993	5/1/1999	
Fort Collins-Loveland	CO	Fort Collins-Loveland Municipal	FNL	CS	$4.50	8/1/2004	12/1/2011	
Fort Collins-Loveland	CO	Fort Collins-Loveland Municipal	FNL	CS	$4.50	2/1/2012	3/1/2015	2,223,679
Grand Junction	CO	Grand Junction Regional	GJT	N	$3.00	4/1/1993	9/1/2006	
Grand Junction	CO	Grand Junction Regional	GJT	N	$4.50	9/1/2006	1/1/2024	20,737,334
Gunnison	CO	Gunnison-Crested Butte Regional	GUC	N	$3.00	11/1/1993	4/1/2001	
Gunnison	CO	Gunnison-Crested Butte Regional	GUC	N	$4.50	4/1/2001	8/1/2023	4,214,518
Hayden	CO	Yampa Valley	HDN	N	$3.00	11/1/1993	7/1/2001	
Hayden	CO	Yampa Valley	HDN	N	$4.50	7/1/2001	7/1/2018	9,369,120
Montrose	CO	Montrose Regional	MTJ	N	$3.00	11/1/1993	8/1/2003	
Montrose	CO	Montrose Regional	MTJ	N	$4.50	8/1/2003	6/1/2006	
Montrose	CO	Montrose Regional	MTJ	N	$4.50	8/1/2006	8/1/2010	
Montrose	CO	Montrose Regional	MTJ	N	$4.50	11/1/2010	7/1/2020	6,768,697
Pueblo	CO	Pueblo Memorial	PUB	CS	$3.00	11/1/1993	12/1/2014	
Pueblo	CO	Pueblo Memorial	PUB	CS	$4.50	3/1/2015	4/1/2036	1,229,111
Steamboat Springs	CO	Steamboat Springs/Bob Adams	SBS		$3.00	4/1/1993	6/1/1997	159,576
Telluride	CO	Telluride Regional	TEX	CS	$3.00	2/1/1993	4/1/2002	
Telluride	CO	Telluride Regional	TEX	CS	$4.50	4/1/2002	1/1/2019	7,047,037
New Haven	CT	Tweed-New Haven	HVN	N	$3.00	12/1/1993	4/1/1998	
New Haven	CT	Tweed-New Haven	HVN	N	$4.50	10/1/2001	7/1/2005	
New Haven	CT	Tweed-New Haven	HVN	N	$4.50	5/1/2006	7/1/2020	4,177,603
Windsor Locks	CT	Bradley International	BDL	M	$3.00	10/1/1993	12/1/1995	
Windsor Locks	CT	Bradley International	BDL	M	$3.00	7/1/1996	1/1/1997	
Windsor Locks	CT	Bradley International	BDL	M	$3.00	9/1/1997	8/1/2000	
Windsor Locks	CT	Bradley International	BDL	M	$4.50	5/1/2001	3/1/2020	
Windsor Locks	CT	Bradley International	BDL	M	$3.00	3/1/2020	7/1/2020	
Windsor Locks	CT	Bradley International	BDL	M	$4.50	7/1/2020	12/1/2021	321,060,686

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Wilmington	DE	New Castle County	ILG	N	$4.50	7/1/2014	5/1/2025	1,810,089
Daytona Beach	FL	Daytona Beach International	DAB	N	$3.00	7/1/1993	8/1/2001	
Daytona Beach	FL	Daytona Beach International	DAB	N	$3.00	2/1/2002	11/1/2005	
Daytona Beach	FL	Daytona Beach International	DAB	N	$4.50	11/1/2005	3/1/2020	29,469,817
Fort Lauderdale	FL	Fort Lauderdale/Hollywood International	FLL	L	$3.00	1/1/1995	10/1/2005	
Fort Lauderdale	FL	Fort Lauderdale/Hollywood International	FLL	L	$4.50	10/1/2005	8/1/2031	1,882,636,787
Fort Myers	FL	Southwest Florida International	RSW	M	$3.00	11/1/1992	11/1/2003	
Fort Myers	FL	Southwest Florida International	RSW	M	$4.50	11/1/2003	12/1/2019	322,047,603
Gainesville	FL	Gainesville Regional	GNV	N	$3.00	7/1/2000	2/1/2002	
Gainesville	FL	Gainesville Regional	GNV	N	$4.50	1/1/2003	2/1/2013	
Gainesville	FL	Gainesville Regional	GNV	N	$4.50	1/1/2014	9/1/2015	
Gainesville	FL	Gainesville Regional	GNV	N	$4.50	3/1/2016	10/1/2023	13,769,631
Jacksonville	FL	Jacksonville International	JAX	M	$3.00	4/1/1994	5/1/2003	
Jacksonville	FL	Jacksonville International	JAX	M	$4.50	5/1/2003	3/1/2026	363,462,178
Key West	FL	Key West International	EYW	N	$3.00	3/1/1993	8/1/1996	
Key West	FL	Key West International	EYW	N	$3.00	12/1/1997	6/1/2003	
Key West	FL	Key West International	EYW	N	$4.50	6/1/2003	7/1/2005	
Key West	FL	Key West International	EYW	N	$4.50	10/1/2005	11/1/2018	23,861,414
Marathon	FL	Marathon	MTH	GA	$3.00	3/1/1993	6/1/1998	390,001
Melbourne	FL	Melbourne International	MLB	N	$3.00	5/1/1997	12/1/2009	
Melbourne	FL	Melbourne International	MLB	N	$4.50	12/1/2009	3/1/2022	13,898,919
Miami	FL	Miami International	MIA	L	$3.00	11/1/1994	1/1/2002	
Miami	FL	Miami International	MIA	L	$4.50	1/1/2002	10/1/2037	2,597,130,503
Naples	FL	Naples Municipal	APF	GA	$3.00	2/1/1995	2/1/2001	
Naples	FL	Naples Municipal	APF	GA	$3.00	2/1/2002	5/1/2004	991,336
Orlando	FL	Orlando International	MCO	L	$3.00	2/1/1993	4/1/2007	
Orlando	FL	Orlando International	MCO	L	$4.50	4/1/2007	10/1/2019	
Orlando	FL	Orlando International	MCO	L	$3.00	10/1/2019	3/1/2023	
Orlando	FL	Orlando International	MCO	L	$4.50	3/1/2023	8/1/2027	
Orlando	FL	Orlando International	MCO	L	$3.00	8/1/2027	4/1/2041	3,931,155,398
Orlando	FL	Orlando Sanford International	SFB	S	$1.00	3/1/2001	12/1/2003	
Orlando	FL	Orlando Sanford International	SFB	S	$2.00	12/1/2003	9/1/2011	
Orlando	FL	Orlando Sanford International	SFB	S	$4.00	9/1/2011	11/1/2022	44,341,609
Panama City	FL	Northwest Florida Beaches International	ECP	S	$3.00	2/1/1994	5/1/2004	
Panama City	FL	Northwest Florida Beaches International	ECP	S	$4.50	5/1/2004	4/1/2039	48,700,720
Pensacola	FL	Penscola Gulf Coast Regional	PNS	S	$3.00	2/1/1993	12/1/2002	
Pensacola	FL	Penscola Gulf Coast Regional	PNS	S	$4.50	12/1/2002	10/1/2031	144,489,392
Sarasota	FL	Sarasota/Bradenton International	SRQ	S	$3.00	9/1/1992	5/1/2002	
Sarasota	FL	Sarasota/Bradenton International	SRQ	S	$4.50	5/1/2002	2/1/2022	75,384,399
St Petersburg	FL	St Petersburg-Clearwater International	PIE	S	$3.00	5/1/2005	11/1/2006	
St Petersburg	FL	St Petersburg-Clearwater International	PIE	S	$4.50	11/1/2006	2/1/2021	32,622,319
Tallahassee	FL	Tallahassee Regional	TLH	N	$3.00	2/1/1993	10/1/2002	
Tallahassee	FL	Tallahassee Regional	TLH	N	$4.50	10/1/2002	7/1/2028	56,306,718
Tampa	FL	Tampa International	TPA	L	$3.00	10/1/1993	6/1/2002	
Tampa	FL	Tampa International	TPA	L	$4.50	6/1/2002	10/1/2020	
Tampa	FL	Tampa International	TPA	L	$3.00	10/1/2020	10/1/2035	1,298,745,444
Valparaiso	FL	Eglin AFB	VPS	N	$3.00	1/1/2001	6/1/2002	
Valparaiso	FL	Eglin AFB	VPS	N	$4.50	6/1/2002	4/1/2025	47,010,379
West Palm	FL	Palm Beach International	PBI	M	$3.00	4/1/1994	7/1/2008	

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Beach								
West Palm Beach	FL	Palm Beach International	PBI	M	$4.50	7/1/2008	6/1/2021	256,256,866
Albany	GA	Southwest Georgia Regional	ABY	N	$3.00	9/1/1995	6/1/1998	
Albany	GA	Southwest Georgia Regional	ABY	N	$3.00	6/1/1999	2/1/2003	
Albany	GA	Southwest Georgia Regional	ABY	N	$4.50	2/1/2003	2/1/2008	
Albany	GA	Southwest Georgia Regional	ABY	N	$4.50	7/1/2008	8/1/2016	2,445,999
Athens	GA	Athens/Ben Epps	AHN	GA	$3.00	8/1/1997	1/1/2002	165,615
Atlanta	GA	Hartsfield-Jackson Atlanta Internatiional	ATL	L	$3.00	5/1/1997	4/1/2001	
Atlanta	GA	Hartsfield-Jackson Atlanta Internatiional	ATL	L	$4.50	4/1/2001	9/1/2024	4,532,676,054
Augusta	GA	Augusta Regional @ Bush Field	AGS	N	$3.00	9/1/1999	7/1/2001	
Augusta	GA	Augusta Regional @ Bush Field	AGS	N	$4.50	7/1/2001	11/1/2027	31,734,394
Brunswick	GA	Brunswick Golden Isles	BQK	N	$3.00	5/1/2001	11/1/2003	
Brunswick	GA	Brunswick Golden Isles	BQK	N	$4.50	11/1/2003	4/1/2017	1,673,438
Columbus	GA	Columbus	CSG	N	$3.00	12/1/1993	9/1/1995	
Columbus	GA	Columbus	CSG	N	$3.00	8/1/2000	6/1/2003	
Columbus	GA	Columbus	CSG	N	$4.50	6/1/2003	11/1/2006	
Columbus	GA	Columbus	CSG	N	$4.50	2/1/2010	4/1/2012	
Columbus	GA	Columbus	CSG	N	$4.50	8/1/2012	3/1/2015	
Columbus	GA	Columbus	CSG	N	$4.50	3/1/2016	2/1/2020	3,654,321
Macon	GA	Middle Georgia Regional	MCN	GA	$4.50	3/1/2002	5/1/2011	1,052,392
Savannah	GA	Savannah/ Hilton Head International	SAV	S	$3.00	7/1/1992	4/1/2001	
Savannah	GA	Savannah/ Hilton Head International	SAV	S	$4.50	4/1/2001	2/1/2010	
Savannah	GA	Savannah/ Hilton Head International	SAV	S	$3.00	2/1/2010	5/1/2010	
Savannah	GA	Savannah/ Hilton Head International	SAV	S	$4.50	5/1/2010	2/1/2020	80,898,227
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	3/1/1993	10/1/1999	
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	4/1/2000	6/1/2001	
Valdosta	GA	Valdosta Regional	VLD	N	$4.50	6/1/2001	9/1/2004	
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	2/1/2006	5/1/2006	
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	11/1/2006	1/1/2007	
Valdosta	GA	Valdosta Regional	VLD	N	$3.00	8/1/2009	7/1/2010	
Valdosta	GA	Valdosta Regional	VLD	N	$4.50	6/1/2011	1/1/2014	
Valdosta	GA	Valdosta Regional	VLD	N	$4.50	4/1/2014	4/1/2016	
Valdosta	GA	Valdosta Regional	VLD	N	$4.50	7/1/2016	11/1/2016	2,076,704
Agana	GU	Guam International	GUM	S	$3.00	2/1/1993	11/1/2002	
Agana	GU	Guam International	GUM	S	$4.50	11/1/2002	3/1/2025	258,370,758
Hilo	HI	Hilo International	ITO	S	$3.00	2/1/2007	11/1/2008	
Hilo	HI	Hilo International	ITO	S	$4.50	11/1/2008	1/1/2010	
Hilo	HI	Hilo International	ITO	S	$4.50	2/1/2014	7/1/2026	18,114,523
Honolulu	HI	Honolulu International	HNL	L	$3.00	10/1/2004	11/1/2008	
Honolulu	HI	Honolulu International	HNL	L	$4.50	11/1/2008	7/1/2026	492,183,209
Kahului	HI	Kahului	OGG	M	$3.00	10/1/2004	11/1/2008	
Kahului	HI	Kahului	OGG	M	$4.50	11/1/2008	7/1/2026	128,996,871
Kailua/Kona	HI	Kona International @ Keohole	KOA	S	$3.00	10/1/2004	11/1/2008	
Kailua/Kona	HI	Kona International @ Keohole	KOA	S	$4.50	11/1/2008	7/1/2026	40,540,815
Lihue	HI	Lihue	LIH	S	$3.00	10/1/2004	11/1/2008	
Lihue	HI	Lihue	LIH	S	$4.50	11/1/2008	7/1/2026	29,577,369
Burlington	IA	Southeast Iowa Regional	BRL	CS	$3.00	7/1/1997	9/1/2001	
Burlington	IA	Southeast Iowa Regional	BRL	CS	$4.50	9/1/2001	11/1/2028	941,789
Cedar Rapids	IA	The Eastern Iowa	CID	S	$3.00	1/1/1995	6/1/2002	
Cedar Rapids	IA	The Eastern Iowa	CID	S	$4.50	6/1/2002	3/1/2004	
Cedar Rapids	IA	The Eastern Iowa	CID	S	$4.50	5/1/2004	9/1/2025	60,866,105

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Des Moines	IA	Des Moines International	DSM	S	$3.00	3/1/1994	8/1/2001	
Des Moines	IA	Des Moines International	DSM	S	$4.50	8/1/2001	10/1/2024	95,019,992
Dubuque	IA	Dubuque Regional	DBQ	N	$3.00	1/1/1993	5/1/2001	
Dubuque	IA	Dubuque Regional	DBQ	N	$4.50	5/1/2001	2/1/2033	7,568,350
Fort Dodge	IA	Fort Dodge Regional	FOD	CS	$3.00	3/1/1995	9/1/2001	
Fort Dodge	IA	Fort Dodge Regional	FOD	CS	$4.50	1/1/2002	4/1/2011	484,901
Mason City	IA	Mason City Municipal	MCW	GA	$3.00	2/1/1996	10/1/2001	
Mason City	IA	Mason City Municipal	MCW	GA	$4.50	10/1/2001	4/1/2003	
Mason City	IA	Mason City Municipal	MCW	GA	$4.50	8/1/2003	12/1/2022	1,310,907
Sioux City	IA	Sioux Gateway/Col. Bud Day Field	SUX	N	$3.00	6/1/1993	6/1/1994	
Sioux City	IA	Sioux Gateway/Col. Bud Day Field	SUX	N	$3.00	2/1/1995	3/1/2002	
Sioux City	IA	Sioux Gateway/Col. Bud Day Field	SUX	N	$4.50	3/1/2002	1/1/2004	
Sioux City	IA	Sioux Gateway/Col. Bud Day Field	SUX	N	$4.50	11/1/2004	7/1/2021	4,510,580
Spencer	IA	Spencer Municipal	SPW	GA	$3.00	9/1/1995	3/1/2006	77,638
Waterloo	IA	Waterloo Regional	ALO	N	$3.00	6/1/1994	6/1/1998	
Waterloo	IA	Waterloo Regional	ALO	N	$3.00	9/1/1999	7/1/2001	
Waterloo	IA	Waterloo Regional	ALO	N	$4.50	7/1/2001	4/1/2023	3,062,056
Boise	ID	Boise Air Terminal/ Gowen Field	BOI	S	$3.00	8/1/1994	8/1/2001	
Boise	ID	Boise Air Terminal/ Gowen Field	BOI	S	$4.50	8/1/2001	9/1/2015	109,930,856
Hailey	ID	Friedman Memorial	SUN	N	$3.00	9/1/1993	10/1/1994	
Hailey	ID	Friedman Memorial	SUN	N	$3.00	3/1/1995	6/1/2005	
Hailey	ID	Friedman Memorial	SUN	N	$4.50	6/1/2005	7/1/2028	6,987,776
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$3.00	1/1/1993	1/1/1998	
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$3.00	2/1/1998	10/1/2000	
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$3.00	10/1/2000	4/1/2001	
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$4.50	4/1/2001	10/1/2023	3,968,437
Lewiston	ID	Lewiston-Nez Perce County	LWS	N	$3.00	5/1/1994	5/1/2001	
Lewiston	ID	Lewiston-Nez Perce County	LWS	N	$4.50	5/1/2001	3/1/2019	5,165,540
Pocatello	ID	Pocatello Regional	PIH	N	$3.00	9/1/1994	5/1/2001	
Pocatello	ID	Pocatello Regional	PIH	N	$4.50	5/1/2001	8/1/2019	2,856,131
Twin Falls	ID	Joslin Field - Magic Valley Regional	TWF	N	$3.00	11/1/1992	6/1/2001	
Twin Falls	ID	Joslin Field - Magic Valley Regional	TWF	N	$4.50	6/1/2001	6/1/2007	
Twin Falls	ID	Joslin Field - Magic Valley Regional	TWF	N	$4.50	7/1/2007	6/1/2022	3,390,352
Belleville	IL	Scott AFB/Midamerica	BLV	N	$3.00	11/1/2005	3/1/2047	7,000,000
Bloomington	IL	Central Illinois Regional Airport at Bloomington-Normal	BMI	N	$3.00	11/1/1994	4/1/2001	
Bloomington	IL	Central Illinois Regional Airport at Bloomington-Normal	BMI	N	$4.50	4/1/2001	6/1/2018	29,245,583
Champaign/Urbana	IL	University of Illinois-Willard	CMI	N	$3.00	12/1/1995	2/1/2004	
Champaign/Urbana	IL	University of Illinois-Willard	CMI	N	$4.50	10/1/2005	6/1/2019	7,707,325
Chicago	IL	Chicago Midway International	MDW	L	$3.00	9/1/1993	1/1/2007	
Chicago	IL	Chicago Midway International	MDW	L	$4.50	1/1/2007	11/1/2053	2,244,468,143
Chicago	IL	Chicago O'Hare International	ORD	L	$3.00	9/1/1993	4/1/2001	
Chicago	IL	Chicago O'Hare International	ORD	L	$4.50	4/1/2001	7/1/2041	6,926,705,514
Decatur	IL	Decatur	DEC	CS	$4.50	6/1/2006	3/1/2019	732,628
Marion	IL	Williamson County Regional	MWA	N	$4.50	9/1/2005	4/1/2019	509,499
Moline	IL	Quad City International	MLI	N	$3.00	12/1/1994	1/1/2002	
Moline	IL	Quad City International	MLI	N	$4.50	1/1/2002	7/1/2037	55,655,811

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Peoria	IL	General Downing - Peoria International	PIA	N	$3.00	12/1/1994	7/1/2001	
Peoria	IL	General Downing - Peoria International	PIA	N	$4.50	7/1/2001	2/1/2007	
Peoria	IL	General Downing - Peoria International	PIA	N	$4.50	2/1/2007	8/1/2008	
Peoria	IL	General Downing - Peoria International	PIA	N	$4.50	11/1/2008	9/1/2023	28,880,056
Quincy	IL	Quincy Regional-Baldwin Field	UIN	CS	$3.00	10/1/1994	7/1/1997	
Quincy	IL	Quincy Regional-Baldwin Field	UIN	CS	$3.00	11/1/1997	6/1/2005	
Quincy	IL	Quincy Regional-Baldwin Field	UIN	CS	$3.00	11/1/2005	1/1/2008	
Quincy	IL	Quincy Regional-Baldwin Field	UIN	CS	$4.50	1/1/2008	3/1/2019	902,993
Rockford	IL	Chicago/ Rockford International	RFD	N	$3.00	10/1/1992	10/1/1996	
Rockford	IL	Chicago/ Rockford International	RFD	N	$3.00	5/1/1997	6/1/2007	
Rockford	IL	Chicago/ Rockford International	RFD	N	$4.50	6/1/2007	3/1/2038	16,080,225
Springfield	IL	Abraham Lincoln Capital	SPI	N	$3.00	6/1/1992	5/1/2002	
Springfield	IL	Abraham Lincoln Capital	SPI	N	$4.50	5/1/2002	7/1/2021	8,509,863
Evansville	IN	Evansville Regional	EVV	N	$4.50	8/1/2007	11/1/2008	
Evansville	IN	Evansville Regional	EVV	N	$4.50	12/1/2008	11/1/2018	7,690,345
Fort Wayne	IN	Fort Wayne International	FWA	N	$3.00	7/1/1993	12/1/2005	
Fort Wayne	IN	Fort Wayne International	FWA	N	$4.50	12/1/2005	8/1/2022	32,664,585
Indianapolis	IN	Indianapolis International	IND	M	$3.00	9/1/1993	4/1/2001	
Indianapolis	IN	Indianapolis International	IND	M	$4.50	4/1/2001	9/1/2022	
Indianapolis	IN	Indianapolis International	IND	M	$3.00	9/1/2022	10/1/2022	524,907,605
South Bend	IN	South Bend	SBN	N	$3.00	11/1/1994	7/1/2011	
South Bend	IN	South Bend	SBN	N	$4.50	7/1/2011	7/1/2029	40,172,802
Garden City	KS	Garden City Regional	GCK	N	$4.50	10/1/2013	10/1/2022	770,628
Hays	KS	Hays Regional	HYS	CS	$4.50	4/1/2015	5/1/2018	207,045
Manhattan	KS	Manhattan Regional	MHK	N	$3.00	10/1/1998	3/1/2002	
Manhattan	KS	Manhattan Regional	MHK	N	$4.50	3/1/2002	5/1/2025	4,499,903
Topeka	KS	Topeka Regional	FOE	CS	$4.50	8/1/2007	3/1/2023	823,720
Wichita	KS	Wichita Mid-Continent	ICT	S	$3.00	12/1/1994	5/1/2005	
Wichita	KS	Wichita Mid-Continent	ICT	S	$4.50	5/1/2005	6/1/2007	
Wichita	KS	Wichita Mid-Continent	ICT	S	$4.50	7/1/2007	9/1/2009	
Wichita	KS	Wichita Mid-Continent	ICT	S	$4.50	11/1/2010	4/1/2046	199,528,281
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$3.00	6/1/1994	8/1/2000	
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$3.00	7/1/2001	8/1/2003	
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$4.50	8/1/2003	5/1/2009	
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$3.00	5/1/2009	1/1/2013	
Covington	KY	Cincinnati/Northern Kentucky International	CVG	M	$4.50	1/1/2013	3/1/2020	576,424,151
Lexington	KY	Blue Grass	LEX	S	$3.00	11/1/1993	6/1/2001	
Lexington	KY	Blue Grass	LEX	S	$4.50	6/1/2001	6/1/2003	
Lexington	KY	Blue Grass	LEX	S	$3.00	8/1/2003	12/1/2003	
Lexington	KY	Blue Grass	LEX	S	$4.50	12/1/2003	2/1/2038	100,206,268
Louisville	KY	Louisville International - Standiford Field	SDF	S	$3.00	5/1/1997	3/1/2006	
Louisville	KY	Louisville International - Standiford Field	SDF	S	$4.50	3/1/2006	10/1/2006	
Louisville	KY	Louisville International - Standiford Field	SDF	S	$3.00	10/1/2006	9/1/2008	
Louisville	KY	Louisville International - Standiford Field	SDF	S	$4.50	9/1/2008	10/1/2008	
Louisville	KY	Louisville International -	SDF	S	$3.00	10/1/2008	12/1/2010	

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		Standiford Field						
Louisville	KY	Louisville International - Standiford Field	SDF	S	$4.50	12/1/2010	8/1/2015	
Louisville	KY	Louisville International - Standiford Field	SDF	S	$3.00	8/1/2015	10/1/2016	
Louisville	KY	Louisville International - Standiford Field	SDF	S	$1.00	10/1/2016	10/1/2017	110,313,773
Paducah	KY	Barkley Regional	PAH	N	$3.00	3/1/1994	5/1/2014	
Paducah	KY	Barkley Regional	PAH	N	$4.50	5/1/2014	8/1/2024	2,121,050
Alexandria	LA	Alexandria International	AEX	N	$3.00	5/1/1999	1/1/2002	
Alexandria	LA	Alexandria International	AEX	N	$4.50	1/1/2002	12/1/2025	12,262,615
Baton Rouge	LA	Baton Rouge Metropolitan, Ryan Field	BTR	N	$3.00	12/1/1992	10/1/2005	
Baton Rouge	LA	Baton Rouge Metropolitan, Ryan Field	BTR	N	$4.50	10/1/2005	7/1/2031	81,359,236
Lafayette	LA	Lafayette Regional	LFT	N	$3.00	9/1/1995	9/1/1998	
Lafayette	LA	Lafayette Regional	LFT	N	$3.00	4/1/2001	4/1/2002	
Lafayette	LA	Lafayette Regional	LFT	N	$4.50	4/1/2002	1/1/2005	
Lafayette	LA	Lafayette Regional	LFT	N	$4.50	5/1/2005	4/1/2008	
Lafayette	LA	Lafayette Regional	LFT	N	$4.50	8/1/2008	12/1/2014	12,527,078
Lake Charles	LA	Lake Charles Regional	LCH	N	$3.00	3/1/2001	5/1/2005	
Lake Charles	LA	Lake Charles Regional	LCH	N	$4.50	5/1/2005	5/1/2017	3,470,558
Monroe	LA	Monroe Regional	MLU	N	$4.50	4/1/2003	9/1/2007	
Monroe	LA	Monroe Regional	MLU	N	$4.50	11/1/2008	6/1/2036	17,759,504
New Orleans	LA	Louis Armstrong New Orleans International	MSY	M	$3.00	6/1/1993	4/1/2002	
New Orleans	LA	Louis Armstrong New Orleans International	MSY	M	$4.50	4/1/2002	2/1/2026	
New Orleans	LA	Louis Armstrong New Orleans International	MSY	M	$3.00	2/1/2026	9/1/2043	965,553,986
Shreveport	LA	Shreveport Regional	SHV	N	$3.00	2/1/1994	11/1/2002	
Shreveport	LA	Shreveport Regional	SHV	N	$4.50	11/1/2002	9/1/2014	
Shreveport	LA	Shreveport Regional	SHV	N	$4.50	2/1/2015	2/1/2020	29,841,354
Boston	MA	General Edward Lawrence Logan International	BOS	L	$3.00	11/1/1993	10/1/2005	
Boston	MA	General Edward Lawrence Logan International	BOS	L	$4.50	10/1/2005	5/1/2026	1,669,574,564
Hyannis	MA	Barnstable Municipal-Boardman/Polando Field	HYA	N	$2.00	3/1/2011	10/1/2024	2,573,600
Nantucket	MA	Nantucket Memorial	ACK	N	$4.50	7/1/2014	5/1/2024	6,942,081
Worcester	MA	Worcester Regional	ORH	CS	$3.00	10/1/1992	10/1/1997	
Worcester	MA	Worcester Regional	ORH	CS	$3.00	9/1/1999	12/1/2011	1,635,753
Baltimore	MD	Baltimore/Washington International Thurgood Marshall	BWI	L	$3.00	10/1/1992	6/1/2002	
Baltimore	MD	Baltimore/Washington International Thurgood Marshall	BWI	L	$4.50	6/1/2002	12/1/2032	1,665,791,348
Hagerstown	MD	Hagerstown Regional-Richard A Henson Field	HGR	N	$3.00	8/1/1999	3/1/2002	
Hagerstown	MD	Hagerstown Regional-Richard A Henson Field	HGR	N	$4.50	3/1/2002	1/1/2004	
Hagerstown	MD	Hagerstown Regional-Richard A Henson Field	HGR	N	$4.50	1/1/2004	8/1/2007	
Hagerstown	MD	Hagerstown Regional-Richard A Henson Field	HGR	N	$4.50	4/1/2013	4/1/2013	429,244
Salisbury	MD	Salisbury-Ocean City Wicomico Regional	SBY	N	$3.00	2/1/2002	3/1/2008	
Salisbury	MD	Salisbury-Ocean City Wicomico Regional	SBY	N	$4.50	3/1/2008	5/1/2020	3,937,010

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Wiley Ford	MD	Greater Cumberland Reg	CBE	GA	$3.00	7/1/1994	7/1/1999	
Wiley Ford	MD	Greater Cumberland Reg	CBE	GA	$3.00	10/1/1999	6/1/2006	144,345
Bangor	ME	Bangor International	BGR	N	$3.00	6/1/1995	9/1/2010	
Bangor	ME	Bangor International	BGR	N	$4.50	12/1/2010	5/1/2018	16,535,603
Portland	ME	Portland International Jetport	PWM	S	$3.00	2/1/1994	2/1/2009	
Portland	ME	Portland International Jetport	PWM	S	$4.50	2/1/2009	4/1/2040	165,807,186
Presque Isle	ME	Northern Maine Regional Airport at Presque Isle	PQI	N	$4.50	9/1/2004	6/1/2009	
Presque Isle	ME	Northern Maine Regional Airport at Presque Isle	PQI	N	$4.50	8/1/2010	1/1/2018	599,151
Rockland	ME	Knox County Regional	RKD	N	$4.50	1/1/2012	8/1/2018	167,250
Alpena	MI	Alpena County Regional	APN	N	$3.00	8/1/2001	12/1/2005	
Alpena	MI	Alpena County Regional	APN	N	$4.50	12/1/2005	4/1/2022	632,191
Detroit	MI	Detroit Metropolitan Wayne County	DTW	L	$3.00	1/1/1993	10/1/2001	
Detroit	MI	Coleman A Young Municipal	DET	GA	$3.00	1/1/2000	3/1/2004	240,053
Detroit	MI	Detroit Metropolitan Wayne County	DTW	L	$4.50	10/1/2001	2/1/2034	3,134,966,084
Escanaba	MI	Delta County	ESC	N	$3.00	2/1/1993	11/1/1997	
Escanaba	MI	Delta County	ESC	N	$3.00	8/1/1998	7/1/2000	
Escanaba	MI	Delta County	ESC	N	$3.00	10/1/2001	3/1/2004	
Escanaba	MI	Delta County	ESC	N	$4.50	3/1/2004	1/1/2006	
Escanaba	MI	Delta County	ESC	N	$4.50	4/1/2006	1/1/2016	930,234
Flint	MI	Bishop International	FNT	S	$3.00	9/1/1993	10/1/2001	
Flint	MI	Bishop International	FNT	S	$4.50	10/1/2001	8/1/2020	42,304,023
Grand Rapids	MI	Gerald R. Ford International	GRR	S	$3.00	12/1/1992	11/1/2005	
Grand Rapids	MI	Gerald R. Ford International	GRR	S	$4.50	11/1/2005	6/1/2023	106,111,756
Hancock	MI	Houghton County Memorial	CMX	N	$3.00	7/1/1993	3/1/1996	
Hancock	MI	Houghton County Memorial	CMX	N	$3.00	7/1/1996	7/1/1999	
Hancock	MI	Houghton County Memorial	CMX	N	$3.00	10/1/1999	7/1/2005	
Hancock	MI	Houghton County Memorial	CMX	N	$4.50	7/1/2005	8/1/2016	1,773,963
Iron Mountain Kingsford	MI	Ford	IMT	N	$3.00	9/1/1995	6/1/2004	178,243
Ironwood	MI	Gogebic-Iron County	IWD	CS	$3.00	8/1/1993	10/1/2006	
Ironwood	MI	Gogebic-Iron County	IWD	CS	$4.50	6/1/2007	5/1/2018	219,080
Kalamazoo	MI	Kalamazoo/Battle Creek Internaitonal	AZO	N	$3.00	4/1/1997	6/1/2000	
Kalamazoo	MI	Kalamazoo/Battle Creek Internaitonal	AZO	N	$3.00	1/1/2001	1/1/2005	
Kalamazoo	MI	Kalamazoo/Battle Creek Internaitonal	AZO	N	$4.50	1/1/2005	8/1/2006	
Kalamazoo	MI	Kalamazoo/Battle Creek Internaitonal	AZO	N	$4.50	10/1/2006	4/1/2008	
Kalamazoo	MI	Kalamazoo/Battle Creek Internaitonal	AZO	N	$4.50	9/1/2008	9/1/2024	22,503,006
Lansing	MI	Capital Region International	LAN	N	$3.00	10/1/1993	7/1/2002	
Lansing	MI	Capital Region International	LAN	N	$4.50	7/1/2002	4/1/2028	30,496,100
Manistee	MI	Manistee County-Blacker	MBL	GA	$4.50	6/1/2008	11/1/2040	388,986
Marquette	MI	Sawyer International	SAW	N	$3.00	12/1/1992	12/1/1996	
Marquette	MI	Sawyer International	SAW	N	$3.00	4/1/1998	7/1/2002	
Marquette	MI	Sawyer International	SAW	N	$4.50	7/1/2002	1/1/2003	
Marquette	MI	Sawyer International	SAW	N	$4.50	1/1/2003	9/1/2006	
Marquette	MI	Sawyer International	SAW	N	$4.50	10/1/2006	5/1/2008	
Marquette	MI	Sawyer International	SAW	N	$4.50	8/1/2008	8/1/2011	
Marquette	MI	Sawyer International	SAW	N	$4.50	3/1/2012	3/1/2015	
Marquette	MI	Sawyer International	SAW	N	$4.50	5/1/2015	5/1/2017	3,832,232
Muskegon	MI	Muskegon County	MKG	N	$3.00	5/1/1994	5/1/2004	
Muskegon	MI	Muskegon County	MKG	N	$4.50	5/1/2004	11/1/2020	5,013,088

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Pellston	MI	Pellston Regional Airport of Emmet County	PLN	N	$3.00	3/1/1993	9/1/1997	
Pellston	MI	Pellston Regional Airport of Emmet County	PLN	N	$3.00	12/1/1997	7/1/2011	
Pellston	MI	Pellston Regional Airport of Emmet County	PLN	N	$4.50	7/1/2011	9/1/2019	2,251,435
Saginaw	MI	MBS International	MBS	N	$3.00	2/1/1997	7/1/2007	
Saginaw	MI	MBS International	MBS	N	$4.50	7/1/2007	4/1/2021	12,023,124
Sault Ste. Marie	MI	Chippewa County International	CIU	N	$4.50	11/1/2005	7/1/2020	1,050,115
Traverse City	MI	Cherry Capital	TVC	N	$3.00	1/1/1997	1/1/2002	
Traverse City	MI	Cherry Capital	TVC	N	$4.50	1/1/2002	10/1/2003	
Traverse City	MI	Cherry Capital	TVC	N	$4.50	10/1/2003	12/1/2010	
Traverse City	MI	Cherry Capital	TVC	N	$4.50	2/1/2011	2/1/2016	
Traverse City	MI	Cherry Capital	TVC	N	$4.50	2/1/2017	2/1/2019	14,656,915
Bemidji	MN	Bemidji Regional	BJI	N	$3.00	11/1/1996	2/1/2002	
Bemidji	MN	Bemidji Regional	BJI	N	$4.50	2/1/2002	8/1/2005	
Bemidji	MN	Bemidji Regional	BJI	N	$4.50	6/1/2006	2/1/2022	2,158,956
Brainerd	MN	Brainerd Lakes Regional	BRD	N	$3.00	8/1/1993	7/1/2001	
Brainerd	MN	Brainerd Lakes Regional	BRD	N	$4.50	7/1/2001	8/1/2033	2,147,011
Duluth	MN	Duluth International	DLH	N	$3.00	10/1/1994	4/1/2002	
Duluth	MN	Duluth International	DLH	N	$4.50	4/1/2002	11/1/2004	
Duluth	MN	Duluth International	DLH	N	$4.50	4/1/2005	12/1/2020	12,665,073
Grand Rapids	MN	Grand Rapids/Itasca County	GPZ	GA	$3.00	12/1/1997	10/1/2001	
Grand Rapids	MN	Grand Rapids/Itasca County	GPZ	GA	$4.50	10/1/2001	1/1/2007	151,263
Hibbing	MN	Range Regional	HIB	N	$3.00	6/1/1996	7/1/2003	
Hibbing	MN	Range Regional	HIB	N	$4.50	7/1/2003	7/1/2019	800,036
International Falls	MN	Falls International	INL	N	$3.00	12/1/1994	6/1/2002	
International Falls	MN	Falls International	INL	N	$4.50	6/1/2002	6/1/2005	
International Falls	MN	Falls International	INL	N	$4.50	11/1/2005	3/1/2033	1,909,923
Minneapolis	MN	Minneapolis-St Paul International/Wold-Chamberlain	MSP	L	$3.00	6/1/1992	4/1/2001	
Minneapolis	MN	Minneapolis-St Paul International/Wold-Chamberlain	MSP	L	$4.50	4/1/2001	2/1/2020	1,621,307,770
Rochester	MN	Rochester International	RST	N	$3.00	5/1/1996	3/1/2002	
Rochester	MN	Rochester International	RST	N	$4.50	3/1/2002	10/1/2019	11,074,911
St. Cloud	MN	St. Cloud Regional	STC	N	$3.00	2/1/2000	7/1/2002	
St. Cloud	MN	St. Cloud Regional	STC	N	$4.50	7/1/2002	3/1/2060	4,375,081
Thief River Falls	MN	Thief River Falls Regional	TVF	GA	$4.50	6/1/2003	6/1/2023	636,828
Columbia	MO	Columbia Regional	COU	N	$4.50	11/1/2002	3/1/2016	
Columbia	MO	Columbia Regional	COU	N	$4.50	6/1/2016	3/1/2022	3,595,914
Joplin	MO	Joplin Regional	JLN	N	$4.50	4/1/2003	6/1/2026	2,117,227
Kansas City	MO	Kansas City International	MCI	M	$3.00	3/1/1996	8/1/2005	
Kansas City	MO	Kansas City International	MCI	M	$4.50	8/1/2005	7/1/2018	429,005,608
Springfield	MO	Springfield-Branson National	SGF	S	$3.00	11/1/1993	5/1/1997	
Springfield	MO	Springfield-Branson National	SGF	S	$3.00	7/1/1998	5/1/2001	
Springfield	MO	Springfield-Branson National	SGF	S	$4.50	5/1/2001	1/1/2004	
Springfield	MO	Springfield-Branson National	SGF	S	$4.50	5/1/2004	8/1/2005	
Springfield	MO	Springfield-Branson National	SGF	S	$4.50	9/1/2005	3/1/2006	
Springfield	MO	Springfield-Branson National	SGF	S	$4.50	1/1/2007	1/1/2036	96,200,309
St Louis	MO	Lambert-St Louis International	STL	M	$3.00	12/1/1992	12/1/2001	
St Louis	MO	Lambert-St Louis International	STL	M	$4.50	12/1/2001	4/1/2026	1,075,575,370
Rota Island	MP	Benjamin Taisacan Mangiona International	GRO	N	$4.50	1/1/2005	6/1/2021	1,777,742
Saipan	MP	Francisco C. Ada/Saipan International	GSN	S	$4.50	1/1/2005	6/1/2021	29,573,280

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Tinian Island	MP	Tinian International	TNI	CS	$4.50	1/1/2005	6/1/2021	1,705,526
Columbus	MS	Golden Triangle Regional	GTR	N	$3.00	8/1/1992	4/1/2001	
Columbus	MS	Golden Triangle Regional	GTR	N	$4.50	4/1/2001	12/1/2019	4,036,108
Greenville	MS	Mid Delta Regional	GLH	GA	$3.00	10/1/1998	2/1/2003	
Greenville	MS	Mid Delta Regional	GLH	GA	$3.00	4/1/2003	8/1/2003	
Greenville	MS	Mid Delta Regional	GLH	GA	$3.00	8/1/2003	4/1/2005	
Greenville	MS	Mid Delta Regional	GLH	GA	$4.50	4/1/2005	12/1/2005	
Greenville	MS	Mid Delta Regional	GLH	GA	$4.50	12/1/2005	8/1/2011	
Greenville	MS	Mid Delta Regional	GLH	GA	$4.50	9/1/2012	1/1/2023	453,780
Gulfport	MS	Gulfport-Biloxi International	GPT	N	$3.00	7/1/1992	8/1/2001	
Gulfport	MS	Gulfport-Biloxi International	GPT	N	$3.00	12/1/2001	6/1/2002	
Gulfport	MS	Gulfport-Biloxi International	GPT	N	$3.00	6/1/2002	5/1/2003	
Gulfport	MS	Gulfport-Biloxi International	GPT	N	$4.50	5/1/2003	1/1/2028	66,424,061
Hattiesburg	MS	Hattiesburg-Laurel Regional	PIB	N	$3.00	7/1/1992	6/1/2001	
Hattiesburg	MS	Hattiesburg-Laurel Regional	PIB	N	$4.50	6/1/2001	12/1/2024	1,108,865
Jackson	MS	Jackson-Medgar Wiley Evers International	JAN	S	$3.00	5/1/1993	10/1/2003	
Jackson	MS	Jackson-Medgar Wiley Evers International	JAN	S	$4.50	10/1/2003	2/1/2031	88,407,168
Meridian	MS	Key Field	MEI	N	$3.00	11/1/1992	8/1/1996	
Meridian	MS	Key Field	MEI	N	$3.00	3/1/1997	12/1/2001	
Meridian	MS	Key Field	MEI	N	$4.50	12/1/2001	5/1/2004	
Meridian	MS	Key Field	MEI	N	$4.50	10/1/2005	10/1/2020	1,716,875
Tupelo	MS	Tupelo Regional	TUP	CS	$3.00	11/1/1994	4/1/2003	
Tupelo	MS	Tupelo Regional	TUP	CS	$4.50	4/1/2003	12/1/2018	1,743,189
Billings	MT	Billings Logan International	BIL	S	$3.00	4/1/1994	9/1/2014	
Billings	MT	Billings Logan International	BIL	S	$3.00	11/1/2016	3/1/2018	21,131,387
Bozeman	MT	Bozeman Yellowstone International	BZN	S	$3.00	8/1/1993	3/1/2009	
Bozeman	MT	Bozeman Yellowstone International	BZN	S	$4.50	3/1/2009	7/1/2028	40,344,326
Butte	MT	Bert Mooney	BTM	N	$3.00	7/1/1994	6/1/2006	
Butte	MT	Bert Mooney	BTM	N	$3.00	7/1/2006	8/1/2007	
Butte	MT	Bert Mooney	BTM	N	$3.00	11/1/2007	3/1/2010	
Butte	MT	Bert Mooney	BTM	N	$4.50	3/1/2010	3/1/2018	2,370,324
Great Falls	MT	Great Falls International	GTF	N	$3.00	11/1/1992	7/1/2002	
Great Falls	MT	Great Falls International	GTF	N	$4.50	7/1/2002	2/1/2022	17,754,080
Helena	MT	Helena Regional	HLN	N	$3.00	4/1/1993	8/1/2002	
Helena	MT	Helena Regional	HLN	N	$4.50	8/1/2002	7/1/2018	7,132,400
Kalispell	MT	Glacier Park International	GPI	N	$3.00	12/1/1993	4/1/2005	
Kalispell	MT	Glacier Park International	GPI	N	$4.50	4/1/2005	12/1/2021	14,044,375
Missoula	MT	Missoula International	MSO	N	$3.00	9/1/1992	4/1/2001	
Missoula	MT	Missoula International	MSO	N	$4.50	4/1/2001	11/1/2018	23,416,623
West Yellowstone	MT	Yellowstone	WYS	CS	$4.50	6/1/2011	6/1/2025	277,202
Asheville	NC	Asheville Regional	AVL	N	$3.00	12/1/1994	10/1/2002	
Asheville	NC	Asheville Regional	AVL	N	$4.50	10/1/2002	11/1/2006	
Asheville	NC	Asheville Regional	AVL	N	$4.50	4/1/2007	9/1/2007	
Asheville	NC	Asheville Regional	AVL	N	$4.50	10/1/2007	4/1/2024	29,552,251
Charlotte	NC	Charlotte/Douglas International	CLT	L	$3.00	11/1/2004	5/1/2023	1,087,474,538
Fayetteville	NC	Fayetteville Regional/Grannis Field	FAY	N	$3.00	11/1/2000	2/1/2006	
Fayetteville	NC	Fayetteville Regional/Grannis Field	FAY	N	$4.00	7/1/2009	10/1/2012	
Fayetteville	NC	Fayetteville Regional/Grannis Field	FAY	N	$4.00	3/1/2013	6/1/2013	
Fayetteville	NC	Fayetteville Regional/Grannis Field	FAY	N	$4.00	5/1/2015	8/1/2020	9,291,259

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Greensboro	NC	Piedmont Triad International	GSO	S	$4.50	9/1/2011	5/1/2022	43,872,158
Greenville	NC	Pitt-Greenville	PGV	N	$3.00	10/1/1997	4/1/2001	
Greenville	NC	Pitt-Greenville	PGV	N	$4.50	4/1/2001	1/1/2016	
Greenville	NC	Pitt-Greenville	PGV	N	$4.50	7/1/2016	1/1/2024	5,589,449
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	1/1/1996	10/1/1998	
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	9/1/1999	8/1/2000	
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	3/1/2005	1/1/2009	
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	2/1/2009	11/1/2011	
Jacksonville	NC	Albert J. Ellis	OAJ	N	$3.00	11/1/2011	2/1/2012	
Jacksonville	NC	Albert J. Ellis	OAJ	N	$4.50	2/1/2012	5/1/2028	11,329,661
New Bern	NC	Coastal Carolina Regional	EWN	N	$3.00	2/1/1997	11/1/2003	
New Bern	NC	Coastal Carolina Regional	EWN	N	$4.50	11/1/2003	10/1/2025	11,160,275
Raleigh	NC	Raleigh-Durham International	RDU	M	$3.00	4/1/2003	10/1/2004	
Raleigh	NC	Raleigh-Durham International	RDU	M	$4.50	10/1/2004	9/1/2032	772,690,405
Wilmington	NC	Wilmington International	ILM	N	$3.00	2/1/1994	9/1/1996	
Wilmington	NC	Wilmington International	ILM	N	$3.00	6/1/1998	5/1/2003	
Wilmington	NC	Wilmington International	ILM	N	$4.50	5/1/2003	8/1/2024	33,213,719
Bismarck	ND	Bismarck Municipal	BIS	N	$3.00	7/1/1996	7/1/1997	
Bismarck	ND	Bismarck Municipal	BIS	N	$3.00	6/1/1998	4/1/2002	
Bismarck	ND	Bismarck Municipal	BIS	N	$4.50	4/1/2002	6/1/2018	14,881,807
Dickinson	ND	Dickinson - Theodore Roosevelt Regional	DIK	N	$4.50	4/1/2014	6/1/2020	714,384
Fargo	ND	Hector International	FAR	S	$3.00	1/1/1997	8/1/2002	
Fargo	ND	Hector International	FAR	S	$4.50	8/1/2002	3/1/2018	25,911,798
Grand Forks	ND	Grand Forks International	GFK	N	$3.00	2/1/1993	8/1/1996	
Grand Forks	ND	Grand Forks International	GFK	N	$3.00	5/1/1997	4/1/2001	
Grand Forks	ND	Grand Forks International	GFK	N	$4.50	4/1/2001	6/1/2003	
Grand Forks	ND	Grand Forks International	GFK	N	$4.50	5/1/2004	10/1/2008	
Grand Forks	ND	Grand Forks International	GFK	N	$4.50	1/1/2009	9/1/2020	10,251,697
Minot	ND	Minot International	MOT	N	$3.00	3/1/1994	7/1/1998	
Minot	ND	Minot International	MOT	N	$3.00	3/1/1999	2/1/2002	
Minot	ND	Minot International	MOT	N	$4.50	2/1/2002	10/1/2020	16,760,900
Williston	ND	Sloulin Field International	ISN	N	$4.50	4/1/2013	2/1/2026	2,825,713
Grand Island	NE	Central Nebraska Regional	GRI	N	$3.00	2/1/1999	4/1/2001	
Grand Island	NE	Central Nebraska Regional	GRI	N	$4.50	5/1/2001	1/1/2030	5,248,737
Kearney	NE	Kearney Regional	EAR	N	$4.00	11/1/2005	9/1/2007	
Kearney	NE	Kearney Regional	EAR	N	$4.50	9/1/2007	7/1/2011	
Kearney	NE	Kearney Regional	EAR	N	$4.50	10/1/2011	11/1/2017	470,403
Lincoln	NE	Lincoln	LNK	N	$4.50	11/1/2016	11/1/2025	5,411,638
Scottsbluff	NE	Western Nebraska Regional/ William B. Heilig Field	BFF	CS	$3.00	3/1/2000	3/1/2003	
Scottsbluff	NE	Western Nebraska Regional/ William B. Heilig Field	BFF	CS	$4.50	7/1/2004	7/1/2024	1,299,534
Lebanon	NH	Lebanon Municipal	LEB	N	$3.00	8/1/1995	8/1/2002	
Lebanon	NH	Lebanon Municipal	LEB	N	$4.50	11/1/2003	5/1/2006	
Lebanon	NH	Lebanon Municipal	LEB	N	$4.50	10/1/2007	5/1/2014	
Lebanon	NH	Lebanon Municipal	LEB	N	$4.50	10/1/2014	6/1/2018	970,751
Manchester	NH	Manchester	MHT	S	$3.00	1/1/1993	1/1/2008	
Manchester	NH	Manchester	MHT	S	$4.50	1/1/2008	12/1/2022	189,980,151
Atlantic City	NJ	Atlantic City International	ACY	S	$3.00	10/1/1999	12/1/2005	
Atlantic City	NJ	Atlantic City International	ACY	S	$4.50	12/1/2005	4/1/2009	
Atlantic City	NJ	Atlantic City International	ACY	S	$4.50	4/1/2009	8/1/2014	
Atlantic City	NJ	Atlantic City International	ACY	S	$4.50	9/1/2014	3/1/2025	57,765,575
Newark	NJ	Newark Liberty International	EWR	L	$3.00	10/1/1992	4/1/2006	
Newark	NJ	Newark Liberty International	EWR	L	$4.50	4/1/2006	12/1/2017	1,336,977,116
Trenton	NJ	Trenton Mercer	TTN	N	$3.00	1/1/2001	5/1/2004	
Trenton	NJ	Trenton Mercer	TTN	N	$4.50	5/1/2004	6/1/2018	9,645,113

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Albuquerque	NM	Albuquerque International Sunport	ABQ	M	$3.00	7/1/1996	7/1/2011	
Albuquerque	NM	Albuquerque International Sunport	ABQ	M	$4.50	7/1/2011	4/1/2018	183,986,105
Farmington	NM	Four Corners Regional	FMN	CS	$3.00	6/1/2003	5/1/2023	661,102
Roswell	NM	Roswell International Air Center	ROW	N	$3.00	4/1/1999	2/1/2004	
Roswell	NM	Roswell International Air Center	ROW	N	$4.50	2/1/2004	6/1/2004	
Roswell	NM	Roswell International Air Center	ROW	N	$3.00	6/1/2004	6/1/2005	
Roswell	NM	Roswell International Air Center	ROW	N	$4.50	6/1/2005	2/1/2008	
Roswell	NM	Roswell International Air Center	ROW	N	$4.50	3/1/2008	4/1/2022	2,420,266
Elko	NV	Elko Regional	EKO	N	$3.00	9/1/1998	11/1/2003	
Elko	NV	Elko Regional	EKO	N	$4.50	11/1/2003	2/1/2021	6,790,017
Las Vegas	NV	McCarran International	LAS	L	$3.00	6/1/1992	11/1/2004	
Las Vegas	NV	McCarran International	LAS	L	$4.50	11/1/2004	9/1/2006	
Las Vegas	NV	McCarran International	LAS	L	$3.00	9/1/2006	1/1/2007	
Las Vegas	NV	McCarran International	LAS	L	$4.00	1/1/2007	10/1/2008	
Las Vegas	NV	McCarran International	LAS	L	$4.50	10/1/2008	11/1/2053	4,563,146,058
Reno	NV	Reno/Tahoe International	RNO	S	$3.00	1/1/1994	2/1/2001	
Reno	NV	Reno/Tahoe International	RNO	S	$4.50	8/1/2001	6/1/2002	
Reno	NV	Reno/Tahoe International	RNO	S	$3.00	6/1/2002	2/1/2003	
Reno	NV	Reno/Tahoe International	RNO	S	$4.50	2/1/2003	10/1/2004	
Reno	NV	Reno/Tahoe International	RNO	S	$3.00	10/1/2004	12/1/2004	
Reno	NV	Reno/Tahoe International	RNO	S	$3.00	12/1/2004	4/1/2005	
Reno	NV	Reno/Tahoe International	RNO	S	$4.50	4/1/2005	7/1/2007	
Reno	NV	Reno/Tahoe International	RNO	S	$3.00	7/1/2007	12/1/2007	
Reno	NV	Reno/Tahoe International	RNO	S	$4.50	12/1/2007	9/1/2017	186,418,819
Albany	NY	Albany International	ALB	S	$3.00	3/1/1994	9/1/2009	
Albany	NY	Albany International	ALB	S	$4.50	9/1/2009	2/1/2020	116,740,338
Binghamton	NY	Greater Binghamton/Edwin A. Link Field	BGM	N	$3.00	11/1/1993	9/1/2002	
Binghamton	NY	Greater Binghamton/Edwin A. Link Field	BGM	N	$4.50	9/1/2002	7/1/2006	
Binghamton	NY	Greater Binghamton/Edwin A. Link Field	BGM	N	$4.50	7/1/2006	2/1/2008	
Binghamton	NY	Greater Binghamton/Edwin A. Link Field	BGM	N	$4.50	5/1/2008	9/1/2020	10,208,831
Buffalo	NY	Buffalo Niagara International	BUF	M	$3.00	8/1/1992	8/1/2007	
Buffalo	NY	Buffalo Niagara International	BUF	M	$4.50	8/1/2007	8/1/2018	203,522,960
Elmira	NY	Elmira/Corning Regional	ELM	N	$3.00	12/1/2004	1/1/2008	
Elmira	NY	Elmira/Corning Regional	ELM	N	$4.50	5/1/2008	10/1/2020	7,640,812
Islip	NY	Long Island MacArthur	ISP	S	$3.00	12/1/1994	9/1/2005	
Islip	NY	Long Island MacArthur	ISP	S	$4.50	9/1/2005	8/1/2018	70,928,028
Ithaca	NY	Ithaca Tompkins Regional	ITH	N	$3.00	1/1/1993	3/1/2009	
Ithaca	NY	Ithaca Tompkins Regional	ITH	N	$4.50	3/1/2009	12/1/2018	7,850,987
Jamestown	NY	Chautauqua County/Jamestown	JHW	CS	$3.00	6/1/1993	8/1/2002	
Jamestown	NY	Chautauqua County/Jamestown	JHW	CS	$4.50	9/1/2004	3/1/2018	730,945
Massena	NY	Massena International - Richards Field	MSS	CS	$3.00	4/1/1996	4/1/2061	163,429
New York	NY	John F. Kennedy International	JFK	L	$3.00	10/1/1992	4/1/2006	
New York	NY	John F. Kennedy International	JFK	L	$4.50	4/1/2006	2/1/2018	1,741,711,147
New York	NY	LaGuardia	LGA	L	$3.00	10/1/1992	4/1/2006	
New York	NY	LaGuardia	LGA	L	$4.50	4/1/2006	2/1/2018	1,082,955,414
Newburgh	NY	Stewart International	SWF	N	$3.00	11/1/1995	3/1/2002	
Newburgh	NY	Stewart International	SWF	N	$4.50	3/1/2002	11/1/2005	
Newburgh	NY	Stewart International	SWF	N	$4.50	5/1/2007	9/1/2007	
Newburgh	NY	Stewart International	SWF	N	$4.50	7/1/2010	11/1/2019	17,811,117
Ogdensburg	NY	Ogdensburg International	OGS	CS	$3.00	4/1/1996	7/1/2016	
Ogdensburg	NY	Ogdensburg International	OGS	CS	$4.50	7/1/2016	4/1/2022	865,512

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Plattsburgh	NY	Clinton County	PLB	N	$3.00	7/1/1993	3/1/2001	
Plattsburgh	NY	Clinton County	PLB	N	$3.00	6/1/2001	4/1/2003	230,975
Plattsburgh	NY	Plattsburgh International	PBG	N	$4.50	1/1/2009	2/1/2043	39,561,720
Rochester	NY	Greater Rochester International	ROC	S	$3.00	12/1/1997	9/1/2004	
Rochester	NY	Greater Rochester International	ROC	S	$4.50	9/1/2004	9/1/2027	118,547,358
Saranac Lake	NY	Adirondack Regional	SLK	CS	$3.00	8/1/1994	9/1/2007	
Saranac Lake	NY	Adirondack Regional	SLK	CS	$4.50	2/1/2011	6/1/2033	591,574
Syracuse	NY	Syracuse Hancock International	SYR	S	$3.00	10/1/1995	1/1/2002	
Syracuse	NY	Syracuse Hancock International	SYR	S	$4.50	10/1/2002	8/1/2005	
Syracuse	NY	Syracuse Hancock International	SYR	S	$4.50	11/1/2005	2/1/2007	
Syracuse	NY	Syracuse Hancock International	SYR	S	$4.50	4/1/2007	8/1/2026	126,921,592
Utica	NY	Oneida County	UCA		$3.00	8/1/1997	6/1/2010	1,298,631
Watertown	NY	Watertown International	ART	N	$4.50	4/1/2017	4/1/2023	605,205
White Plains	NY	Westchester County	HPN	S	$3.00	2/1/1993	12/1/2001	
White Plains	NY	Westchester County	HPN	S	$4.50	12/1/2001	5/1/2014	
White Plains	NY	Westchester County	HPN	S	$4.50	8/1/2016	3/1/2018	58,771,838
Akron	OH	Akron-Canton Regional	CAK	S	$3.00	9/1/1992	9/1/2002	
Akron	OH	Akron-Canton Regional	CAK	S	$4.50	9/1/2002	1/1/2019	53,537,202
Cleveland	OH	Cleveland-Hopkins International	CLE	M	$3.00	11/1/1992	3/1/2002	
Cleveland	OH	Cleveland-Hopkins International	CLE	M	$4.50	3/1/2002	9/1/2023	590,917,465
Columbus	OH	Port Columbus International	CMH	M	$3.00	10/1/1992	4/1/2002	
Columbus	OH	Port Columbus International	CMH	M	$4.50	4/1/2002	11/1/2020	353,675,428
Dayton	OH	James M Cox Dayton International	DAY	S	$3.00	10/1/1994	9/1/2001	
Dayton	OH	James M Cox Dayton International	DAY	S	$4.50	9/1/2001	5/1/2025	157,884,518
Toledo	OH	Toledo Express	TOL	N	$3.00	9/1/1993	9/1/1996	
Toledo	OH	Toledo Express	TOL	N	$3.00	7/1/1997	7/1/2001	
Toledo	OH	Toledo Express	TOL	N	$4.50	7/1/2001	12/1/2017	16,674,815
Youngstown	OH	Youngstown-Warren Regional	YNG	N	$3.00	5/1/1994	7/1/1996	
Youngstown	OH	Youngstown-Warren Regional	YNG	N	$3.00	8/1/1997	2/1/2002	
Youngstown	OH	Youngstown-Warren Regional	YNG	N	$4.50	4/1/2007	12/1/2027	5,467,796
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$2.00	8/1/1992	1/1/1994	
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$3.00	1/1/1994	4/1/1996	
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$3.00	1/1/1998	8/1/2000	
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$4.50	6/1/2002	3/1/2004	
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$4.50	9/1/2004	10/1/2005	
Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$4.50	11/1/2007	4/1/2019	4,150,206
Oklahoma City	OK	Will Rogers World	OKC	S	$3.00	7/1/1997	4/1/2010	
Oklahoma City	OK	Will Rogers World	OKC	S	$4.50	4/1/2010	12/1/2020	136,283,571
Tulsa	OK	Tulsa International	TUL	S	$3.00	8/1/1992	3/1/1996	
Tulsa	OK	Tulsa International	TUL	S	$3.00	1/1/1997	8/1/2010	
Tulsa	OK	Tulsa International	TUL	S	$4.50	8/1/2010	4/1/2033	202,441,498
Eugene	OR	Mahlon Sweet Field	EUG	S	$3.00	11/1/1993	6/1/2001	
Eugene	OR	Mahlon Sweet Field	EUG	S	$4.50	6/1/2001	7/1/2019	35,568,797
Klamath Falls	OR	Klamath Falls	LMT	CS	$3.00	3/1/2000	4/1/2001	
Klamath Falls	OR	Klamath Falls	LMT	CS	$4.50	4/1/2001	5/1/2004	
Klamath Falls	OR	Klamath Falls	LMT	CS	$4.50	5/1/2004	12/1/2011	
Klamath Falls	OR	Klamath Falls	LMT	CS	$4.50	4/1/2012	10/1/2023	2,132,265
Medford	OR	Rogue Valley International - Medford	MFR	N	$3.00	7/1/1993	4/1/2001	
Medford	OR	Rogue Valley International - Medford	MFR	N	$4.50	4/1/2001	8/1/2026	34,832,860
North Bend	OR	Southwest Oregon Regional	OTH	N	$3.00	2/1/1994	8/1/2001	
North Bend	OR	Southwest Oregon Regional	OTH	N	$4.50	8/1/2001	2/1/2021	3,077,968
Pendleton	OR	Eastern Oregon Regional at Pendleton	PDT	CS	$3.00	12/1/1995	10/1/2009	

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Pendleton	OR	Eastern Oregon Regional at Pendleton	PDT	CS	$4.50	10/1/2009	1/1/2018	486,540
Portland	OR	Portland International	PDX	L	$3.00	7/1/1992	10/1/2001	
Portland	OR	Portland International	PDX	L	$4.50	10/1/2001	3/1/2036	1,154,650,335
Redmond	OR	Roberts Field	RDM	N	$3.00	10/1/1993	11/1/2001	
Redmond	OR	Roberts Field	RDM	N	$4.50	11/1/2001	12/1/2003	
Redmond	OR	Roberts Field	RDM	N	$4.50	12/1/2003	12/1/2006	
Redmond	OR	Roberts Field	RDM	N	$4.50	3/1/2007	7/1/2040	33,531,050
Allentown	PA	Lehigh Valley International	ABE	N	$3.00	11/1/1992	2/1/2001	
Allentown	PA	Lehigh Valley International	ABE	N	$3.00	6/1/2001	11/1/2001	
Allentown	PA	Lehigh Valley International	ABE	N	$4.50	11/1/2001	1/1/2003	
Allentown	PA	Lehigh Valley International	ABE	N	$4.50	9/1/2003	8/1/2018	44,975,522
Altoona	PA	Altoona-Blair County	AOO	CS	$3.00	5/1/1993	2/1/1996	
Altoona	PA	Altoona-Blair County	AOO	CS	$3.00	1/1/1997	10/1/1999	
Altoona	PA	Altoona-Blair County	AOO	CS	$3.00	7/1/2000	12/1/2008	
Altoona	PA	Altoona-Blair County	AOO	CS	$4.50	12/1/2008	5/1/2022	716,045
Bradford	PA	Bradford Regional	BFD	CS	$3.00	8/1/1995	5/1/2003	
Bradford	PA	Bradford Regional	BFD	CS	$4.50	5/1/2003	6/1/2030	584,559
Du Bois	PA	Dubois Regional	DUJ	CS	$3.00	6/1/1995	4/1/2001	
Du Bois	PA	Dubois Regional	DUJ	CS	$4.50	4/1/2001	11/1/2003	
Du Bois	PA	Dubois Regional	DUJ	CS	$4.50	4/1/2004	10/1/2018	712,049
Erie	PA	Erie International/Tom Ridge Field	ERI	N	$3.00	10/1/1992	6/1/1997	
Erie	PA	Erie International/Tom Ridge Field	ERI	N	$3.00	12/1/1997	5/1/2001	
Erie	PA	Erie International/Tom Ridge Field	ERI	N	$4.50	8/1/2003	1/1/2005	
Erie	PA	Erie International/Tom Ridge Field	ERI	N	$4.50	7/1/2005	2/1/2025	15,928,448
Harrisburg	PA	Harrisburg International	MDT	S	$3.00	2/1/1997	1/1/2003	
Harrisburg	PA	Harrisburg International	MDT	S	$4.50	1/1/2003	7/1/2034	136,117,114
Johnstown	PA	John Murtha Johnstown-Cambria County	JST	CS	$3.00	11/1/1993	12/1/1996	
Johnstown	PA	John Murtha Johnstown-Cambria County	JST	CS	$3.00	12/1/1997	5/1/2001	
Johnstown	PA	John Murtha Johnstown-Cambria County	JST	CS	$4.50	5/1/2001	1/1/2007	
Johnstown	PA	John Murtha Johnstown-Cambria County	JST	CS	$4.50	7/1/2007	5/1/2023	1,085,952
Lancaster	PA	Lancaster	LNS	CS	$3.00	2/1/1995	2/1/2009	
Lancaster	PA	Lancaster	LNS	CS	$4.50	7/1/2013	9/1/2019	569,174
Latrobe	PA	Arnold Palmer Regional	LBE	N	$3.00	3/1/1996	7/1/2013	
Latrobe	PA	Arnold Palmer Regional	LBE	N	$4.50	7/1/2013	7/1/2025	11,107,518
Philadelphia	PA	Philadelphia International	PHL	L	$3.00	9/1/1992	4/1/2001	
Philadelphia	PA	Philadelphia International	PHL	L	$4.50	4/1/2001	2/1/2013	
Philadelphia	PA	Philadelphia International	PHL	L	$3.00	2/1/2013	3/1/2013	
Philadelphia	PA	Philadelphia International	PHL	L	$4.50	3/1/2013	5/1/2021	1,564,269,848
Pittsburgh	PA	Pittsburgh International	PIT	M	$3.00	10/1/2001	12/1/2004	
Pittsburgh	PA	Pittsburgh International	PIT	M	$4.50	12/1/2004	11/1/2030	503,924,164
Reading	PA	Reading Regional/Carl A Spaatz Field	RDG	GA	$3.00	12/1/1994	7/1/2008	1,006,653
State College	PA	University Park	UNV	N	$3.00	11/1/1992	11/1/2003	
State College	PA	University Park	UNV	N	$4.50	11/1/2003	7/1/2019	11,633,487
Wilkes-Barre	PA	Wilkes-Barre/Scranton International	AVP	N	$3.00	12/1/1993	6/1/1997	
Wilkes-Barre	PA	Wilkes-Barre/Scranton International	AVP	N	$3.00	12/1/1997	5/1/2001	

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Wilkes-Barre	PA	Wilkes-Barre/Scranton International	AVP	N	$4.50	5/1/2001	9/1/2027	19,651,383
Williamsport	PA	Williamsport Regional	IPT	N	$3.00	5/1/1997	11/1/1998	
Williamsport	PA	Williamsport Regional	IPT	N	$4.50	11/1/2013	9/1/2028	1,857,488
Aguadilla	PR	Rafael Hernandez	BQN	N	$3.00	3/1/1993	5/1/1996	
Aguadilla	PR	Rafael Hernandez	BQN	N	$4.50	12/1/2005	4/1/2015	9,828,476
Ponce	PR	Mercedita	PSE	N	$3.00	3/1/1993	9/1/1998	866,000
San Juan	PR	Luis Munoz Marin International	SJU	M	$3.00	3/1/1993	12/1/2005	
San Juan	PR	Luis Munoz Marin International	SJU	M	$4.50	12/1/2005	9/1/2027	594,010,551
Providence	RI	Theodore Francis Green State	PVD	S	$3.00	2/1/1994	9/1/2006	
Providence	RI	Theodore Francis Green State	PVD	S	$4.50	9/1/2006	7/1/2028	261,935,756
Charleston	SC	Charleston AFB/International	CHS	S	$4.50	3/1/2010	7/1/2039	189,546,679
Columbia	SC	Columbia Metropolitan	CAE	S	$3.00	11/1/1993	12/1/2001	
Columbia	SC	Columbia Metropolitan	CAE	S	$4.50	12/1/2001	10/1/2028	70,528,884
Florence	SC	Florence Regional	FLO	N	$3.00	12/1/1995	11/1/1999	
Florence	SC	Florence Regional	FLO	N	$3.00	12/1/1999	2/1/2000	
Florence	SC	Florence Regional	FLO	N	$4.50	12/1/2014	6/1/2019	1,850,845
Hilton Head Island	SC	Hilton Head	HXD	N	$3.00	2/1/1994	6/1/2000	
Hilton Head Island	SC	Hilton Head	HXD	N	$3.00	12/1/2000	10/1/2007	
Hilton Head Island	SC	Hilton Head	HXD	N	$4.50	5/1/2012	6/1/2023	5,934,148
Myrtle Beach	SC	Myrtle Beach International	MYR	S	$3.00	10/1/1996	8/1/2001	
Myrtle Beach	SC	Myrtle Beach International	MYR	S	$4.50	8/1/2001	8/1/2007	
Myrtle Beach	SC	Myrtle Beach International	MYR	S	$4.50	6/1/2010	1/1/2032	119,254,552
Aberdeen	SD	Aberdeen Regional	ABR	N	$3.00	1/1/2000	1/1/2002	
Aberdeen	SD	Aberdeen Regional	ABR	N	$4.50	1/1/2002	4/1/2019	1,753,949
Pierre	SD	Pierre Regional	PIR	CS	$4.50	2/1/2003	7/1/2009	
Pierre	SD	Pierre Regional	PIR	CS	$4.50	9/1/2009	9/1/2019	788,346
Rapid City	SD	Rapid City Regional	RAP	N	$3.00	8/1/1997	1/1/2000	
Rapid City	SD	Rapid City Regional	RAP	N	$3.00	6/1/2000	6/1/2006	
Rapid City	SD	Rapid City Regional	RAP	N	$4.50	6/1/2006	3/1/2034	34,932,281
Sioux Falls	SD	Sioux Falls Regional	FSD	S	$4.50	1/1/2017	4/1/2025	17,612,920
Bristol	TN	Tri-Cities Regional TN/VA	TRI	N	$3.00	2/1/1997	7/1/2007	
Bristol	TN	Tri-Cities Regional TN/VA	TRI	N	$4.50	7/1/2007	9/1/2019	16,407,404
Chattanooga	TN	Lovell Field	CHA	N	$3.00	7/1/1994	4/1/2001	
Chattanooga	TN	Lovell Field	CHA	N	$4.50	4/1/2001	11/1/2004	
Chattanooga	TN	Lovell Field	CHA	N	$3.00	11/1/2004	2/1/2005	
Chattanooga	TN	Lovell Field	CHA	N	$4.50	2/1/2005	10/1/2020	30,775,915
Jackson	TN	McKellar-Sipes Regional	MKL	GA	$4.50	10/1/2002	6/1/2025	332,248
Knoxville	TN	McGhee Tyson	TYS	S	$3.00	1/1/1994	10/1/2003	
Knoxville	TN	McGhee Tyson	TYS	S	$4.50	10/1/2003	9/1/2023	103,771,921
Memphis	TN	Memphis International	MEM	M	$3.00	8/1/1992	1/1/1997	53,700,000
Nashville	TN	Nashville International	BNA	M	$3.00	1/1/1993	12/1/2009	
Nashville	TN	Nashville International	BNA	M	$4.50	12/1/2009	9/1/2010	
Nashville	TN	Nashville International	BNA	M	$3.00	9/1/2010	5/1/2015	
Nashville	TN	Nashville International	BNA	M	$4.50	5/1/2015	7/1/2021	435,002,498
Abilene	TX	Abilene Regional	ABI	N	$3.00	1/1/1998	9/1/2002	
Abilene	TX	Abilene Regional	ABI	N	$4.50	9/1/2002	10/1/2022	7,176,261
Amarillo	TX	Rick Husband Amarillo International	AMA	N	$4.50	12/1/2008	7/1/2018	19,200,000
Austin	TX	Robert Mueller Municipal	AUS	M	$2.00	11/1/1993	2/1/1994	
Austin	TX	Robert Mueller Municipal	AUS	M	$3.00	2/1/1994	2/1/1995	
Austin	TX	Austin-Bergstrom International	AUS	M	$3.00	7/1/1995	4/1/2004	
Austin	TX	Austin-Bergstrom International	AUS	M	$4.50	4/1/2004	1/1/2035	831,089,379
Beaumont/Port Arthur	TX	Jack Brooks Regional	BPT	N	$3.00	9/1/1994	3/1/2002	

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Beaumont/Port Arthur	TX	Jack Brooks Regional	BPT	N	$4.50	3/1/2002	10/1/2021	4,543,341
Brownsville	TX	Brownsville/South Padre Island International	BRO	N	$3.00	10/1/1997	5/1/2003	
Brownsville	TX	Brownsville/South Padre Island International	BRO	N	$4.50	5/1/2003	2/1/2024	8,178,196
College Station	TX	Easterwood Field	CLL	N	$3.00	7/1/1996	4/1/2001	
College Station	TX	Easterwood Field	CLL	N	$4.50	4/1/2001	5/1/2018	6,776,641
Corpus Christi	TX	Corpus Christi International	CRP	N	$3.00	3/1/1994	3/1/2003	
Corpus Christi	TX	Corpus Christi International	CRP	N	$4.50	3/1/2003	1/1/2027	49,700,114
Dallas	TX	Dallas Love Field	DAL	M	$3.00	2/1/2008	2/1/2010	
Dallas	TX	Dallas Love Field	DAL	M	$4.50	2/1/2010	5/1/2024	
Dallas	TX	Dallas Love Field	DAL	M	$3.00	5/1/2024	2/1/2025	365,106,697
Dallas-Ft Worth	TX	Dallas/Ft Worth International	DFW	L	$3.00	5/1/1994	6/1/1996	
Dallas-Ft Worth	TX	Dallas/Ft Worth International	DFW	L	$3.00	2/1/1997	7/1/2002	
Dallas-Ft Worth	TX	Dallas/Ft Worth International	DFW	L	$4.50	7/1/2002	10/1/2038	5,655,256,130
Del Rio	TX	Del Rio International	DRT	GA	$4.50	2/1/2010	6/1/2020	403,739
El Paso	TX	El Paso International	ELP	S	$3.00	1/1/1997	8/1/2010	
El Paso	TX	El Paso International	ELP	S	$4.50	8/1/2010	5/1/2013	
El Paso	TX	El Paso International	ELP	S	$4.50	6/1/2013	3/1/2018	103,786,483
Harlingen	TX	Valley International	HRL	N	$3.00	11/1/1998	12/1/2007	
Harlingen	TX	Valley International	HRL	N	$4.50	12/1/2007	7/1/2009	
Harlingen	TX	Valley International	HRL	N	$4.50	8/1/2009	4/1/2019	24,720,749
Houston	TX	William P. Hobby	HOU	M	$3.00	11/1/2006	3/1/2015	
Houston	TX	William P. Hobby	HOU	M	$4.50	3/1/2015	9/1/2038	736,300,640
Houston	TX	George Bush Intercontinental/ Houston	IAH	L	$3.00	12/1/2008	3/1/2015	
Houston	TX	George Bush Intercontinental/ Houston	IAH	L	$4.50	3/1/2015	1/1/2028	1,372,445,143
Killeen	TX	Robert Gray AAF	GRK	N	$3.00	1/1/1993	11/1/1994	
Killeen	TX	Robert Gray AAF	GRK	N	$3.00	4/1/1995	5/1/2001	
Killeen	TX	Robert Gray AAF	GRK	N	$4.50	5/1/2001	8/1/2003	
Killeen	TX	Robert Gray AAF	GRK	N	$4.50	12/1/2003	1/1/2006	
Killeen	TX	Robert Gray AAF	GRK	N	$4.50	6/1/2006	3/1/2019	11,917,960
Laredo	TX	Laredo International	LRD	N	$3.00	10/1/1993	6/1/2009	
Laredo	TX	Laredo International	LRD	N	$4.50	6/1/2009	4/1/2040	20,779,276
Longview	TX	East Texas Regional	GGG	N	$3.00	9/1/1996	4/1/2002	
Longview	TX	East Texas Regional	GGG	N	$3.00	9/1/2002	9/1/2012	
Longview	TX	East Texas Regional	GGG	N	$4.50	9/1/2012	9/1/2023	2,350,343
Lubbock	TX	Lubbock Preston Smith International	LBB	S	$3.00	10/1/1993	2/1/2005	
Lubbock	TX	Lubbock Preston Smith International	LBB	S	$2.00	2/1/2005	2/1/2007	
Lubbock	TX	Lubbock Preston Smith International	LBB	S	$3.00	2/1/2007	6/1/2008	
Lubbock	TX	Lubbock Preston Smith International	LBB	S	$4.50	6/1/2008	10/1/2020	46,791,509
McAllen	TX	McAllen Miller International	MFE	N	$3.00	4/1/1998	6/1/2011	
McAllen	TX	McAllen Miller International	MFE	N	$4.50	6/1/2011	1/1/2023	29,874,804
Midland	TX	Midland International	MAF	S	$3.00	1/1/1993	9/1/2004	
Midland	TX	Midland International	MAF	S	$4.50	9/1/2004	1/1/2014	
Midland	TX	Midland International	MAF	S	$3.00	1/1/2014	11/1/2014	
Midland	TX	Midland International	MAF	S	$4.50	11/1/2014	5/1/2018	44,988,527
San Angelo	TX	San Angelo Regional/Mathis Field	SJT	N	$3.00	5/1/1993	4/1/2002	
San Angelo	TX	San Angelo Regional/Mathis Field	SJT	N	$4.50	4/1/2002	10/1/2019	5,282,162
San Antonio	TX	San Antonio International	SAT	M	$3.00	11/1/2001	10/1/2007	

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San Antonio	TX	San Antonio International	SAT	M	$4.50	10/1/2007	7/1/2025	463,710,203
Tyler	TX	Tyler Pounds Regional	TYR	N	$3.00	3/1/1994	9/1/2003	
Tyler	TX	Tyler Pounds Regional	TYR	N	$4.50	9/1/2003	10/1/2037	11,668,802
Victoria	TX	Victoria Regional	VCT	GA	$3.00	12/1/1994	8/1/1998	
Victoria	TX	Victoria Regional	VCT	GA	$3.00	1/1/1999	1/1/2002	
Victoria	TX	Victoria Regional	VCT	GA	$4.50	1/1/2002	8/1/2016	829,737
Waco	TX	Waco Regional	ACT	N	$3.00	11/1/1995	10/1/2001	
Waco	TX	Waco Regional	ACT	N	$4.50	10/1/2001	5/1/2018	5,245,955
Wichita Falls	TX	Sheppard AFB/Wichita Falls Municipal	SPS	N	$4.50	10/1/2008	8/1/2058	9,607,509
Cedar City	UT	Cedar City Regional	CDC	N	$4.50	2/1/2007	10/1/2011	
Cedar City	UT	Cedar City Regional	CDC	N	$4.50	2/1/2012	2/1/2021	496,704
Salt Lake City	UT	Salt Lake City International	SLC	L	$3.00	12/1/1994	4/1/2001	
Salt Lake City	UT	Salt Lake City International	SLC	L	$4.50	4/1/2001	10/1/2035	2,067,702,396
St George	UT	St George Municipal	SGU	N	$3.00	5/1/1998	9/1/2002	
St George	UT	St George Municipal	SGU	N	$4.50	6/1/2003	6/1/2031	6,604,984
Wendover	UT	Wendover	ENV	GA	$3.00	8/1/1996	10/1/1999	142,300
Arlington	VA	Ronald Reagan Washington National	DCA	L	$3.00	11/1/1993	5/1/2001	
Arlington	VA	Ronald Reagan Washington National	DCA	L	$4.50	5/1/2001	2/1/2023	1,025,567,305
Chantilly	VA	Washington Dulles International	IAD	L	$3.00	1/1/1994	5/1/2001	
Chantilly	VA	Washington Dulles International	IAD	L	$4.50	5/1/2001	12/1/2038	2,442,654,150
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$2.00	9/1/1992	10/1/1993	
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$3.00	4/1/1995	1/1/2005	
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$4.50	1/1/2005	2/1/2005	
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$4.50	2/1/2005	1/1/2010	
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$4.50	8/1/2010	12/1/2019	16,914,678
Lynchburg	VA	Lynchburg Regional/Preston Glenn Field	LYH	N	$3.00	7/1/1995	7/1/1996	
Lynchburg	VA	Lynchburg Regional/Preston Glenn Field	LYH	N	$3.00	9/1/2000	6/1/2002	
Lynchburg	VA	Lynchburg Regional/Preston Glenn Field	LYH	N	$4.50	6/1/2002	9/1/2031	8,364,446
Newport News	VA	Newport News/Williamsburg International	PHF	N	$3.00	10/1/2006	7/1/2007	
Newport News	VA	Newport News/Williamsburg International	PHF	N	$4.50	7/1/2010	5/1/2032	27,821,415
Norfolk	VA	Norfolk International	ORF	S	$3.00	5/1/1997	1/1/2010	
Norfolk	VA	Norfolk International	ORF	S	$4.50	9/1/2010	9/1/2019	112,166,455
Richmond	VA	Richmond International	RIC	S	$3.00	5/1/1994	1/1/2005	
Richmond	VA	Richmond International	RIC	S	$4.50	1/1/2005	3/1/2025	169,972,887
Roanoke	VA	Roanoke Regional/Woodrum Field	ROA	N	$3.00	9/1/1998	12/1/2001	
Roanoke	VA	Roanoke Regional/Woodrum Field	ROA	N	$4.50	12/1/2001	2/1/2005	
Roanoke	VA	Roanoke Regional/Woodrum Field	ROA	N	$3.00	2/1/2005	11/1/2005	
Roanoke	VA	Roanoke Regional/Woodrum Field	ROA	N	$4.50	11/1/2005	1/1/2022	27,293,777
Staunton	VA	Shenandoah Valley Regional	SHD	CS	$3.00	12/1/2001	12/1/2006	
Staunton	VA	Shenandoah Valley Regional	SHD	CS	$4.50	6/1/2007	9/1/2022	642,846
Charlotte Amalie	VI	Cyril E. King	STT	S	$3.00	3/1/1993	8/1/1995	
Charlotte Amalie	VI	Cyril E. King	STT	S	$3.00	12/1/1995	12/1/2002	
Charlotte Amalie	VI	Cyril E. King	STT	S	$3.00	8/1/2004	4/1/2012	

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Charlotte Amalie	VI	Cyril E. King	STT	S	$4.50	4/1/2012	1/1/2019	40,794,518
Christiansted	VI	Henry E. Rohlsen	STX	N	$3.00	3/1/1993	4/1/1996	
Christiansted	VI	Henry E. Rohlsen	STX	N	$3.00	12/1/1996	7/1/2003	
Christiansted	VI	Henry E. Rohlsen	STX	N	$3.00	10/1/2011	7/1/2016	9,339,163
Burlington	VT	Burlington International	BTV	S	$3.00	4/1/1997	9/1/2003	
Burlington	VT	Burlington International	BTV	S	$4.50	9/1/2003	10/1/2009	
Burlington	VT	Burlington International	BTV	S	$4.50	12/1/2009	8/1/2021	52,013,046
Bellingham	WA	Bellingham International	BLI	S	$3.00	7/1/1993	8/1/1998	
Bellingham	WA	Bellingham International	BLI	S	$3.00	3/1/1999	1/1/2000	
Bellingham	WA	Bellingham International	BLI	S	$3.00	1/1/2000	7/1/2002	
Bellingham	WA	Bellingham International	BLI	S	$4.50	7/1/2002	6/1/2005	
Bellingham	WA	Bellingham International	BLI	S	$4.50	6/1/2005	7/1/2010	
Bellingham	WA	Bellingham International	BLI	S	$4.50	10/1/2010	10/1/2027	38,188,548
Friday Harbor	WA	Friday Harbor	FHR	N	$3.00	2/1/2001	7/1/2016	517,077
Moses Lake	WA	Grant County International	MWH	GA	$3.00	3/1/1999	11/1/2005	
Moses Lake	WA	Grant County International	MWH	GA	$4.50	11/1/2005	2/1/2017	162,124
Pasco	WA	Tri-Cities	PSC	N	$3.00	11/1/1993	10/1/2001	
Pasco	WA	Tri-Cities	PSC	N	$4.50	10/1/2001	4/1/2035	56,113,124
Port Angeles	WA	William R. Fairchild International	CLM	CS	$3.00	8/1/1993	5/1/1995	
Port Angeles	WA	William R. Fairchild International	CLM	CS	$3.00	9/1/1996	10/1/2011	
Port Angeles	WA	William R. Fairchild International	CLM	CS	$3.00	7/1/2012	4/1/2022	1,000,156
Pullman	WA	Pullman/Moscow Regional	PUW	N	$3.00	6/1/1994	2/1/1996	
Pullman	WA	Pullman/Moscow Regional	PUW	N	$3.00	2/1/2000	1/1/2002	
Pullman	WA	Pullman/Moscow Regional	PUW	N	$4.50	1/1/2002	10/1/2005	
Pullman	WA	Pullman/Moscow Regional	PUW	N	$4.50	10/1/2005	9/1/2013	
Pullman	WA	Pullman/Moscow Regional	PUW	N	$4.50	11/1/2013	6/1/2069	11,352,608
Seattle	WA	Seattle-Tacoma International	SEA	L	$3.00	11/1/1992	10/1/2001	
Seattle	WA	Seattle-Tacoma International	SEA	L	$4.50	10/1/2001	11/1/2028	2,167,378,460
Spokane	WA	Spokane International	GEG	S	$3.00	6/1/1993	4/1/2003	
Spokane	WA	Spokane International	GEG	S	$4.50	4/1/2003	11/1/2017	134,678,692
Walla Walla	WA	Walla Walla Regional	ALW	N	$3.00	11/1/1993	10/1/2001	
Walla Walla	WA	Walla Walla Regional	ALW	N	$4.50	10/1/2001	10/1/2019	3,745,775
Wenatchee	WA	Pangborn Memorial	EAT	N	$3.00	8/1/1993	10/1/1995	
Wenatchee	WA	Pangborn Memorial	EAT	N	$3.00	6/1/1998	7/1/2002	
Wenatchee	WA	Pangborn Memorial	EAT	N	$4.50	7/1/2002	2/1/2003	
Wenatchee	WA	Pangborn Memorial	EAT	N	$4.50	5/1/2003	4/1/2010	
Wenatchee	WA	Pangborn Memorial	EAT	N	$4.50	5/1/2010	8/1/2019	4,468,813
Yakima	WA	Yakima Air Terminal/McAllister Field	YKM	N	$3.00	2/1/1993	2/1/1999	
Yakima	WA	Yakima Air Terminal/McAllister Field	YKM	N	$3.00	5/1/1999	6/1/2000	
Yakima	WA	Yakima Air Terminal/McAllister Field	YKM	N	$3.00	6/1/2000	4/1/2011	
Yakima	WA	Yakima Air Terminal/McAllister Field	YKM	N	$4.50	4/1/2011	4/1/2019	5,465,251
Appleton	WI	Appleton International	ATW	N	$3.00	7/1/1994	6/1/2006	
Appleton	WI	Appleton International	ATW	N	$4.50	6/1/2006	4/1/2008	
Appleton	WI	Appleton International	ATW	N	$3.00	4/1/2008	9/1/2008	
Appleton	WI	Appleton International	ATW	N	$4.50	9/1/2008	1/1/2023	20,417,560
Eau Claire	WI	Chippewa Valley Regional	EAU	N	$3.00	2/1/1996	12/1/2001	
Eau Claire	WI	Chippewa Valley Regional	EAU	N	$4.50	12/1/2001	1/1/2006	
Eau Claire	WI	Chippewa Valley Regional	EAU	N	$4.50	8/1/2006	6/1/2024	2,147,974
Green Bay	WI	Green Bay - Austin Straubel International	GRB	N	$3.00	3/1/1993	3/1/2002	

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Green Bay	WI	Green Bay - Austin Straubel International	GRB	N	$4.50	3/1/2002	10/1/2020	46,299,787
La Crosse	WI	La Crosse Regional	LSE	N	$3.00	7/1/1994	4/1/2001	
La Crosse	WI	La Crosse Regional	LSE	N	$4.50	4/1/2001	4/1/2028	12,741,825
Madison	WI	Dane County Regional - Truax Field	MSN	S	$3.00	9/1/1993	11/1/2001	
Madison	WI	Dane County Regional - Truax Field	MSN	S	$4.50	11/1/2001	10/1/2023	92,211,569
Milwaukee	WI	General Mitchell International	MKE	M	$3.00	5/1/1995	11/1/2012	
Milwaukee	WI	General Mitchell International	MKE	M	$4.50	11/1/2012	2/1/2020	
Milwaukee	WI	General Mitchell International	MKE	M	$3.00	2/1/2020	4/1/2028	394,620,217
Mosinee	WI	Central Wisconsin	CWA	N	$3.00	11/1/1993	9/1/2007	
Mosinee	WI	Central Wisconsin	CWA	N	$4.50	9/1/2007	8/1/2017	11,255,100
Rhinelander	WI	Rhinelander-Oneida County	RHI	N	$3.00	1/1/1994	4/1/1996	
Rhinelander	WI	Rhinelander-Oneida County	RHI	N	$3.00	6/1/1996	9/1/2001	
Rhinelander	WI	Rhinelander-Oneida County	RHI	N	$4.50	9/1/2001	12/1/2018	2,473,501
Charleston	WV	Yeager	CRW	N	$3.00	8/1/1993	11/1/2001	
Charleston	WV	Yeager	CRW	N	$4.50	11/1/2001	6/1/2018	25,641,516
Clarksburg	WV	North Central West Virginia	CKB	N	$3.00	3/1/1994	10/1/1995	
Clarksburg	WV	North Central West Virginia	CKB	N	$4.50	4/1/2001	8/1/2002	
Clarksburg	WV	North Central West Virginia	CKB	N	$4.50	5/1/2004	5/1/2054	3,101,233
Huntington	WV	Tri-State/Milton J. Ferguson Field	HTS	N	$3.00	12/1/1995	12/1/2008	
Huntington	WV	Tri-State/Milton J. Ferguson Field	HTS	N	$3.00	5/1/2009	6/1/2012	
Huntington	WV	Tri-State/Milton J. Ferguson Field	HTS	N	$4.50	7/1/2012	5/1/2020	6,162,682
Lewisburg	WV	Greenbrier Valley	LWB	CS	$4.50	4/1/2011	1/1/2025	1,104,958
Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$2.00	12/1/1992	1/1/1994	
Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$2.00	12/1/1994	1/1/2002	
Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$4.50	1/1/2002	6/1/2004	
Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$4.50	6/1/2004	3/1/2008	
Morgantown	WV	Morgantown Municipal-Walter L. Bill Hart Field	MGW	N	$4.50	6/1/2009	1/1/2026	1,170,454
Parkersburg	WV	Mid-Ohio Valley Regional	PKB	CS	$3.00	5/1/1999	8/1/2002	
Parkersburg	WV	Mid-Ohio Valley Regional	PKB	CS	$4.50	8/1/2003	10/1/2027	798,612
Casper	WY	Casper/ Natrona County International	CPR	N	$3.00	9/1/1993	4/1/2001	
Casper	WY	Casper/ Natrona County International	CPR	N	$4.50	4/1/2001	6/1/2003	
Casper	WY	Casper/ Natrona County International	CPR	N	$4.50	6/1/2003	3/1/2012	
Casper	WY	Casper/ Natrona County International	CPR	N	$3.00	3/1/2012	10/1/2021	6,506,449
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	CS	$3.00	11/1/1993	4/1/2001	
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	CS	$4.50	4/1/2001	1/1/2007	
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	CS	$4.50	1/1/2007	9/1/2012	
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	CS	$4.50	9/1/2014	9/1/2024	1,804,637
Cody	WY	Yellowstone Regional	COD	N	$3.00	8/1/1997	7/1/2001	
Cody	WY	Yellowstone Regional	COD	N	$4.50	7/1/2001	7/1/2003	

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Cody	WY	Yellowstone Regional	COD	N	$4.50	7/1/2003	4/1/2005	
Cody	WY	Yellowstone Regional	COD	N	$4.50	9/1/2005	6/1/2018	2,224,832
Gillette	WY	Gillette-Campbell County	GCC	N	$3.00	9/1/1993	12/1/2001	
Gillette	WY	Gillette-Campbell County	GCC	N	$4.50	12/1/2001	6/1/2004	
Gillette	WY	Gillette-Campbell County	GCC	N	$4.50	1/1/2005	7/1/2018	2,136,520
Jackson	WY	Jackson Hole	JAC	N	$3.00	8/1/1993	4/1/2001	
Jackson	WY	Jackson Hole	JAC	N	$4.50	4/1/2001	9/1/2041	39,749,014
Laramie	WY	Laramie Regional	LAR	N	$3.00	8/1/1996	10/1/2000	
Laramie	WY	Laramie Regional	LAR	N	$3.00	12/1/2000	8/1/2001	
Laramie	WY	Laramie Regional	LAR	N	$4.50	12/1/2006	4/1/2013	
Laramie	WY	Laramie Regional	LAR	N	$4.50	6/1/2013	2/1/2024	563,891
Riverton	WY	Riverton Regional	RIW	CS	$3.00	5/1/1995	4/1/2001	
Riverton	WY	Riverton Regional	RIW	CS	$4.50	4/1/2001	3/1/2045	1,754,285
Rock Springs	WY	Rock Springs-Sweetwater County	RKS	N	$3.00	4/1/1995	4/1/2006	
Rock Springs	WY	Rock Springs-Sweetwater County	RKS	N	$4.50	4/1/2006	11/1/2023	2,009,268
Sheridan	WY	Sheridan County	SHR	CS	$3.00	3/1/1996	12/1/2001	
Sheridan	WY	Sheridan County	SHR	CS	$4.50	12/1/2001	9/1/2008	
Sheridan	WY	Sheridan County	SHR	CS	$4.50	10/1/2008	8/1/2035	1,388,712
Worland	WY	Worland Municipal	WRL	CS	$4.50	1/1/2003	3/1/2008	
Worland	WY	Worland Municipal	WRL	CS	$4.50	8/1/2008	7/1/2022	265,060
NOTES:								
Total PFC approved includes all the collections at the location		# of unique locations approved	394					$92,127,227,500

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2017	Entitlement 2017	Discretionary 2018	Entitlement 2018
CA	Los Angeles	Los Angeles International	11,000,000.00	0	11,000,000.00	0
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	20,000,000.00	0	20,000,000.00	0
IL	Chicago	Chicago O'Hare International	60,000,000.00	0	65,000,000.00	0
IN	Gary	Gary/Chicago International	4,906,500.00	0	0	0
NY	New York	John F Kennedy International	0	0	7,000,000.00	0
OH	Cleveland	Cleveland-Hopkins International	0	658,991.00	0	0
OH	Columbus	Port Columbus International	0	0	0	0
PA	Philadelphia	Philadelphia International (1)	19,000,000.00	0	22,000,000.00	0
TX	Dallas	Dallas Love Field	7,000,000.00	900,000.00	0	0
		Total	121,906,500	1,558,991	125,000,000	0

[1] At this time, the City of Philadelphia is reviewing its long-term financial plans so the amounts and timing of the PHL LOI are subject to change.

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2019	Entitlement 2019	Discretionary 2020	Entitlement 2020
CA	Los Angeles	Los Angeles International	11,000,000.00	0	0	0
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	20,000,000.00	0	20,000,000.00	0
IL	Chicago	Chicago O'Hare International	65,000,000.00	0	65,000,000.00	0
IN	Gary	Gary/Chicago International	0	0	0	0
NY	New York	John F Kennedy International	0	0	0	0
OH	Cleveland	Cleveland-Hopkins International	0	0	0	0
OH	Columbus	Port Columbus International	0	0	0	0
PA	Philadelphia	Philadelphia International (1)	26,000,000.00	0	30,000,000.00	0
TX	Dallas	Dallas Love Field	0	0	0	0
		Total	122,000,000	0	157,000,000	0

[1] At this time, the City of Philadelphia is reviewing its long-term financial plans so the amounts and timing of the PHL LOI are subject to change.

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2021	Entitlement 2021	Discretionary 2022	Entitlement 2022
CA	Los Angeles	Los Angeles International	0	0	0	0
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	20,000,000.00	0	10,000,000.00	0
IL	Chicago	Chicago O'Hare International	25,000,000.00	0	30,000,000.00	0
IN	Gary	Gary/Chicago International	0	0	0	0
NY	New York	John F Kennedy International	0	0	0	0
OH	Cleveland	Cleveland-Hopkins International	0	0	0	0
OH	Columbus	Port Columbus International	0	0	0	0
PA	Philadelphia	Philadelphia International (1)	32,000,000.00	0	40,000,000.00	0
TX	Dallas	Dallas Love Field	0	0	0	0
		Total	77,000,000.00	0	80,000,000.00	0

[1] At this time, the City of Philadelphia is reviewing its long-term financial plans so the amounts and timing of the PHL LOI are subject to change.

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2023	Entitlement 2023	Discretionary 2024	Entitlement 2024
CA	Los Angeles	Los Angeles International	0	0	0	0
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	0	0	0	0
IL	Chicago	Chicago O'Hare International	30,000,000.00	0	30,000,000.00	0
IN	Gary	Gary/Chicago International	0	0	0	0
NY	New York	John F Kennedy International	0	0	0	0
OH	Cleveland	Cleveland-Hopkins International	0	0	0	0
OH	Columbus	Port Columbus International	0	0	0	0
PA	Philadelphia	Philadelphia International (1)	40,000,000.00	0	40,000,000.00	0
TX	Dallas	Dallas Love Field	0	0	0	0
		Total	70,000,000	0	70,000,000	0

[1] At this time, the City of Philadelphia is reviewing its long-term financial plans so the amounts and timing of the PHL LOI are subject to change.

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2025	Entitlement 2025	Discretionary Beyond	Entitlement Beyond
CA	Los Angeles	Los Angeles International	0	0	0	0
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	0	0	0	0
IL	Chicago	Chicago O'Hare International	30,000,000.00	0	20,000,000.00	0
IN	Gary	Gary/Chicago International	0	0	0	0
NY	New York	John F Kennedy International	0	0	0	0
OH	Cleveland	Cleveland-Hopkins International	0	0	0	0
OH	Columbus	Port Columbus International	0	0	0	0
PA	Philadelphia	Philadelphia International (1)	41,000,000.00	0	87,000,000.00	0
TX	Dallas	Dallas Love Field	0	0	0	0
		Total	71,000,000	0	107,000,000	0

[1] At this time, the City of Philadelphia is reviewing its long-term financial plans so the amounts and timing of the PHL LOI are subject to change.

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name			Discretionary Total	Entitlement Total
CA	Los Angeles	Los Angeles International			33,000,000.00	0
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International			110,000,000.00	0
IL	Chicago	Chicago O'Hare International			420,000,000.00	0
IN	Gary	Gary/Chicago International			4,906,500.00	0
NY	New York	John F Kennedy International			7,000,000.00	0
OH	Cleveland	Cleveland-Hopkins International			0	658,991.00
OH	Columbus	Port Columbus International			0	0
PA	Philadelphia	Philadelphia International (1)			377,000,000.00	0
TX	Dallas	Dallas Love Field			7,000,000.00	900,000.00
		Total			958,906,500.00	1,558,991.00

[1] At this time, the City of Philadelphia is reviewing its long-term financial plans so the amounts and timing of the PHL LOI are subject to change

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3E. OTHER INFORMATION

AVIATION USER FEES

Special and Trust Fund Receipts
(in millions of dollars)

Identification code: 69-5422-0-2-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
0100	Balance, start of year...	8	12	12
	Receipts:			
	Current Law:			
1110	Aviation User Fees, Overflight Fees	110	113	119
1130	Property Disposal or Lease Proceeds, Aviation User Fee	8	.....	.....
1199	Total Current Law Receipts	118	113	119
1999	Total Receipts	118	113	119
2000	Total: Balances and Receipts	126	125	131
	Appropriations:			
	Current Law:			
2101	Aviation User Fees	-121	-121	-119
2132	Essential Air Service and Rural Airport Improvement Fund	8	8	.....
2199	Total current law appropriations	-113	-113	-119
2999	Total appropriations..	-113	-113	-119
5098	Rounding Adjustment	-1	.....	.....
5099	Balance, end of year	12	12	12

Program and Financing
(in millions of dollars)

Identification code: 69-5422-0-2-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Obligations by program activity:			
0001	Other Collections	1	......	......
0100	Direct program activities, subtotal	1	......	......
0900	Total new obligations (object class 25.2)	1	......	......
	Budgetary resources:			
	Unobligated balance:			
1000	Unobligated balance brought forward, Oct 1............................	2	10	10
1011	Unobligated balance transfer from other acct [069-5423]	1	.....	.....
1050	Unobligated balance (total)...	3	10	10
	Budget authority:			
	Appropriations, mandatory:			
1201	Appropriations (special or trust fund)......................................	121	121	119
1220	Appropriations Transferred to other accounts [069-5423]	-113	-121	-119
1260	Appropriations, mandatory (total)...	8	......	......
1900	Budget authority (total)..	8	.....	......
1930	Total budgetary resources available	11	10	10
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year............................	10	10	10
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid Obligations, brought forward, Oct 1	.....	1	1
3010	New Obligations, unexpired accounts.	1	......	......
3050	Unpaid Obligations, end of the year	1	1	1
	Memorandum (non-add) entries:			
3100	Obligated balance, start of the year	.....	1	1
3200	Obligated balance, end of the year	1	1	1
	Budget authority and outlays, net:			

	Mandatory:			
4090	Budget authority, gross..	8	......	......
	Outlays, gross:			
4180	Budget authority, net (total)..	8	.....	......
4190	Outlays, net (total)	.....	.....	.....

The Federal Aviation Reauthorization Act of 1996 (P.L. 104–264) authorized the collection of user fees for air traffic control and related services provided by the Federal Aviation Administration to aircraft that neither take off nor land in the United States, commonly known as overflight fees. The Budget estimates that $119 million in overflight fees will be collected in 2018.

AVIATION INSURANCE REVOLVING FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4120-0-3-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Request
	Obligations by program activity:			
0801	Program administration	1	1	1
0802	Insurance Claims	20	......	......
0900	Total new obligations, unexpired accounts	21	1	1
	Budget resources:			
	Unobligated balance:			
1000	Unobligated balance brought forward, Oct. 1	2,132	2,147	2,217
	Budget authority:			
	Spending authority form offsetting collections, mandatory:			
1800	Collected	36	71	82
1930	Total budgetary resources available	2,168	2,218	2,299
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	2,147	2,217	2,298
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct. 1	1	1	1
3010	New Obligations, unexpired accounts	21	1	1
3020	Outlays (gross)	-21	-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
	Budget authority and outlays net:			
	Mandatory:			
4090	Budget authority, gross	36	71	82
	Outlay, gross:			
4100	Outlays from new mandatory authority	21	1	1
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4121	Interest on Federal securities	-36	-71	-82
4180	Budget authority, net (total)	.....	......	......
4190	Outlays, net (total)	-15	-70	-81
	Memorandum (non-add) entries:			
5000	Total investments, SOY: Federal securities: Par value	2,126	1,872	2,198
5001	Total investments, EOY: Federal securities: Par value	1,872	2,198	2,279

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 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 2016 Actual	FY 2017 Estimate	FY 2018 Request
	Reimbursable obligations:			
11.1	Personnel Compensation: Full time permanent.......................	.....	1	1
25.2	Other Services from Non-Federal sources	1	......	......
42.0	Projected Insurance Claims and indemnities	20	......	......
99.9	Total new obligations, unexpired accounts	21	1	1

Employment Summary

Identification code: 69-4120-0-3-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Request
2001	Reimbursable Civilian full-time equivalent employment	4	4	4

ADMINISTRATIVE SERVICES FRANCHISE FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4562-0-4-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Obligations by program activity:			
0801	Accounting Services	46	56	51
0804	Information Services	117	120	183
0806	Multi Media	3	3	3
0807	FLLI (formerly CMEL/Training)	9	11	11
0808	International Training	4	5	5
0810	Logistics	218	218	220
0811	Aircraft Maintenance	60	61	62
0812	Acquisition	6	4	4
0900	Total new obligations, unexpired accounts	463	478	539
	Budgetary Resources:			
	Unobligated balance:			
1000	Unobligated balance brought forward, Oct 1	184	261	327
1021	Recoveries of prior year unpaid obligations	33	28	....
1050	Unobligated balance (total)	217	289	327
	Budget authority:			
	Spending authority from offsetting collections, discretionary:			
1700	Collected	507	516	566
1930	Total budgetary resources available	724	805	893
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	261	327	354
	Change in obligated balances:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct 1	173	155	98
3010	Obligations incurred, unexpired accounts	463	478	539
3020	Outlays (gross)	-448	-507	-575
3040	Recoveries of prior year unpaid obligations unexpired	-33	-28	....
3050	Unpaid obligations, end of year	155	98	62
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	173	155	98
3200	Obligated balance, end of year	155	98	62
	Budget authority and Outlays, net:			
	Discretionary:			
4000	Budget authority, gross	507	516	566
	Outlays gross:			
4010	Outlays from new discretionary authority	337	351	385
4011	Outlays from discretionary balances	111	156	190
4020	Outlays, gross (total)	448	507	575
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-505	-514	-564
4033	Non-Federal sources	-2	-2	-2
4040	Offsets against gross budget authority and outlays (total)	-507	-516	-566
	Additional offsets against gross budget authority only:			
4080	Outlays, net (discretionary)	-59	-9	9
4180	Budget authority, net (total)	....	....	....
4190	Outlays, net (total)	-59	-9	9

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 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Reimbursable obligations:			
11.1	Personnel compensation: Full-time permanent	130	139	141
12.1	Civilian personnel benefits	45	50	50
21.0	Travel and transportation of persons	5	6	6
22.0	Transportation of things	6	6	6
23.3	Communications, utilities, and miscellaneous charges	12	12	13
25.2	Other services from non-Federal sources	189	162	219
26.0	Supplies and materials	65	94	95
31.0	Equipment	10	7	7
42.0	Insurance claims and indemnities	1	2	2
99.9	Total new obligations, unexpired accounts	463	478	539

Employment Summary

Identification code: 69-4562-0-4-402		FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
2001	Reimbursable civilian full-time equivalent employment	1,627	1,731	1,697

AIRPORT AND AIRWAY TRUST FUND

Program and Financing
(in millions of dollars)

	Identification code: 69-8103-0-7-402	FY 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Memorandum (non-add) entries:			
5000	Total investments, start of year: Federal securities: Par value	12,716	13,400	13,918
5001	Total investments, end of year: Federal securities: Par value	13,400	13,981	15,307

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 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Unexpended balance, start of year:			
0100	Balance, start of year	14,071	14,773	15,424
0999	Total balance, start of year	14,071	14,773	15,424
	Cash Income during the year:			
	Current law:			
	Receipts			
1110	Excise Taxes, Airport and Airway Trust Fund	14,406	14,874	15,452
1130	Grants-in-aid for Airports (Airport and Airway Trust Fund)	2	1	1
1130	Facilities and Equipment (Airport and Airway and Airport Trust Fund)	42	51	51
1130	Research, Engineering and Development (Airport and Airway Trust Fund)	1		
1150	Interest, Airport and Airway Trust Fund	261	277	289
1160	Facilities and Equipment (Airport and Airway Trust Fund)	37	72	52
1160	Facilities and Equipment (Airport and Airway Trust Fund)		20	
1160	Research, Engineering and Development (Airport and Airway Trust Fund)	1	3	3
1199	Income under present law	14,750	15,278	15,848
1999	Total cash income	14,750	15,278	15,848
	Cash outgo during year:			
	Current law:			
2100	Payments to Air Carriers (021-04-8301-0)	-169	-166	-70
2100	Trust Fund Share of FAA Activities (Airport and Airway Trust Fund) (021-12-8104-0)	-7,922	-7,907	-8,100
2100	Grants-in-aid for Airports (Airport and Airway Trust Fund) (021-12-8106-0)	-3,127	-3,414	-3,480
2100	Facilities and Equipment (Airport and Airway Trust Fund) (021-12-8107-0)	-2,670	-2,955	-2,932

2100	Research, Engineering and Development (Airport and Airway Trust Fund) (021-12-8108-0)	-161	-185	-181
2199	Outgo under current law (-)	-14,049	-14,627	-14,763
2999	Total Cash outgo (-)	-14,049	-14,627	-14,763
	Surplus Deficit:			
3110	Excluding interest	440	374	796
3120	Interest	261	277	289
3199	Subtotal, surplus or deficit	701	651	1,085
	Manual Adjustments:			
3298	Rounding adjustment	1		
3299	Total adjustments	1		
	Unexpended balance, end of year:			
4100	Uninvested balance (net), end of year	1,373	1,506	1,202
4200	Airport and Airway Trust Fund	13,400	13,918	15,307
4999	Total balance, end of year	14,773	15,424	16,509

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 2016 Actual	FY 2017 Estimate	FY 2018 Estimate
	Obligations by program activity:			
0001	Payment to Operations	7,922	7,907	8,100
0900	Total new obligations (object class 94.0)	7,922	7,907	8,100
	Budgetary resources:			
	Appropriations, discretionary:			
	Budge authority:			
1101	Appropriations (special or trust fund).	7,922	7,907	8,100
1930	Total budgetary resources available	7,922	7,907	8,100
	Change in obligated balance:			
	Unpaid obligations:			
3010	Obligations incurred, unexpired accounts	7,922	7,907	8,100
3020	Outlays (gross):	-7,922	-7,907	-8,100
	Budget authority and outlays, net:			
	Discretionary:			
4000	Budget authority, gross	7,922	7,907	8,100
	Outlays, gross:			
4010	Outlays from new discretionary authority	7,922	7,907	8,100
4180	Budget authority, net (total)	7,922	7,907	8,100
4190	Outlays, net (total)	7,922	7,907	8,100

For 2018, the Budget proposes $9,891 million for Federal Aviation Administration Operations, of which $8,100 million would be provided from the Airport and Airway Trust Fund.

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FAA ADMINISTRATIVE PROVISIONS - REQUESTED

Sec. 110. The Administrator of the Federal Aviation Administration may reimburse amounts made available to satisfy 49 U.S.C. 41742(a)(1) from fees credited under 49 U.S.C. 45303 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 funding from the Facilities & Equipment (F&E) account. This provision ensures that the F&E account is reimbursed from the over-flight fees collected and is needed in order to continue the practice in FY 2018.

Sec. 111. Amounts collected under section 40113(e) of title 49, United States Code, shall be credited to the appropriation current at the time of collection, to be merged with and available for the same purposes of such appropriation.

- As authorized under 49 USC 40113(e), the FAA may provide safety-related training and operational services to foreign aviation authorities with or without reimbursement. While FAA generally enforces a prepayment policy for reimbursable goods and services provided to foreign countries or international organizations, many have laws or regulations similar to the U.S. that prohibit advance payments. In those instances, FAA often receives payments for services provided during a fiscal year after that year has ended. This provision allows FAA to use the funds for additional technical assistance work that cannot be prepaid, instead of returning the funds to a lapsed appropriation.

Sec. 112. None of the funds 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 2018 in order to minimize potential payroll liability.

Sec. 113. 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. 114. 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 2018 budget proposes to retain the provision that all FAA retention bonuses continue to be approved by the Assistant Secretary for Administration.

SEC. 115. 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 section 404 of this Act 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."

- The FY 2018 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 request the transfer of 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.

FAA ADMINISTRATIVE PROVISIONS - DELETED

[SEC. 110. None of the funds in this Act may be used to compensate in excess of 600 technical staff-years under the federally funded research and development center contract between the Federal Aviation Administration and the Center for Advanced Aviation Systems Development during fiscal year 2016.**]**

[SEC. 111. None of the funds in this Act shall be used to pursue or adopt guidelines or regulations requiring airport sponsors to provide to the Federal Aviation Administration without cost building construction, maintenance, utilities and expenses, or space in airport sponsor-owned buildings for services relating to air traffic control, air navigation, or weather reporting: *Provided*, That the prohibition of funds in this section does not apply to negotiations between the agency and airport sponsors to achieve agreement on "below-market" rates for these items or to grant assurances that require airport sponsors to provide land without cost to the FAA for air traffic control facilities.**]**

[SEC. 116. The Secretary shall apportion to the sponsor of an airport that received scheduled or unscheduled air service from a large certified air carrier (as defined in part 241 of title 14 Code of Federal Regulations, or such other regulations as may be issued by the Secretary under the authority of section 41709) an amount equal to the minimum apportionment specified in 49 U.S.C. 47114(c), if the Secretary determines that airport had more than 10,000 passenger boardings in the preceding calendar year, based on data submitted to the Secretary under part 241 of title 14, Code of Federal Regulations.]

[SEC. 118. Notwithstanding any other provision of law, none of the funds made available under this Act or any prior Act may be used to implement or to continue to implement any limitation on the ability of any owner or operator of a private aircraft to obtain, upon a request to the Administrator of the Federal Aviation Administration, a blocking of that owner's or operator's aircraft registration number from any display of the Federal Aviation Administration's Aircraft Situational Display to Industry data that is made available to the public, except data made available to a Government agency, for the noncommercial flights of that owner or operator.]

[SEC. 119. None of the funds in this Act shall be available for salaries and expenses of more than nine political and Presidential appointees in the Federal Aviation Administration.]

[SEC. 119A. None of the funds made available under this Act may be used to increase fees pursuant to section 44721 of title 49, United States Code, until the FAA provides to the House and Senate Committees on Appropriations a report that justifies all fees related to aeronautical navigation products and explains how such fees are consistent with Executive Order 13642.]

[SEC. 119B. None of the funds in this Act may be used to close a regional operations center of the Federal Aviation Administration or reduce its services unless the Administrator notifies the House and Senate Committees on Appropriations not less than 90 full business days in advance.]

[SEC. 119C. None of the funds appropriated or limited by this Act may be used to change weight restrictions or prior permission rules at Teterboro airport in Teterboro, New Jersey.]

FEDERAL AVIATION ADMINISTRATION

OPERATIONS

ESTIMATES		APPROPRIATIONS	
2007	[1] 8,366,000,000	2007	[2] 8,374,374,217
2008	[3] 8,725,783,000	2008	[4] 8,740,000,000
2009	[5] 8,998,461,700	2009	[6] 9,046,167,000
2010	[7] 9,335,798,000	2010	[8,9] 9,351,400,000
2011	[10] 9,793,000,000	2011	[11] 9,516,172,000
2012	[12] 9,823,000,000	2012	[13] 9,653,395,000
2013	[14] 9,517,948,000	2013	[15] 9,653,395,000
		2013 Sequester (P.L.112-240)	[16] -485,623,489
		2013 Rescission (P.L. 113-6)	[17] -19,307,790
2014	[18] 9,707,000,000	2014	[19] 9,651,422,000
2015	[20] 9,750,000,000	2015	[21] 9,740,700,000
2016	[22] 9,915,000,000	2016	[23] 9,909,724,000
2017	[24] 9,994,352,000	2017	[25] 10,025,852,000
2018	[26] 9,890,886,000		

[1] Includes $5,445,900 from the Airport and Airway Trust Fund
[2] Includes $5,627,900,000 from the Airport and Airway Trust Fund
[3] 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.
[4] Includes $6,397,061,000 from the Airport and Airway Trust Fund.
[5] 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.
[6] Includes $5,238,005,000 from Airport and Airway Trust Fund. Also includes $3.7 million transfer from the U.S. Department of State.
[7] Includes $6,207,798,000 from the Airport and Airway Trust Fund.
[8] Includes $4,000,000,000 from the Airport and Airway Trust Fund.
[9] Includes $1,300,000 transfer from the U.S. Department of State.
[10] Includes $6,064,000,000 from the Airport and Airway Trust Fund
[11] Reflects a 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
[12] Includes $4,958,000,000 from the Airport and Airway Trust Fund
[13] Includes $5,060,694,000 from the Airport and Airway Trust Fund
[14] Includes $6,721,000,000 from the Airport and Airway Trust Fund
[15] Reflects funding at the FY 2012 funding level pursuant to P.L. 113-6, Consolidated and Further Continuing Appropriations Act, 2013.
[16] 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).
[17] Reflects a 0.20 percent across-the-board rescission per P.L. 113-6.
[18] Includes $6,484,000,000 from the Airport and Airway Trust Fund
[19] Includes $6,495,208,000 from the Airport and Airway Trust Fund.
[20] Includes $9,040,850,000 from the Airport and Airway Trust Fund.
[21] Includes $8,595,000,000 from the Airport and Airway Trust Fund.
[22] Includes $8,547,000,000 from the Airport and Airway Trust Fund.
[23] Includes $7,922,000,000 from the Airport and Airway Trust Fund.
[24] Includes $7,608,000,000 from the Airport and Airway Trust Fund.
[25] Includes $9,173,000,000 from the Airport and Airway Trust Fund.
[26] Includes $8,100,000,000 from the Airport and Airway Trust Fund

FEDERAL AVIATION ADMINISTRATION

FACILITIES AND EQUIPMENT (AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2007	2,503,000,000	2007	2,517,520,000
2008	[1]2,461,566,000	2008	2,513,611,000
2009	[2]2,723,510,000	2009	2,742,095,000
		2009 Supplemental (P.L.111-5)	[3]200,000,000
2010	2,925,202,000	2010	[4]2,928,315,000
2011	2,970,000,000	2011	[5]2,730,731,000
2012	[6]3,120,000,000	2012	2,730,731,074
2013	2,850,000,000	2013	[7]2,730,731,074
		2013 Supplemental (P.L. 113-2)	[8]30,000,000
		2013 Sequester (P.L.11-240)	[9]-141,642,505
		2013 Rescission (P.L. 113-6)	[10]-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	2016	2,855,000,000
2017	2,838,000,000	2017	2,855,000,000
2018	2,766,200,000		

[1] 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.
[2] 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.
[3] American Recovery and Reinvestment Act Supplemental per P.L. 111-5, from the General Fund.
[4] Reflects $7,888,294 rescission of prior year authority per P.L. 111-226.
[5] Reflects a rescission of $5,472,000 per P.L. 112-55.
[6] Includes $250,000,000 of mandatory General Fund from the Administration's Infrastructure proposal.
[7] Reflects funding at the FY 2012 funding level pursuant to P.L. 113-6, Consolidated and Further Continuing Appropriations Act, 2013.
[8] Hurricane Sandy Emergency Supplemental, P.L. 113-2
[9] 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.
[10] Reflects a 0.20 percent across-the-board rescission per P.L. 113-6.

FEDERAL AVIATION ADMINISTRATION

RESEARCH, ENGINEERING, AND DEVELOPMENT (AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2007	130,000,000	2007	130,234,000
2008	[1]140,000,000	2008	146,828,000
2009	[2]171,028,000	2009	171,000,000
2010	180,000,000	2010	190,500,000
2011	190,000,000	2011	[3]169,660,000
2012	190,000,000	2012	167,556,000
2013	180,000,000	2013	[4]167,556,000
		2013 Sequester (P.L.112-240)	[5]-8,429,072
		2013 Rescission (P.L. 113-6)	[6] -335,112
2014	166,000,000	2014	158,792,000
		2014 Rescission	[7]-26,183,998
2015	156,750,000	2015	156,750,000
2016	166,000,000	2016	166,000,000
2017	167,500,000	2017	176,500,000
2018	150,000,000		

[1] Includes $122,867,000 from the Airport and Airway Trust Fund and $17,133,000 from the General Fund.
[2] Includes $156,003,000 from the Airport and Airway Trust Fund and $15,025,000 from the General Fund.
[3] Reflects a $340,000 rescission per P.L. 112-55.
[4] Reflects funding at the FY 2012 funding level pursuant to P.L. 113-6, Consolidated and Further Continuing Appropriations Act, 2013.
[5] 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).
[6] Reflects a 0.20 percent across-the-board rescission per P.L. 113-6.
[7] 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	
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	[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	2016	3,600,000,000
2017	3,500,000,000	2017	3,750,000,000
2018	3,000,000,000		

[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	
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	[1](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)	2016	(3,350,000,000)
2017	(2,900,000,000)	2017	(3,350,000,000)
2018	(3,350,000,000)		

[1] 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
DEPARTMENT OF TRANSPORTATION
BUDGET AUTHORITY
($ in Thousands)

	FEDERAL AVIATION ADMINISTRATION	FY 2016 Eancted	FY 2017 Annualized CR	FY 2018 Request	Applied	Development
A.	**Research, Engineering and Development**	**166,000**	**165,684**	**150,000**	**150,000**	
A11	**Improve Aviation Safety**	**95,969**	**95,787**	**88,752**	**88,752**	
a.	Fire Research and Safety	6,000	5,989	7,044	7,044	
b.	Propulsion and Fuel Systems	2,034	2,030	2,269	2,269	
c.	Advanced Materials/Structural Safety	7,409	7,395	4,338	4,338	
d.	Aircraft Icing/Digital System Safety	5,500	5,490	9,253	9,253	
e.	Continued Airworthiness	8,987	8,970	10,437	10,437	
f.	Aircraft Catastrophic Failure Prevention Research	1,433	1,430	1,570	1,570	
g.	Flightdeck/Maintenance/System Integration Human Factors	5,000	4,991	6,825	6,825	
h.	System Safety Management	6,063	6,051	4,149	4,149	
I.	Air Traffic Control/Technical Operations Human Factors	5,410	5,400	5,196	5,196	
j.	Aeromedical Research	8,467	8,451	9,765	9,765	
k.	Weather Program	15,031	15,002	13,399	13,399	
l.	Unmanned Aircraft Systems Research	17,635	17,601	6,787	6,787	
m.	NextGen - Alternative Fuels for General Aviation	7,000	6,987	5,924	5,924	
n.	Commercial Space			1,796	1,796	
A12	**Economic Competitiveness**	**22,589**	**22,546**	**18,232**	**18,232**	
b.	NextGen - Wake Turbulence	8,541	8,525	6,831	6,831	
c.	NextGen - Air Ground Integration Human Factors	8,000	7,985	6,757	6,757	
e.	NextGen - Weather Technology in the Cockpit	4,048	4,040	3,644	3,644	
d.	NextGen - Information Security			1,000	1,000	
	Commercial Space	2000	1,996			
A13	**Reduce Environmental Impact**	**41,897**	**41,817**	**37,648**	**37,648**	
a.	Environment and Energy	16,074	16,043	14,497	14,497	
b.	NextGen - Environmental Research - Aircraft Technologies, Fuels, and Metrics	25,823	25,774	23,151	23,151	
A14	**Mission Support**	**5,545**	**5,534**	**5,368**	**5,368**	
a.	System Planning and Resource Management	2,100	2,096	2,135	2,135	
b.	William J. Hughes Technical Center Laboratory Facility	3,445	3,438	3,233	3,233	
B.	**Facilities & Equipment**	**203,050**	**202,665**	**202,600**		**202,600**
a.	Advanced Technology Development and Prototype	21,300	21,260	26,800		26,800
b.	Plant	32,250	32,189	29,000		29,000
c.	Center for Advanced Aviation System Development (CAASD	60,000	59,886	57,000		57,000
d.	NextGen Applied Research & Development *	89,500	89,330	89,800		89,800
C.	**Grants-In-Aid for Airports, Airport Technology (T)**	**46,000**	**45,913**	**46,210**		**46,210**
a.	Airport Technology Research	31,000	30,942	31,210		31,210
b.	Airport Cooperative Research	15,000	14,971	15,000		15,000
D.	**Operations**	**10,143**	**8,945**	**8,945**		**8,945**
E.	**Commercial Space Transportation Safety**	**0**	**0**	**0**		**0**
	Subtotal, Research and Development Total	**346,943**	**345,105**	**332,545**	**150,000**	**182,545**
	Subtotal, Technology Investment (T) Total	**46,000**	**45,913**	**46,210**	**0**	**46,210**
	Subtotal , Facilities (F) Total	**32,250**	**32,189**	**29,000**	**0**	**29,000**
	TOTAL FAA	**425,193**	**423,207**	**407,755**	**150,000**	**257,755**

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SECTION 5: NEXTGEN

Next Generation Air Transportation System (NextGen)

For FY 2018, the FAA is requesting a total of $988 million for the Next Generation Air Transportation System.

Introduction

NextGen is not a single program, rather a transformative change in the management and operation of how we fly. NextGen encompasses many programs, systems, and procedures, at different levels of maturity, and supports investments to develop and deploy capabilities in addition to new infrastructure. Some are being deployed now; some are in development and nearing deployment with additional capabilities being defined as the technology necessary for them becomes available.

The FAA has now baselined several significant programs out of development and into operation, including Data Communications (Data Comm), Time-Based Flow Management (TBFM), Automatic Dependent Surveillance-Broadcast (ADS-B), Performance Based Navigation (PBN) and System Wide Information Management (SWIM). Our stakeholders are beginning to experience the benefits of NextGen investments, and we have already provided several important new capabilities to the aviation community.

The benefits are highlighted in NextGen's accomplishments below.

- Data Communications. The NextGen Data Communications (Data Comm) program is making pilot and controller exchanges more efficient and reliable. The effort enables air traffic controllers to send text-based departure clearance instructions to flight crews of equipped aircraft instead of speaking over the radio. As part of the NextGen Priorities, FAA has enabled text-based departure clearances (DCL) for equipped aircraft at 55 airports almost two and half years ahead of schedule. Additionally, initial flight trials at Kansas City Air Route Traffic Control Center (ARTCC) for initial en route Data Comm services have proven successful.

- Time Based Flow Management. TBFM uses Time Based Metering (TBM) to optimize use of NAS capacity. TFBM provides departure decision support for departures into En Route and Arrival metering, a display of departure options, and alerts for non-conforming flights (e.g., flights that missed the assigned departure window). It determines specific time of arrival for points in an aircraft's route resulting in a systemic and efficient flow of aircraft to the terminal airspace, beginning hundreds of miles away. Integrated Departure Arrival Capability (IDAC) was initially deployed in 2014 and will continue to be expanded to additional sites in 2018. IDAC automates the call-for-release process and streamlines the departure scheduling into automatic and semi-automatic modes. TBFM is currently installed in the 20 ARTCCs with supporting equipment in most major TRACONS and the airports served by those centers.

- Satellite-Based Surveillance and Navigation via the Automatic Dependent Surveillance-Broadcast (ADS-B). The FAA completed the baseline deployment of the ground stations in 2014. ADS-B has now been integrated into all En Route automation platforms, which control high-altitude traffic. Similar system upgrades in our terminal radar approach control facilities are also on track and will be completed by 2019. As of March 2017, 20,888 general aviation aircraft and 999 commercial aircraft have been equipped with ADS-B avionics. General aviation pilots in properly equipped aircraft have subscription-free access to traffic and weather nation-wide. The FAA is working with industry to resolve barriers delaying operators from equipping with ADS-B Out avionics to meet the ADS-B mandate by January 1, 2020.

- Performance Based Navigation (PBN). The introduction of area navigation operations and the more advanced GPS-based PBN procedures optimization are reducing flight distances, flight times, noise pollution, fuel consumption, and harmful engine emissions. As part of our Metroplex initiative, new satellite-based air traffic procedures have been implemented in several major metropolitan areas, including Houston, North Texas, Northern California, and Washington D.C. The additional sites will be evaluated and implemented are Las Vegas, Florida, Cleveland/Detroit, and Denver.

- Data Standards and Information Management. The FAA has developed standards to enable information sharing among various users and stakeholders, both NAS and international, allowing for better coordination, situational awareness, and collaborative decision making. These standards address flight, weather, and aeronautical information and are updated annually in collaboration with industry and the international community including ICAO and International Air Transport Association (IATA). Through SWIM, this data is collected, managed, and disseminated to support NAS operations.

The FY 2018 request will allow the FAA to continue the on-going development and implementation of operational improvements to safely and efficiently operate the NAS, 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. The entire NextGen portfolio totals $988 million distributed among F&E programs ($867.9 million), Research, Engineering & Development programs ($54.1 million) and Operations activities ($66.0 million).

The FY 2018 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. The FAA's investments are consistent with the *NextGen Priorities Joint Implementation Plan* report delivered to Congress in October of 2014 and updated every two years.

The table below shows the Budget Line Items (BLIs) and detailed funding and program requirements can be found in the budget narrative, Section 3. The table located on the last page of this section gives the section and page number of the specific locations of the Section 3 narrative.

NextGen Program Summary

	FY 2016 Actual	FY 2017 Annualized CR	FY 2018 Request
Facilities and Equipment	**$854,545,000**	**$877,419,037**	**$867,905,179**
NextGen - Separation Management Portfolio	31,500,000	25,800,000	13,500,000
NextGen – Traffic Flow Management Portfolio			10,800,000
NextGen - Improved Surface	17,000,000	2,000,000	0
NextGen - On Demand NAS Portfolio	11,000,000	8,500,000	12,000,000
NextGen - Environment Portfolio	1,000,000	0	0
NextGen - Improved Multiple Runway Operations Portfolio	8,000,000	6,500,000	0
NextGen - NAS Infrastructure Portfolio	11,000,000	17,660,000	17,500,000
NextGen – Support (NIEC, Test Bed) Portfolio	10,000,000	12,000,000	12,000,000
NextGen - System Safety Management Portfolio	17,000,000	17,000,000	16,200,000
NextGen – Unmanned Aircraft System (UAS)			15,000,000
NextGen – Enterprise, Concept Development, Human Factors and Demonstration Portfolio	0	0	9,000,000
Performance Based Navigation and Metroplex Portfolio	13,000,000	17,500,000	20,000,000
NextGen - Communications in Support of NextGen	234,900,000	232,000,000	154,100,000
En Route Automation Modernization (ERAM) - System Enhancements	79,400,000	78,000,000	76,650,000
System - Wide Information Management (SWIM)	37,400,000	28,800,000	50,050,000
ADS - B NAS Wide Implementation	184,600,000	154,800,000	139,150,000
Collaborative Air Traffic Management (CATMT) Portfolio	14,770,000	13,820,000	9,000,000
Terminal Flight Data Manager (TFDM)	0	42,200,000	90,350,000
Tactical Time Based Flow Management (TBFM)	42,600,000	50,600,000	40,450,000
Next Generation Weather Processor (NWP)	7,000,000	27,800,000	35,450,000
NAS Voice System (NVS)	53,550,000	48,400,000	68,750,000
SBS Advanced Surveillance Enhanced Procedural Separation	0	0	4,350,000
Flight Interfacility Data Interface (FIDI) Modernization	9,000,000	15,000,000	0
Aeronautical Information Management Program (AIM)	5,000,000	10,400,000	4,700,000
Cross Agency NextGen Management	3,000,000	2,000,000	1,000,000
Activity 5 F&E PCBT - NextGen Staffing*	63,825,000	66,639,037	67,905,179
Research Engineering and Development (RE&D)	**$71,047,000**	**$70,912,000**	**$54,094,000**
NextGen - Alternative Fuels for General Aviation	7,000,000	6,987,000	5,924,000
NextGen- Information Security	0	0	1,000,000
NextGen - Wake Turbulence	8,541,000	8,525,000	6,831,000
NextGen - Air Ground Integration	8,000,000	7,985,000	6,757,000
NextGen - Weather in the Cockpit	4,048,000	4,040,000	3,644,000
NextGen - Environmental Research, Aircraft Technologies, Fuels and Metrics	25,823,000	25,774,000	23,151,000
Unmanned Aircraft Systems Research	17,635,000	17.601,000	6,787,000
Operations	**$54,641,000**	**$58,279,723**	**$66,042,634**
NextGen Staffing	29,460,000	32,963,723	33,590,034
NextGen Unmanned Aircraft System	11,656,000	11,656,000	18,656,000
Performance Based Navigation (PBN) Activities	13,525,000	13,660,000	13,796,600
Total NextGen Programs	**$980,233,000**	**$1,006,610,760**	**$988,041,813**

NextGen's Planned Accomplishments – Building on Investments

In FY 2018, NextGen plans to build upon the past achievements particularly in the areas of data communication, networkable voice communication and air traffic management. The FY 2018 funding will support implementation of the following NextGen capabilities:

- Data Communications. The FAA is increasing its focus on the way information is transferred between the cockpit and air traffic control facilities. The use of voice communication is labor intensive, time consuming, and limits the ability of the NAS to effectively meet future traffic demand. Data Comm is allowing controllers and pilots to communicate with digitally delivered written messages. The next steps for Data Comm will be adding benefits like in-flight rerouting with initial en route services in high altitude airspace, which will be available at all 20 en route centers by 2021.

- Time Based Flow Management. 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 monitors departure demand and identify departure slots, provides distributed, electronic communication that enables software based communication for departure time negotiation instead of phone based communication. It 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 NextGen advances will support controllers in overcoming obstacles to implementing PBN and improve the flow of arrival traffic by efficiently maximizing the use of existing capacity, saving fuel and reducing emissions.

- NAS Voice System. Future air traffic operations as envisioned by NextGen will require a new networkable voice communications system with flexible networking capabilities. NAS Voice System (NVS) is the key voice communication component for the NextGen System. NVS is a Voice Over Internet Protocol system that will carry the ground portion of voice communications digitally over the secure FAA Telecommunications Infrastructure (FTI). NVS software is being tested by the developers in preparation for testing at the FAA Technical Center in 2018. Initial FAA operational testing and evaluation using NVS for communication with aircraft in the NAS will occur at three sites in 2019: Seattle Center, Seattle TRACON, and Seattle-Tacoma International Airport. After the evaluation phase, NVS will roll out to 20 en route centers between 2020 and 2025.

- Terminal Flight Data Manager (TFDM). TFDM will provide an integrated approach to maximize the efficient collection, distribution, and update of data including flight information in the terminal area, the status of airspace around an airport and airport surface data to improve access to information necessary for safe and efficient ATC. The tool will consist of Electronic Flight Data/Electronic Flight Strips (EFD), system interfaces with EFD, and Departure Scheduler.

Unmanned Aircraft Systems (UAS)

Safe, efficient, and timely integration of UAS into the NAS poses challenges to FAA and the aviation industry. UAS often use new or novel technologies to achieve unique operational capabilities that challenge the expectations of current NAS users. Integrating UAS in the NAS will potentially affect the entire system, as a result of the various sizes of the aircraft, which can range from less than a foot to the size of a commercial jet. UAS operations have increased dramatically in both the public and civil sectors. This proliferation introduces greater operational risk and exposure to the users of the NAS. The FY 2018 work to support integration of UAS into the NAS spans all four FAA appropriations and totals approximately $51 million for contract and personnel compensation costs.

UAS Funding Summary

Appropriation (in millions)	2016 Enacted	2017 Annualized CR	2018 Request
Operations	18.0	18.0	25.0
Facilities & Equipment	12.5	15.9	19.0
Research, Engineering, & Development	17.6	17.6	6.8
Airport Improvement Program	0.0	0.1	0.2
Total	**48.1**	**51.6**	**51.0**

The funding requested for UAS under the Operations appropriation will enable Aviation Safety (AVS) to expand certification and integration services for newly designed and manufactured UAS products. The FAA will determine the impacts of these new entrants on the air traffic management operations, continue with the development of standards, issuance of policy, and guidance, and determine if new training and ATC skills are required to further enable UAS operations and will adapt 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.

The F&E funding supports the overall analysis and planning for the development, integration, and subsequent implementation of emerging UAS enabling technologies. These activities are essential to the FAA's objective of integrating UAS operations into the NAS. The proliferation of UAS introduces greater operational risk and exposure to the users of the NAS. As such, air traffic products, policies, and procedures must be reviewed and refined, or newly developed through supporting concept maturation work to permit safe UAS operations, alongside manned aircraft operations. This program will continue to identify and mature concepts and capabilities to facilitate the safe and timely integration of UAS into the NAS. In addition, the requested funding will allow the FAA to develop and implement a UAS Flight Information Management System (FIMS) to effectively support the management of UAS operations by providing a means for UAS operators to notify the FAA prior to operating in the NAS. A joint NASA/FAA Research Transition Team (RTT) effort was established to ensure that UTM research and development needed for NextGen implementation is identified, quantified, conducted, and effectively transferred. The joint NASA/FAA RTT will develop the UTM concept, the prototype for FIMS and support the establishment of the UTM system pilot program.

The RE&D request will further FAA efforts by studying safety implications of new aircraft operational concepts and technology and supporting the development of new and modified regulatory standards. UAS specific technical issues, such as detect and avoid, datalink aircraft control and communication with air traffic control, small UAS low altitude traffic management and electronic identification and tracking requirements, will require research efforts to promote the ultimate integration of these systems into the NAS. Incorporation of new technologies is needed and may include communications, surveillance, and automation changes to support continued evolution of UAS in the NAS. Challenges associated with integrating UAS in the NAS include the inability of UAS to comply with traditional see and avoid requirements, unique communications needs, lost link procedures, and other issues which dictate that concept engineering activities address all aspects associated with UAS integration.

The AIP request funds one position in the Office of Airports that coordinates UAS issues with airports, Air Traffic, Aviation Safety, and airport associations.

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 (GA), benefit from the work being conducted under this program since it leads to safe UAS integration.

FAA Stakeholder Collaboration to Achieve NextGen Benefits

The FAA's collaboration with aviation industry representatives allows the agency to focus its resources on priority NextGen efforts. The FAA met its commitments to RTCA Task Force 5 and convened the NextGen Advisory Committee (NAC). The collaboration meetings have enabled the FAA and industry to reach agreement on all of the high-priority, high-readiness capabilities, with the FAA committing to specific site implementation plans and industry ensuring operator preparedness to take full advantage of NextGen benefits. This has been a contributing factor in the FAA's successful optimization of NextGen investments.

In October 2014, the FAA delivered the *NextGen Priorities Joint Implementation Plan* to Congress, which outlined a plan to implement a number of high-priority NextGen capabilities in four focus areas described below: Multiple Runway Operations, Performance Based Navigation, Surface Operations and Data Sharing, and Data Communications. A new plan is now developed every two years and includes a three-year window of joint implementation planning, implementation, and industry commitments.

The FAA and industry jointly updated NextGen priorities commitments through 2019 and codified those in the NextGen Priorities Joint Implementation Rolling Plan, 2017-2019. The latest plan provides additional focus to surface management through the deployment of the Terminal Flight Data Manager (TFDM), as well as additional focus to optimizing PBN through Time Based Flow Management (TBFM) enhancements. The FAA and industry have completed 141 of 143 milestones on time with more than 60 completed ahead of schedule, ranging from large-scale Metroplex airspace redesigns to targeted tasks such as merging data streams among the FAA and airline operators. These priorities are providing tangible benefits to industry.

- Multiple Runway Operations (MRO): The efficiency of parallel runways, particularly those that are closely spaced, has been limited by a variety of factors that influence safety risk, including collision avoidance and the interplay of wake vortices (also known as wake turbulence) with nearby aircraft. MRO capabilities improve access to these runways and can increase basic runway capacity and throughput by reducing aircraft separation based on improved wake categorization standards. Improved access will enable more arrivals and/or departures during instrument meteorological conditions, which will increase efficiency and reduce flight delays. These commitments are a subset of the FAA's overall programs and activities to address these issues.

- Performance Based Navigation (PBN): The FAA has published the *PBN NAS Navigation Strategy 2016*, which was coordinated with and endorsed by the NAC. With PBN, the FAA delivers new routes and procedures that primarily use satellite-based navigation and onboard aircraft equipment to navigate with greater precision and accuracy. PBN provides a basis for to design and implement repeatable flight paths and airspace redesign that increases access to airspace near obstacles and terrain. Benefits include shorter and more-direct flight paths, improved airport arrival rates, enhanced controller productivity, increased safety due to repeatable and predictable flight paths, more-stabilized approaches, fuel savings and a reduction in aviation's environmental impact. These commitments are a subset of the overall series of PBN activities that the FAA plans to implement.

- Surface Operations and Data Sharing: Some of the greatest NextGen efficiencies can be gained when aircraft are still on the ground, at the gate and when connecting the surface to the en route airspace. The FAA commits to implementing surface improvements through the deployment of Terminal Flight Data Manager (TFDM), by exchanging more data with more stakeholders, and by completing feasibility assessments of other capabilities of interest. The goal of these enhancements is to measurably increase predictability and provide actionable and measurable surface efficiency improvements. These commitments are a subset of the overall series of programs and activities. The FAA plans to improve operations in these domains.

- Data Communications: The Data Comm program will provide digital communications services between pilots and air traffic controllers as well as enhanced air traffic control information to airline operations centers. Data Comm will provide a data interface between ground automation and the flight deck for controller and pilot communications for safety-of-flight clearances, instructions, traffic flow management, flight crew requests and reports. Data Comm is critical to the success of NextGen, enabling efficiencies not possible with the current voice system. These services will enhance safety by reducing communication errors, increase controller productivity by reducing communication time between controllers and pilots, and increase airspace capacity and efficiency while reducing delays, fuel burn and carbon emissions.

These are capabilities that will provide significant near-term benefits to NAS users. The commitments for CY 2017-2019 are listed in the table below.

Focus Area	CY 2017	CY 2018	CY 2019
Multiple Runway Operations	Wake Recategorization: Miami International Airport (MIA) Q2; Minneapolis-St. Paul International Airport (MSP) Q2; Washington Dulles International Airport (IAD) Q3; McCarran International Airport (LAS) Q4; and Phoenix Sky Harbor International Airport (PHX) Q4 Amend Dependent Runway Separation Order 7110.308A San Francisco International Airport (SFO) Triple Independent Parallel Operations: Q3 at ATL and IAD Amend National Standards for Vertical Navigation (VNAV) for Simultaneous Independent Parallel Approaches Dependent Parallel Operations for Runways Greater than 4,300 Feet: Q1 CY2017 at Louisville International Airport (SDF), Phoenix Sky Harbor Airport (PHX), Cincinnati/Northern Kentucky International Airport (CVG) and Memphis International Airport (MEM) Feasibility Assessment - Removal of VNAV Requirement for Simultaneous Independent Parallel Approaches Benefits Assessment to Upgrade RECAT Sites to Phase II	Wake Recategorization: PHL Q4; SAT Q4; HNL Q4; DTW Q4; and SEA Q4 Assessment of Time Based Wake Separation Concept for use Q4	Wake Recategorization: BOS Q4; and DFW Q4
Performance Based Navigation	Metroplex CLT Metroplex LAS Design Start Advanced RNP Advisory Circular 90-105; Assess Potential demo sites; Design Guidance New Vertical Guidance Criteria and Location Guidance Established on Required Navigation Performance (EoR) SEA Review Feasibility Assessment: EoR RF (DEN, IAH) and EoR TF (CLT, ATL, SDF, DFW) (Industry) Boeing to provide data on their utility and usability GYY (Industry) JetBlue to provide data on their utility and usability BOS EoR (RF Duals + Triples) Required Navigation Performance 1	TBFM Decision Support Tools - Integrated Departure Arrival Capability (IDAC) (1 site Q4) Southwest to provide data on their utility and usability AUS OPD (Q2) EoR RF/TF to xLS Safety Analysis (Q2) EoR If Favorable Outcome of Independent Duals/Triples Safety Analysis; Develop and Approve Document Change Proposal (DCP) to 7110.65 paragraph 5.9.7 (Q2) EoR If 5.9.7 is Achieved and Applicable; Begin EoR Operations with Modified RF Procedures IAH (Q2) (Industry) Delta Airlines to provide data on their utility and usability ATL EDO(Q2) (Industry) Delta Airlines to	TBFM Decision Support Tools - Integrated Departure Arrival Capability (IDAC) (4 sites Q4) TBFM Decision Support Tools - Terminal Sequencing and Spacing (TSAS) (Q4) EoR Dependent Operations Safety Assessment (Q1) (Industry) NBAA to provide data on their utility and usability LAS (Q4)

Focus Area	CY 2017	CY 2018	CY 2019
	Departures at BUR; SNA EoR Independent/Dependent Operations Capacity Analysis (Industry) PBN Lead Operator Roles Redefined EDO Feasibility Assessment EoR If 5.9.7 is Achieved and Applicable; Begin EoR Operations with Modified RF Procedures at DEN EoR Site Selection Decision Single Site Implementations HND, AUS (2 sites) TBFM GIM-S (3 sites) EDO Authorization to Operate DFW, ATL (2 sites) EoR Feasibility Assessment: Concurrent use of Track to Fix and Radius to Fix (Industry) American to provide data on utility and usability CTL (Industry) Delta to provide data on their utility and usability ATL (Industry) FedEx to provide data on utility and usability EFVS IND	provide data on their utility and usability DFW EDO (Q2) (Industry) NBAA to provide data on their utility and usability for HND RNAV SID (Q2) (Industry) Southwest Airlines to provide data on their utility and usability for DEN RF (Q3) (Industry) United Airlines to provide data on their utility and usability IAH RF (Q3)	
Surface Operations And Data Sharing	(Industry) Lead Operator, American Airlines to provide data for Charlotte Surface Departure Management (Industry) Flight Operators Conduct Outreach to Facilitate Data Sharing participation from Additional Flight Operators (Industry) Data Sharing: Airports Supplement Actual In Block Time (AIBT), Actual Off Block Time (AOBT), Actual Take Off Time (ATOT), Actual Landing Time (ALDT) FAA to Increased Data Sharing providing Surface Surveillance MLAT CAT 10 data (MA and Incidental NMA) to Industry via SWIM Surface Departure Management Demonstration Charlotte (ATD-2) (Industry) Data Sharing: Flight Operators Provision of specific examples of desired TFM data not currently available via SWIM	(Industry) Data Sharing: Additional Airports Providing Data (Q2)	
Data Communications (Data Comm)	Implementation Framework for non-VHF Digital Link (VDL) Mode 2 media (Pre-Implementation) (Industry) Implementation Framework for non-VHF Digital Link (VDL) Mode 2 media (Industry)		IOC for Initial En Route Services (Q3) (Industry) Airlines to Equip 1,900 Aircraft (Q4)

NextGen Staffing

The NextGen initiatives crosscut FAA's organizational structures and lines of business. Based on the crosscutting structure, FAA tracks and reports NextGen dedicated staffing levels. The NextGen dedicated staffing is defined as employees who spend 50 percent or more of their time on NextGen-related activities.

The table below shows our updated NextGen "dedicated" staffing levels.

Appropriation/Organization	FY 2017 Annualized CR			FY 2018 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)	298	298	298	290	290	290	(8)	(8)	(8)
ATO:									
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Various Programs/Projects)	54	54	54	54	54	54	0	0	0
AFN:									
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Various Programs/Projects)	45	45	45	37	37	37	(8)	(8)	(8)
AVS:									
F&E Activity 5, Personnel & Related Expenses - NextGen Staffing (Various Programs/Projects)	30	30	30	46	46	46	16	16	16
Subtotal, NextGen F&E	**427**	**427**	**427**	**427**	**427**	**427**	**0**	**0**	**0**
Research, Engineering & Development (R,E&D)									
ANG:									
NextGen – Wake Turbulence; Air Ground Integration; Self Separation; Weather in the Cockpit	12	12	12	17	17	17	5	5	5
APL:									
NextGen – Environmental Research, Aircraft Technologies, Fuels and Metrics	4	4	4	5	5	5	1	1	1
Subtotal, NextGen R,E&D	**16**	**16**	**16**	**22**	**22**	**22**	**6**	**6**	**6**
Operations									
ANG: NextGen Staffing	52	52	52	41	41	41	(11)	(11)	(11)
ATO: NextGen Staffing	64	64	64	57	57	57	(7)	(7)	(7)
AVS: NextGen Staffing	75	75	70	100	100	100	25	25	30
AFN: NextGen Staffing	13	13	13	9	9	9	(4)	(4)	(4)
AOC: NextGen Staffing	1	1	1	0	0	0	(1)	(1)	(1)
APL: Integrate Environmental Performance into NextGen; Environmental/Noise Studies	8	8	8	4	4	4	(4)	(4)	(4)
Subtotal, NextGen Operations	**213**	**213**	**208**	**211**	**211**	**211**	**(2)**	**(2)**	**(7)**
Total NextGen Staffing	**656**	**656**	**651**	**660**	**660**	**660**	**4**	**4**	**9**
ANG	362	362	362	348	348	348	(14)	(14)	(14)
ATO	118	118	118	111	111	111	(7)	(7)	(7)
AVS	105	105	100	146	146	146	41	41	46
APL	12	12	12	9	9	9	(3)	(3)	(3)
AFN	58	58	58	46	46	46	(12)	(12)	(12)
AOC	1	1	1	0	0	0	(1)	(1)	(1)

The change between FY 2017 and FY 2018 represents a program increase within the RE&D appropriation of 6 FTEs and a net increase of 2 positions under the Operations appropriation to support Unmanned Aircraft System Certification and Integration activities with the AVS organization.

NextGen Benefits

The FAA and its partners continue to make significant progress in the modernization of our air traffic infrastructure and transformation of our operation. NextGen improvements and increased operator equipage are resulting in more and more benefits to airlines, passengers, the FAA, and other users. Continued success demands industry collaboration and operator equipage to compliment air traffic management modernization.

In July 2016, the FAA updated its enterprise level cost-benefit analysis associated with modernizing and transforming the NAS. Using empirical analysis of operational capabilities and system-wide modeling of future capabilities, the Agency estimated the total NextGen benefits to be $160.6 billion by 2030. Of that amount, an estimated $2.7 billion represent the achieved benefits from operational capabilities through 2016, as highlighted below:

- Time Based Flow Management: $1,017 million in estimated benefits to NAS users from the implementation of Enhanced TMA and Adjacent Center Metering.
- Satellite-Based Surveillance and Navigation via the Automatic Dependent Surveillance-Broadcast (ADS-B): $7 million in estimated benefits to NAS users and $260 million in safety benefits.
- Performance Based Navigation (PBN): $975 million in estimated benefits to NAS users from improved routing, and more efficient approaches and departure paths.
- Surface, Multiple Runway, and Low Visibility Operations: $262 million in estimated benefits to NAS users from improved surveillance and situational awareness, and more efficient dependent approaches to parallel runways and low visibility operations.
- Separation Management: $198 million in estimated benefits to NAS users from an overall reduction in aircraft spacing at landing or take-off.

Since July 2016, the Agency has continued to estimate impacts and benefits from other operational capabilities, including:

- In collaboration with industry through the Joint Analysis Team, we estimated annual savings of almost 2,000 hours in surface and terminal time at five additional sites with wake RECAT; 71 hours from shorter down-winds with EOR at Denver; and between $4.5 and $6.5 million in fuel from reduced level segments and increased continuous descents at DFW under the North Texas Metroplex.
- Through Data Comm Clearance Services, 466,833 flights and 62.3 million passengers benefited in more efficient surface operations, with an average per flight savings of six minutes in taxi time and 11 minutes in pushback delay during major weather events.

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	$13,500,000	30
1A06	NextGen – Traffic Flow Management Portfolio	$10,800,000	33
1A07	NextGen – On Demand NAS Portfolio	$12,000,000	36
1A08	NextGen – NAS Infrastructure Portfolio	$17,500,000	40
1A09	NextGen – Support Portfolio	$12,000,000	46
1A10	NextGen – Unmanned Aircraft System (UAS)	$15,000,000	49
1A11	Enterprise, Concept Development, Human Factors and Demonstration Portfolio	$9,000,000	52
2A01	En Route Automation Modernization System Enhancements and Tech Refresh	$76,650,000	56
2A11	System-Wide Information Management (SWIM)	$50,050,000	81
2A12	ADS-B NAS Wide Implementation (ADS-B)	$139,150,000	85
2A14	Collaborative Air Traffic Management (CATMT) Portfolio	$9,000,000	91
2A15	Time Based Flow Management (TBFM) Portfolio	$40,450,000	93
2A16	Next Generation Weather Processor (NWP)	$35,450,000	95
2A18	Data Communications in Support of NextGen	$154,100,000	100
2A20	SBS Advanced Surveillance Enhanced Procedural Separation	$4,350,000	106
2B12	National Airspace System Voice System (NVS)	$68,750,000	139
2B16	Terminal Flight Data Manager (TFDM)	$90,350,000	149
2B19	Performance Based Navigation and Metroplex Portfolio	$20,000,000	156
3A09	NextGen – System Safety Management Portfolio	$16,200,000	247
4A09	Aeronautical Information Management Program (AIM)	$4,700,000	281
4A10	Cross Agency NextGen Management	$1,000,000	284
5A01	Personnel and Related Expenses - NextGen Staffing	$67,905,179	286
	Total, Facilities and Equipment	**$867,905,179**	
	Research, Engineering, and Development		**Section 3C**
A11l	Unmanned Aircraft Systems Research	$6,787,000	52
A11m	NextGen – Alternative Fuels for General Aviation	$5,924,000	54
A12a	NextGen – Wake Turbulence	$6,831,000	59
A12b	NextGen – Air/Ground Integration Human Factors	$6,757,000	62
A12c	NextGen – Weather Technology in the Cockpit	$3,644,000	65
A12d	NextGen- -Information Security	$1,000,000	69
A13b	NextGen – Environmental Research, Aircraft Technologies, Fuels and Metrics	$23,151,000	75
	Total, Research, Engineering, and Development	**$54,094,000**	
	Operations		**Section 3A**
	NextGen Staffing	$33,590,034	ANG/ATO
	Unmanned Aircraft Systems	$18,656,000	ANG/ATO
	Performance Based Navigation (PBN) Metroplex Activities	$13,796,600	ANG/ATO
	Total, Operations	**$66,042,634**	
	Total, NextGen Programs	**$988,041,813**	

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SECTION 6: CAPITAL INVESTMENT PLAN

Federal Aviation Administration
Abbreviated National Airspace System Capital Investment Plan
for Fiscal Years 2018 – 2022

Background

The Consolidated Appropriations Act, 2017 became Public Law 115-31 on May 5, 2017 and provides the appropriation amounts and other direction for the Federal Aviation Administration within DIVISION K—TRANSPORTATION, HOUSING AND URBAN DEVELOPMENT, AND RELATED AGENCIES APPROPRIATIONS ACT, 2017 under Title I—Department of Transportation. FAA's Facilities and Equipment appropriation (F&E) includes the following language: "Provided further, That no later than March 31, the Secretary of Transportation shall transmit to the Congress an investment plan for the Federal Aviation Administration which includes funding for each budget line item for fiscal years 2018 through 2022, 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 (OMB)."

However, the Capital Investment Plan (CIP) could not be completed until the F&E funding targets for Fiscal Years (FY) 2018-2022 were received from OMB to complete preparation of the FY 2018 President's Budget. Although final OMB guidance and the enacted Consolidated Appropriations Act, 2017 were not available until May 2017, the FAA assumed that the prior year language contained in the Consolidated Appropriations Act, 2016 requiring delivery of the CIP and two other agency plans by March 31st would also apply for FY 2017. To provide a timely response for all three plans, the Administrator sent a letter on March 31st to the Chairman and ranking minority members of the House and Senate Appropriation Committees on Transportation. The letter summarizes the requirement and content for each of the plans and states "…the FAA expects to submit more detailed plans for all three planning requirements within 60 days of the transmittal of the FY 2018 Budget."

Summary

The Abbreviated CIP fulfills the Administrator's commitment; complies with the language in the Consolidated Appropriations Act, 2017; and describes the planned investments for the National Airspace System (NAS) for the next five years. This abbreviated version of the CIP contains the following information:

- Highlights of information and programs contained in the FY 2018-2022 CIP.
- A five-year funding table by budget line item for FY 2018 through FY 2022.
- Information for Major Capital Programs with a total F&E investment cost of more than $100 million or those that involve significant impact, complexity, risk, sensitivity, safety or security issues.

Following submission of the FY 2018 President's Budget with the Abbreviated CIP, the full annual CIP for FY 2018-2022 with supporting program detail will be published at http://www.faa.gov/air_traffic/publications/cip

Strategic Priorities and the CIP

The FAA Administrator has established a strategic framework to define where the agency will focus its efforts. This framework consists of four, high-level strategic priorities as follows:

- **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

Access to a reliable worldwide aviation network is essential to the health of the U.S. economy. Both domestic and international commerce rely heavily on ready access to aviation services for carrying passengers and freight to the cities around the world which helps to sustain economic growth. According to a study on "The Economic Impact of Civil Aviation on the U.S. Economy," published in November 2016 by the Air Traffic Organization's Office of Performance Analysis, economic activity attributed to civil aviation-related goods and services during 2014 totaled $1.6 trillion, generating 10.6 million jobs, and $447 billion in earnings. In total, U.S. aviation contributed 5.1 percent to the U.S. Gross Domestic Product (GDP). Other aviation related economic activity for 2014 highlighted in this report includes:

- Air carriers operating in U.S. airspace transported 871.8 million passengers with over 1,230.8 billion revenue passenger miles (RPM).

- In support of commercial activities, more than 64.1 billion revenue ton-miles of freight passed through U.S. airports.

- It's estimated that commercial airline operations enabled $310 billion of visitor expenditures on goods and services.

- Civil aircraft manufacturing, a top U.S. net exporter, had a positive trade balance of $59.9 billion.

Key Considerations in Capital Planning

Building a portfolio of capital investments to sustain and modernize the NAS requires significant time to develop, plan, and prioritize program outcomes to deliver results. Over time, growth in air traffic operations may require an increase in NAS capacity, efficiency, predictability, and system flexibility. Other considerations include adjustments due to periodic changes in economic conditions, the status of ongoing capacity expansion projects at major airports, i.e. new runways, and the level of sustainment needed for mission critical ATC systems, facilities, and other NAS infrastructure. Requirements for new capital investment programs are evaluated by their benefit to the NAS, lifecycle cost, and competing priorities. The capital planning process must also include sufficient time for new systems to complete required testing to demonstrate compliance with NAS reliability and safety standards.

By statute, FAA's total capital investments for each year must balance to the corresponding OMB F&E target for that year. The Joint Resources Council, consisting of senior excutives from the FAA lines of business, e.g. Air Traffic Organization, must approve the allocation of the budget request for these funds between the capital programs that support the ongoing development and deployment of NextGen capabilities with those required to sustain legacy ATC systems and NAS infrastructure. This approach helps to ensure that current levels of NAS performance and safety are maintained before, during, and after the transition to NextGen.

There are 21 Air Route Traffic Control Centers (ARTCC) that house the automation equipment used by air traffic controllers to control oceanic and en route traffic. There are over 500 Air Traffic Control Towers (ATCTs) and 168 Terminal Radar Control (TRACON) facilities that control air traffic approaching, landing, and departing from airports. Successful flow management of air traffic in the NAS depends upon 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 FAA's rigorous availability and reliability goals, equipment at these facilities must be regularly upgraded or replaced.

Examples of capital investment programs supporting NAS sustainment and modernization include:

- **Standard Terminal Automation Replacement System (STARS) – Technology Refresh (TAMR Phase 1)** program is the technology refresh of STARS automated radar processing and display systems at 48 TRACON facilities and their associated ATCTs. The TAMR Phase 1 program will provide hardware updates including new high-resolution Liquid Crystal Display color displays, processors, storage devices, and enhanced memory; a software update to support NextGen initiatives, and to maintain, correct, or improve system performance, efficiency, safety, and security vulnerabilities.

- **Terminal Automation Modernization and Replacement (TAMR) – Phase 3** program is replacing legacy automation platforms at 108 terminal air traffic control facilities with the Standard Terminal Automation Replacement System, or STARS. Establishing a single, common automation platform will reduce maintenance costs. STARS will accept Automatic Dependent Surveillance-Broadcast (ADS-B) position reports to enable NextGen operational improvements.

- **Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)** program replaces aging and obsolete NAS air-to-ground (A/G) analog radios with modern Multimode Digital Radios for voice communication with pilots. The new radios support Voice over Internet Protocol (VoIP) and meet the requirements for the NextGen NAS Voice System (NVS) program.

- **Navigation/Landing programs** – The Wide Area Augmentation System (WAAS) will continue to augment the Global Positioning System (GPS) to support the implementation of improved procedures that are dependent on satellite navigation capabilities. Aging Instrument Landing Systems (ILSs) and other Navigation aids (Navaids) will be replaced if systems become unsupportable due to parts obsolescence.

- **Air Traffic Control Facilities** programs support 21 ARTCCs that house automation equipment used by air traffic controllers to control oceanic and en route air traffic; over 500 ATCTs; and 168 TRACONs facilities. These facilities require periodic 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 to prevent deterioration.

- **Power Systems Sustained Support** program replaces and improves electrical power equipment at airports, terminal facilities, and en route facilities, minimizing disruption of air traffic and maximizing availability and reliability of NAS systems.

Planning for the Future through NextGen Investments

NextGen programs are leading the ongoing transformation of the NAS to ensure that future safety, capacity, and environmental needs will be met by the FAA. The NextGen vision and goals are supported by many capital programs that collectively will fundamentally change the way air traffic is managed by combining new technologies for surveillance, navigation, and communications, with automation system enhancements, workforce training, procedural changes, and airfield development. These improvements will also facilitate the integration of commercial space and the operation of unmanned aircraft systems into the NAS.

NextGen advances will enable precise monitoring of aircraft both on the ground and in flight; allow direct routes for travel between cities; improve decision support to strategically manage traffic flows on busy routes; and leverage precision navigation to improve utilization of existing airspace and runway capacity. Having achieved many of the milestones needed for this transformation FAA is already realizing some of the expected benefits from NextGen. More information concerning the vision, benefits and implementation details and can be found in the NextGen Implementation Plan at http://www.faa.gov/nextgen/library/.

Planning the future systems architecture of the air traffic control system, requires establishing performance goals regarding the NAS improvements to be achieved. These goals are defined by the Operational Improvements (OIs) that describe specific operational performance enhancements to be realized through the NextGen investments. Development of NextGen OIs can include concept development, modeling changes in ATC performance, safety analyses, demonstration of new capabilities, international coordination, standards development, and other pre-implementation activities. When a new concept is developed and adopted, the improvement may be implemented through procedural changes, system enhancements, airspace changes, training, and upgrades to aircraft avionics as necessary. The CIP programs support the activities leading up to the initial investment decisions for implementation. When fully developed, a program solution is baselined for acquisition and implementation.

Some of the major NextGen programs enabling the introduction of new OIs include:

- **ERAM Enhancements 2 and 3** – These programs provide software enhancements for the en route sector controller team through enhanced trajectory management and improved collaboration between the tactical (R Side) and strategic (D Side) controllers. It also involves upgrades to flight data management and system support functions. These improvements will enable implementation of NextGen capabilities that support increased efficiency and capacity benefits.

- **System Wide Information Management (SWIM)** – SWIM provides the standards, hardware and software to enable information management and data sharing required to support NextGen. This includes Common Support Services – Weather (CSS-Wx) which provides access for NAS users to a unified aviation weather picture.

- **Automatic Dependent Surveillance – Broadcast (ADS-B) NAS Wide Implementation (ADS-B)** – ADS-B provides more accurate and timely surveillance data needed to allow direct routing and conflict free routes.

- **Collaborative Air Traffic Management Technologies (CATMT)** – CATMT provides enhancements to the Traffic Flow Management System (TFMS). The TFMS is the primary automation system used by the Air Traffic Control System Command Center (ATCSCC) and the nationwide Traffic Management Units at ATC facilities, to assist the command center in managing air traffic flow and planning for future air traffic demand. TFMS hosts the software decision support tools that assist in managing and metering air traffic to reduce delays, maximize the use of available system capacity, and dynamically balance flight demands.

- **Time Based Flow Management (TBFM)** – TBFM uses time-based metering to better utilize NAS capacity by improving traffic flow management of aircraft approaching and departing congested airspace and airports. Enhancements to TBFM will implement NextGen concepts, such as optimized descent during time-based metering, and Terminal Sequencing and Spacing to provide efficient sequencing and runway assignment.

- **NextGen Weather Processor (NWP)** – This program will establish a common weather processing platform which will provide improved weather products and support more efficient operations.

- **Data Communications in support of NextGen** – Data Comm provides data link communications between controller and pilot to facilitate information transfer, reduce workload, and minimize potential errors in communication of flight plan adjustments.

- **National Airspace System Voice System (NVS)** – NVS will provide a nationwide network of digital voice switches for terminal and en route air traffic facilities. These new systems will provide voice switch configuration flexibility required to support facility backup.

- **NextGen Performance Based Navigation (PBN) – Metroplex Area Navigation (RNAV)/Required Navigation Performance (RNP)** – The program will develop procedures at Metroplexes to improve airspace efficiency. It will examine transition access/egress points to and from terminal airspace not tied to ground-based navigation aids; implement optimized arrival and departure procedures; decouple conflicting operations to and from satellite airports serviced by the same complex terminal airspace; and develop high altitude routes through congested airspace for more efficient routes between major metropolitan areas.

- **Aeronautical Information Management (AIM)** – AIM provides digital aeronautical information to NAS users.

Conclusion

The FY 2018-2022 CIP reflects a balanced investment approach to support continued funding for legacy equipment, facilities, and systems, and services necessary to sustain the current NAS infrastructure while supporting the modernization to NextGen. The ongoing transition to NextGen will improve the efficiency of the NAS by providing new capabilities and aviation services benefitting both service providers and their customers.

Estimated Funding by Budget Line Item (dollars in Millions)

The following table shows funding by Budget Line Item for capital programs in the FY 2018 to FY 2022 time frame. The funding levels in this table reflect policy levels assumed in the President's Budget. The Administration is to shift FAA's air traffic control function to a non-governmental, non-profit organization in 2021. Under this proposal, the non-governmental, non-profit organization would manage and invest in those capital programs that support air traffic control starting in 2021.

BLI Number	Capital Budget Line Item (BLI) Program	FY 2018 Budget	FY 2019 Est.	FY 2020 Est.	FY 2021 Est.	FY 2022 Est.
	Activity 1: Engineering, Development, Test and Evaluation	**$145.6**	**$154.8**	**$179.4**	**$189.9**	**$194.4**
1A01	Advanced Technology Development and Prototyping (ATDP)	$26.8	$34.6	$38.0	$37.0	$37.0
1A02	William J. Hughes Technical Center Laboratory Improvement	$1.0	$1.0	$1.0	$1.0	$1.0
1A03	William J. Hughes Technical Center Laboratory Sustainment	$18.0	$15.9	$15.9	$15.9	$15.9
1A04	William J. Hughes Technical Center Infrastructure Sustainment	$10.0	$10.0	$10.0	$10.0	$10.0
1A05	NextGen – Separation Management Portfolio	$13.5	$13.0	$22.5	$21.5	$26.5
1A06	NextGen – Traffic Flow Management Portfolio	$10.8	$14.0	$11.0	$13.0	$18.0
1A07	NextGen – On Demand NAS Portfolio	$12.0	$16.5	$25.5	$31.5	$26.0
1A08	NextGen – NAS Infrastructure Portfolio	$17.5	$13.5	$17.5	$20.0	$20.0
1A09	NextGen – Support Portfolio	$12.0	$12.8	$11.0	$11.0	$11.0
1A10	NextGen – Unmanned Aircraft Systems (UAS)	$15.0	$14.0	$17.0	$20.0	$20.0
1A11	NextGen – Enterprise, Concept Development, Human Factors, & Demonstrations Portfolio	$9.0	$9.5	$10.0	$9.0	$9.0
	Activity 2: Procurement and Modernization of Air Traffic Control Facilities and Equipment	**$1,718.8**	**$1,690.7**	**$1,669.4**	**$1,642.5**	**$1,659.9**
	A. En Route Programs	**$753.9**	**$687.2**	**$668.5**	**$633.1**	**$648.4**
2A01	NextGen – En Route Automation Modernization (ERAM) – System Enhancements and Technology Refresh	$76.7	$101.7	$91.6	$85.5	$82.7
2A02	En Route Communications Gateway (ECG)	$2.7	$1.7	$2.7	$2.7	$0.7
2A03	Next Generation Weather Radar (NEXRAD)	$5.5	$5.5	$4.0	$6.1	$5.4
2A04	Air Route Traffic Control Center (ARTCC) & Combined Control Facility (CCF) Building Improvements	$100.4	$89.4	$83.0	$83.0	$83.0
2A05	Air Traffic Management (ATM) – Traffic Flow Management (TFM)	$4.9	$6.2	$20.0	$25.2	$27.9
2A06	Air/Ground Communications Infrastructure	$9.8	$8.8	$8.3	$8.3	$8.3
2A07	Air Traffic Control En Route Radar Facilities Improvements	$5.4	$6.6	$6.5	$6.5	$6.5
2A08	Voice Switching Control System (VSCS)	$12.8	$11.4	$11.7	$12.1	$12.4
2A09	Oceanic Automation System	$23.1	$17.5	$13.6	$10.0	$10.0
2A10	Next Generation Very High Frequency Air/Ground Communications System (NEXCOM)	$53.0	$50.0	$60.0	$64.0	$65.0
2A11	NextGen – System-Wide Information Management (SWIM)	$50.1	$54.9	$42.6	$28.5	$30.8
2A12	NextGen – Automatic Dependent Surveillance - Broadcast (ADS-B) NAS Wide Implementation	$139.2	$118.6	$123.5	$125.0	$125.0
2A13	Wind Shear Detection Service (WSDS)	$1.0	$1.0	$1.0	$1.0	$0.7
2A14	NextGen – Collaborative Air Traffic Management Technologies Portfolio	$9.0	$17.7	$24.3	$15.0	$5.0
2A15	NextGen – Time Based Flow Management (TBFM) Portfolio	$40.5	$23.8	$36.3	$44.8	$46.9
2A16	NextGen – Next Generation Weather Processor (NWP)	$35.5	$24.3	$16.0	$6.2	$32.4
2A17	Airborne Collision Avoidance System X (ACAS X)	$7.7	$9.7	$6.9	$5.1	$0.0

BLI Number	Capital Budget Line Item (BLI) Program	FY 2018 Budget	FY 2019 Est.	FY 2020 Est.	FY 2021 Est.	FY 2022 Est.
2A18	NextGen – Data Communication in support of NextGen	$154.1	$113.5	$89.6	$72.1	$64.0
2A19	Offshore Automation	$11.0	$14.0	$15.0	$20.0	$25.0
2A20	Nextgen – Advanced Surveillance Enhanced Procedural Separation (ASEPS)	$4.4	$0.0	$0.0	$0.0	$0.0
2A21	En Route Improvements	$3.0	$1.0	$2.0	$2.0	$2.0
2A22	Commercial Space Integration	$4.5	$10.0	$10.0	$10.1	$14.8
	B. Terminal Programs	**$541.5**	**$526.1**	**$537.4**	**$555.1**	**$564.4**
2B01	Terminal Doppler Weather Radar (TDWR) – Provide	$3.8	$4.5	$2.2	$0.0	$0.0
2B02	Standard Terminal Automation Replacement System (STARS) Sustain	$86.7	$66.9	$40.0	$62.0	$50.0
2B03	Terminal Automation Modernization/ Replacement Program (TAMR Phase 3)	$66.1	$8.0	$0.0	$0.0	$0.0
2B04	Terminal Automation Program	$8.5	$8.5	$9.0	$9.0	$9.0
2B05	Terminal Air Traffic Control Facilities – Replace	$31.1	$19.2	$10.0	$70.0	$143.5
2B06	ATCT/Terminal Radar Approach Control (TRACON) Facilities – Improve	$56.8	$99.7	$96.0	$55.0	$42.5
2B07	Terminal Voice Switch Replacement (TVSR)	$6.0	$6.0	$6.0	$5.0	$5.0
2B08	NAS Facilities OSHA and Environmental Standards Compliance	$46.7	$41.9	$42.0	$42.0	$42.0
2B09	Airport Surveillance Radar (ASR-9) Service Life Extension Program (SLEP)	$11.4	$18.9	$14.0	$25.5	$9.0
2B10	Terminal Digital Radar (ASR-11) Technology Refresh	$3.2	$1.0	$4.4	$4.4	$4.4
2B11	Runway Status Lights (RWSL)	$2.8	$2.0	$3.5	$3.5	$5.0
2B12	NextGen – National Airspace System Voice System (NVS)	$68.8	$42.8	$116.6	$105.5	$106.6
2B13	Integrated Display System (IDS)	$5.0	$18.0	$24.0	$34.2	$45.0
2B14	Remote Monitoring and Logging System (RMLS)	$7.4	$18.1	$16.4	$15.6	$16.7
2B15	Mode S Service Life Extension Program (SLEP)	$20.9	$15.4	$21.0	$19.7	$8.8
2B16	NextGen – Terminal Flight Data Manager (TFDM)	$90.4	$119.0	$112.8	$78.7	$47.9
2B17	NAS Voice Recorder Program (NVRP)	$5.0	$14.0	$14.5	$17.0	$21.0
2B18	Integrated Terminal Weather System (ITWS) Sustainment	$1.0	$2.1	$0.0	$0.0	$0.0
2B19	NextGen – Performance Based Navigation & Metroplex Portfolio	$20.0	$20.0	$5.0	$8.0	$8.0
	C. Flight Service Programs	**$28.0**	**$23.9**	**$14.8**	**$4.7**	**$2.8**
2C01	Aviation Surface Weather Observation System	$10.0	$10.0	$2.0	$0.0	$0.0
2C02	Future Flight Services Program (FFSP)	$14.0	$10.1	$10.1	$2.0	$0.0
2C03	Alaska Flight Service Facility Modernization (AFSFM)	$2.7	$2.7	$2.7	$2.7	$2.7
2C04	Weather Camera Program	$1.3	$1.1	$0.0	$0.0	$0.1
	D. Landing and Navigation Aids Programs	**$152.4**	**$157.7**	**$160.2**	**$173.6**	**$181.9**
2D01	VHF Omnidirectional Radio Range (VOR) with Distance Measuring Equipment (DME)	$11.0	$18.5	$20.0	$19.3	$21.4
2D02	Instrument Landing Systems (ILS)	$7.0	$6.0	$11.0	$11.0	$11.0
2D03	Wide Area Augmentation System (WAAS) for GPS	$102.3	$96.3	$93.6	$99.5	$98.5

BLI Number	Capital Budget Line Item (BLI) Program	FY 2018 Budget	FY 2019 Est.	FY 2020 Est.	FY 2021 Est.	FY 2022 Est.
2D04	Runway Visual Range (RVR)	$4.0	$7.0	$6.0	$6.0	$6.0
2D05	Approach Lighting System Improvement Program (ALSIP)	$3.0	$5.0	$5.0	$5.0	$5.0
2D06	Distance Measuring Equipment (DME)	$3.0	$5.5	$5.0	$5.0	$8.0
2D07	Visual Navaids – Establish/Expand	$2.0	$1.0	$2.0	$2.0	$2.0
2D08	Instrument Flight Procedures Automation (IFPA)	$8.5	$1.4	$1.2	$0.8	$0.0
2D09	Navigation and Landing Aids – Service Life Extension Program (SLEP)	$3.0	$5.0	$5.0	$10.0	$10.0
2D10	VASI Replacement – Replace with Precision Approach Path Indicator	$5.0	$7.0	$10.0	$15.0	$20.0
2D11	Runway Safety Areas – Navigation Mitigation	$1.6	$2.0	$1.4	$0.0	$0.0
2D12	NAVAIDS Monitoring Equipment	$2.0	$3.0	$0.0	$0.0	$0.0
	E. Other ATC Facilities Programs	**$243.0**	**$295.8**	**$288.6**	**$276.0**	**$262.4**
2E01	Fuel Storage Tank Replacement and Management	$28.1	$25.7	$22.0	$22.0	$22.0
2E02	Unstaffed Infrastructure Sustainment	$35.7	$50.9	$49.9	$46.7	$46.3
2E03	Aircraft Related Equipment Program	$12.5	$16.1	$16.1	$16.1	$12.1
2E04	Airport Cable Loop Systems – Sustained Support	$8.0	$10.0	$10.0	$10.0	$10.0
2E05	Alaskan Satellite Telecommunication Infrastructure (ASTI)	$20.9	$16.3	$9.4	$4.0	$0.0
2E06	Facilities Decommissioning	$13.9	$9.0	$10.0	$10.0	$10.0
2E07	Electrical Power Systems – Sustain/Support	$110.0	$147.7	$140.0	$133.0	$135.0
2E08	Energy Management and Compliance (EMC)	$2.4	$2.4	$6.2	$6.2	$0.0
2E09	Child Care Center Sustainment	$1.0	$1.0	$1.5	$1.0	$0.0
2E10	FAA Telecommunications Infrastructure 2	$2.0	$6.7	$11.5	$15.0	$15.0
2E11	Data, Visualization, Analysis and Reporting System (DVARS)	$5.5	$4.5	$4.5	$4.5	$4.5
2E12	Time-Division Multiplexing to Internet Protocol (TDM-to-IP) Migration	$3.0	$3.0	$4.0	$4.0	$4.0
2E13X	Independent Operational Assessment	$0.0	$2.5	$3.5	$3.5	$3.5
	Activity 3: Non-Air Traffic Control Facilities and Equipment	**$193.0**	**$196.1**	**$185.2**	**$199.6**	**$172.5**
	A. Support Programs	**$178.0**	**$181.1**	**$170.2**	**$184.6**	**$157.5**
3A01	Hazardous Materials Management	$35.3	$29.8	$31.0	$31.0	$31.0
3A02	Aviation Safety Analysis System (ASAS)	$12.0	$16.0	$19.7	$20.3	$20.5
3A03	National Airspace System (NAS) Recovery Communications (RCOM)	$12.0	$12.0	$12.0	$12.0	$12.0
3A04	Facility Security Risk Management	$20.4	$17.8	$15.0	$14.9	$12.1
3A05	Information Security	$20.7	$16.0	$17.8	$18.5	$18.2
3A06	System Approach for Safety Oversight (SASO)	$25.8	$25.4	$23.1	$23.7	$25.4
3A07	Aviation Safety Knowledge Management Environment (ASKME)	$4.0	$4.0	$5.0	$8.4	$9.8
3A08	Aerospace Medical Equipment Needs (AMEN)	$7.0	$19.6	$12.8	$18.9	$5.0
3A09	NextGen – System Safety Management Portfolio	$16.2	$14.2	$17.0	$17.0	$17.0

BLI Number	Capital Budget Line Item (BLI) Program	FY 2018 Budget	FY 2019 Est.	FY 2020 Est.	FY 2021 Est.	FY 2022 Est.
3A10	National Test Equipment Program	$4.0	$5.0	$3.0	$3.0	$3.0
3A11	Mobile Assets Management Program	$3.6	$2.2	$1.5	$2.0	$2.0
3A12	Aerospace Medicine Safety Information System (AMSIS)	$14.0	$16.1	$9.3	$9.2	$0.0
3A13	Tower Simulation System (TSS) Technology Refresh	$3.0	$3.0	$3.0	$0.0	$0.0
3A14X	Logistics Support System and Facilities (LSSF)	$0.0	$0.0	$0.0	$5.7	$1.5
	B. Training, Equipment and Facilities	**$15.0**	**$15.0**	**$15.0**	**$15.0**	**$15.0**
3B01	Aeronautical Center Infrastructure Modernization	$14.0	$14.0	$14.0	$14.0	$14.0
3B02	Distance Learning	$1.0	$1.0	$1.0	$1.0	$1.0
	Activity 4: Facilities and Equipment Mission Support	**$225.0**	**$226.2**	**$233.6**	**$233.1**	**$233.5**
4A01	System Engineering and Development Support	$35.7	$38.0	$38.0	$38.0	$38.0
4A02	Program Support Leases	$47.0	$47.0	$50.0	$50.0	$50.0
4A03	Logistics and Acquisition Support Services	$11.0	$11.0	$11.0	$11.0	$11.0
4A04	Mike Monroney Aeronautical Center Leases	$19.7	$20.2	$20.6	$21.1	$21.5
4A05	Transition Engineering Support	$19.9	$17.0	$16.0	$15.0	$15.0
4A06	Technical Support Services Contract (TSSC)	$23.0	$23.0	$23.0	$23.0	$23.0
4A07	Resource Tracking Program (RTP)	$6.0	$6.0	$8.0	$8.0	$8.0
4A08	Center for Advanced Aviation System Development (CAASD)	$57.0	$60.0	$60.0	$60.0	$60.0
4A09	NextGen – Aeronautical Information Management Program	$4.7	$2.0	$5.0	$5.0	$5.0
4A10	NextGen – Cross Agency NextGen Management	$1.0	$2.0	$2.0	$2.0	$2.0
	Activity 5: Personnel Compensation, Benefits and Travel	**$483.8**	**$498.3**	**$498.4**	**$500.9**	**$505.7**
5A01	Personnel and Related Expenses	$483.8	$498.3	$498.4	$500.9	$505.7
	Total Year Funding	**$2,766.2**	**$2,766.0**	**$2,766.0**	**$2,766.0**	**$2,766.0**
	Targets	**$2,766.2**	**$2,766.0**	**$2,766.0**	**$2,766.0**	**$2,766.0**

Note: BLI numbers with X represent outyear programs not requested in the FY 2018 President's Budget.

Note: The funding levels in this table reflect policy levels assumed in the President's Budget. The Administration is to shift FAA's air traffic control function to a non-governmental, non-profit organization in 2021. Under this proposal, the non-governmental, non-profit organization would manage and invest in those capital programs that support air traffic control starting in 2021.

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 Air Traffic Organization'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 recommendations 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 below provides the most recent information on FAA's Major Active Programs and is in included in response to the GAO recommendation.

FAA's major programs are defined as those classified as Acquisition Category (ACAT) 1, 2, 3, or are of strategic importance to the agency. These are typically programs with total F&E costs greater than $100 million and/or those that have significant impact, complexity, risk, sensitivity, safety or security issues. For more information on ACATs see: http://fast.faa.gov/NFFCA_Acquisition_Categories.cfm

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Rebaseline: Rebaseline APB Date	Rebaseline: Revised Completion Date	Rebaseline: Revised Budget $M	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
Automatic Dependent Surveillance Broadcast (ADS-B) – Baseline Services & Applications FY14 - 20 ACAT 1	May-12	Sep-20	$960.4				Sep-20	$960.4	
Common Support Services (CSS) Weather (Wx) ACAT 1	Mar-15	Aug-22	$120.1				Aug-22	$120.1	
Data Communications (Data Comm) Segment 1, Phase 1 (S1P1) ACAT 1	May-12	May-19	$741.4				May-19*	$736.5	Current Estimate vs. Original Baseline: *The FAA completed the Controller Pilot Data Link Communications (CPDLC) Departure Clearance (DCL) deployment waterfall in Dec 2016, 29 months ahead of the baseline schedule and under budget. There are remaining activities to be performed under this phase of the Data Comm program, to include: executing the remaining portion of the equipage initiative, delivering pre-planned air traffic control and flight deck enhancements, and continuing industry outreach and coordination.
Data Communications (Data Comm) Segment 1, Phase 2 (S1P2), Initial En Route Services ACAT 1	Oct-14	Feb-21	$816.7				Feb-21	$816.7	
Data Communications (Data Comm) Segment 1, Phase 2 (S1P2), Full En Route Services ACAT 1 New Investment	Aug-16	Dec-23	$421.4				Dec-23	$421.4	NOTE: New Addition. Final Investment Decision (FID) approved by the JRC in Aug-16.
ERAM System Enhancements and Technology Refresh (SETR) ACAT 1	Sep-13	Sep-17	$152.9				Sep-17	$140.6	

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Rebaseline: Rebaseline APB Date	Rebaseline: Revised Completion Date	Rebaseline: Revised Budget $M	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
ERAM Enhancements 2 ACAT 1	Dec-16	Dec-23	$253.6				Dec-23	$253.6	NOTE: New Addition. FID approved by the JRC in Dec-16.
Facility Security and Risk Management (FSRM) 2 ACAT 2	Jun-11	Sep-22	$182.5				Sep-22	$182.5	
Logistics Center Support System (LCSS) ACAT 2	Apr-10	Apr-14	$67.4	Apr-14	Apr-16	$79.4	May-18	$81.6	Rebaseline 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 Apr-14, the JRC approved a Baseline Change Decision (BCD) for LCSS. Current Estimate vs Rebaseline: The program is projected to be completed in May-18 (-34.7% variance). The delay is associated with the need to stabilize production and operations.
NAS Voice System (NVS) Demonstration and Qualification Phase ACAT 1	Sep-14	Mar-20	$294.2				Mar-20	$294.2	
Next Generational Weather Processor (NWP) ACAT 1	Mar-15	Aug-22	$189.3				Aug-22	$189.3	
Next Generation Air-to-Ground Communication System (NEXCOM) - Segment 2, Phase 1 ACAT 2	Sep-11	Sep-18	$285.9				Sep-18	$285.9	

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline			Rebaseline			Current Estimate		Comments
	Original APB Date	Completion Date	Budget $M	Rebaseline 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	Jun-19	$366.7	Rebaseline vs. Original Baseline: In Jul-13 the JRC approved a BCD for the RWSL program. The JRC determined to minimize the cost exposure to the baseline, deployment will be limited to the 16 airports that have been fully committed and San Francisco International for a total of 17 airports. 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 increase ($39.3M, -12% variance) and schedule delay (23 months, -26.1% variance) 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. Current Estimate vs. Rebaseline: The 21 month schedule delay (-18.9%) is attributed to the addition of Boston, Dallas/Ft. Worth, and San Deigo Airports to the baseline. The 3 airports currently have prototype systems and have committed to a work share agreement with the FAA to upgrade to baseline systems. The work share agreement will allow the FAA to complete the work at the 3 airports with no impact to the rebaseline cost.
System Approach for Safety Oversight (SASO) Phase 2B Segment 1A ACAT 3 New Investment	Feb-16	May-23	$135.7				May-23	$135.6	NOTE: New Addition. FID approved by the JRC in Feb-16.
System Wide Information Management (SWIM) Segment 2A ACAT 2	Jul-12	Dec-17	$120.2				Dec-17	$111.5	

FAA Capital Programs
Current Information for Major Programs

Programs	Original Baseline: Original APB Date	Original Baseline: Completion Date	Original Baseline: Budget $M	Rebaseline: Rebaseline APB Date	Rebaseline: Revised Completion Date	Rebaseline: Revised Budget $M	Current Estimate: Completion Date	Current Estimate: Budget $M	Comments
System Wide Information Management (SWIM) Segment 2B ACAT 2	Oct-15	Sep-21	$119.6				Sep-21	$119.6	
Terminal Automation Modernization and Replacement (TAMR), Phase 3, Segment 2 (P3 S2) ACAT 2	Sep-12	Aug-19	$462.5				Aug-19	$496.8	Current Estimate vs. Original Baseline: The current cost increase of $34.3M (-7.4% variance) is associated with the impact of higher prime costs and a funding reduction in FY16.
Terminal Automation Modernization and Replacement (TAMR), Phase 1 Technology Refresh ACAT 2	Sep-12	Feb-20	$531.5				Feb-20	$531.5	
Terminal Flight Data Manager (TFDM) ACAT 1 New Investment (NI)	Jun-16	Sep-28	$795.2				Sep-28	$795.2	NOTE: New Addition. FID approved by the JRC in Jun-16.
Time Based Flow Management (TBFM) WP3 ACAT 3NI	Apr-15	Sep-22	$188.3				Sep-22	$188.3	
Wide Area Augmentation System (WAAS) Phase IV, Segment 1 - Dual Frequency Operations (DFO) ACAT 1	May-14	Sep-19	$603.2				Sep-19	$603.2	

FAA Capital Programs
Major Programs with Completed Acquisition Phase

Programs	Original Baseline			Rebaseline			Actual Results		Comments
	Original APB Date	Completion Date	Budget $M	Rebaseline-APB Date	Revised Completion Date	Revised Budget $M	Completion Date	Budget $M	
Regulation and Certification Infrastructure for System Safety (RCISS) - Segment 2 ACAT 3	Oct-10	Sep-16	$90.8				May-16	$90.7	Actual Result vs. Original Baseline: The program finished 4 months early (5.6% favorable variance).
Terminal Automation Modernization and Replacement (TAMR), Phase 3, Segment 1 (P3 S1) ACAT 2	Dec-11	Oct-17	$438.0	Aug-15	Oct-17	$528.6	Apr-17	$528.6	Actual Result vs. Rebaseline: The program declared Operational Readiness Date (ORD) at the last site, New York (N90) on April 7, 2017, completing the baseline 6 months early (7.3% favorable variance) to the original and rebaseline schedule.