U.S. Department of Transportation

BUDGET ESTIMATES
FISCAL YEAR 2022

FEDERAL AVIATION ADMINISTRATION

SUBMITTED FOR USE OF
THE COMMITTEE ON APPROPRIATIONS

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Section 1. Overview

OVERVIEW

The FY 2022 budget request continues to hold safety as the Federal Aviation Administration's (FAA) highest priority while preparing the organization to tackle the challenges of tomorrow.

For FY 2022, the FAA's budget request of $18.5 billion represents an increase of 2.7 percent from the FY 2021 enacted level (not including coronavirus response supplemental funding). This funding level allows the FAA to make continued investments to safeguard the most complex airspace in the world. It also allows the FAA to future proof the nation's airspace by continuing the deployment of NextGen technologies as well as safely and securely integrating new entrants such as unmanned aircraft systems and commercial space. In addition, the budget request supports our ongoing efforts to address the impacts aviation has on our environment and climate by overcoming barriers to the development of sustainable aviation fuels and accelerating the maturation of technologies to reduce noise, emissions and fuel burn from new commercial aircraft and engines.

This budget request works hand in hand with the American Jobs Plan to invest in the modernization of our aviation infrastructure. The budget invests $1 billion to improve the physical condition of the FAA facilities that house the workforce and technology at the heart of the FAA's air traffic control system. Aviation is a significant portion of the U. S. economy and is critical to the nation's economic growth. This investment will ensure it remains a vibrant source for job creation and opportunity. As the FAA continues to operationalize NextGen, this budget requests $1 billion to deliver the benefits of these innovations to the users of the nation's airspace.

Operations - The FY 2022 budget request of $11.4 billion for Operations represents an increase of $432.6 million (3.9 percent) from the FY 2021 enacted level. This funding level will improve aviation safety and the FAA's ability to respond to industry innovation, while providing sufficient resources for anticipated cost increases. This funding level enables us to preserve the highest level of safety in the national airspace while investing in innovation. The Operations request funds approximately $303 million in uncontrollable cost increases for FY 2022, including a 2.7 percent pay raise, FERS increase, and the transition of capital programs from Facilities & Equipment.

The budget includes an additional $129.7 million in targeted investments, which include $11.8 million for Enterprise Information Management (EIM), $17.4 million for improving aviation safety oversight, $38 million for cybersecurity, $2.4 million for an expanded FAA international presence, $23.1 million for unmanned aircraft systems (UAS) integration, $21.4 million for Remote Telecommunications Infrastructure Replacement, $3.7 million for commercial space operational staffing and support, $1.5 million for Safety Assurance System development and risk analysis, $7.6 million for community noise engagement, $2.3 million for Science, Technology, Engineering, and Math Aviation and Space Education, and $325 thousand for the Office of Civil Rights' National External Operations Program.

Enterprise Information Management (EIM) is a key FAA priority for which this budget requests $11.8 million. EIM will rapidly and effectively manage and utilize the ever-increasing volume, velocity, and variety of its data, to support near real-time data analysis functions and decision making.

Cybersecurity remains a priority, especially after the SolarWinds incident identified critical cybersecurity needs for the FAA. The budget request includes an increase of $38 million, of which $34.1 is requested in support of government-wide cybersecurity initiatives that leverage the lessons learned from the SolarWinds incident. The remaining $3.9 million supports implementation of required high-security controls for high-impact systems in the national airspace system.

The FAA continues to implement the recommendations and support activities that directly relate to the Boeing 737 MAX investigation and reviews. Among these activities are: improving FAA's gathering, analysis, use, and accessibility of safety data; supporting the FAA's Organization Designation Authorization (ODA) office, which provides centralized oversight and consistent implementation of ODA authorities; and targeted hiring of staff with the technical expertise, capabilities, and adaptability needed to continue to meet the safety needs of a rapidly-evolving aerospace system. The FY 2022 budget requests an additional $17.4 million and 81 FTE to support the FAA Action Plan in response to the recommendations of the Special Committee to review the FAA's Aircraft Certification Process. Responding to the 2021 Aircraft Certification, Safety, and Accountability Act, the FAA is establishing an Ombudsman organization, as well as designating an Office of Investigations and Professional Responsibility to ensure proper execution of the investigative process.

FAA's commitment to innovation is reflected in its investment towards the safe integration of new entrants into the national airspace. The budget requests an increase of $23.1 million to support advanced UAS operations and address the need for enhanced security related to UAS. In the realm of commercial space transportation, the budget supports FAA's efforts to keep pace with the steadily increasing demand for space launch activities, licenses, permits, safety approvals, payload determinations, and inspections, while emphasizing the integration of safe and efficient space launches and reentries into the national airspace.

Finally, as communities continue to demand higher levels of engagement with concerns and complaints around aircraft noise, $7.6 million is requested to continue proactively educating local community roundtables and government officials to support the development of solutions to growing concerns regarding noise.

Facilities & Equipment (F&E) - The FY 2022 Budget request includes $3.41 billion for Facilities and Equipment, an increase of $395 million above the FY 2021 enacted level.

The request includes a total of $1 billion to improve the condition of FAA facilities and ensure that the systems and the staff housed within them remain safe and operational.

This request will allow the FAA to begin addressing its $5.1 billion backlog in maintenance needs. Most air traffic control facilities are in poor condition. The FAA's air route traffic control centers range in age from 55 to 61 years, and some terminal air traffic control facilities are as old as 78 years. In addition to funding for the maintenance of existing facilities, the request includes $331 million for the replacement of facilities that are in poor condition and experience operational issues. This funding works in tandem with the American Jobs Plan, which provides an additional $5 billion towards improving the state of good repair of FAA facilities.

The Budget request includes $825.5 million to sustain currently fielded NextGen systems and funds improvement work to support full recognition of NextGen benefits to the FAA and the aviation community. This funding level fully supports important programs like Terminal Flight Data Manager, En Route Automation Modernization Enhancements, and Data Communications Full Services.

The F&E request also includes $59.3 million to support integration of UAS into the national airspace and $6.5 million for commercial space. The FAA will continue development of a UAS Traffic Management system, as well as work to automate commercial space launch and reentry operations that are currently manual in nature.

Research, Engineering & Development (RE&D) - This budget request includes $258.5 million for the Research, Engineering and Development account, an increase of $60.5 million above the FY 2021 enacted level. This enables the pursuit of critical research in support of multiple mission areas. Of the requested amount, $109 million are invested in programs specifically aimed at mitigating the impact of aviation on climate change and air quality. This amount includes $50 million that is requested in coordination with the establishment of an Advanced Research Projects Agency for Climate (ARPA-C) to support high-risk accelerated research with transformative impact potential in the areas of sustainable fuels for jet engines, unleaded fuel alternatives for piston-engine aircraft and low-noise/low-emissions aircraft technologies including electric propulsion. These research initiatives will be coordinated with air transportation stakeholders in industry and academia and with partner federal agencies including the Department of Energy.

The request provides $22 million for continued research to support safe integration of UAS operations, including efforts to examine counter UAS technologies and evaluate their potential impacts on airport operations.

Finally, the request provides $13.3 million to support ongoing research focusing on the health, safety and performance of safety sensitive personnel and airline passengers. Additionally, the funds support a limited two year pandemic-related research effort to inform a system risk management analysis of infectious disease transmission in flight, and to establish a foundation for developing a cabin safety pandemic playbook for future use.

Grants-in-Aid for Airports - Within the $3.35 billion request level, almost $3.2 billion for airport grants provides the funding needed to preserve and improve critical airfield infrastructure at more than 3,300 public-use airports nationwide.

The request includes $127.2 million for personnel & related expenses for the FAA's Office of Airports. This includes $3.5 million to upgrade the System of Airports Reporting and funding for five new positions – three for airspace coordination efforts with airports to increase safety, and two for the Puerto Rico field office.

The request includes $40.9 million for the Airport Technology Research program to support the safe and efficient integration of new and innovative technologies into the airport environment. Research areas include ways to reduce or eliminate harmful chemicals in firefighting agents, runway condition monitoring using radar, viability of solar technology for runway and taxiway lights, and innovative pavement materials to make airport pavement last longer. This request also includes funding to support UAS research activities that are specific to airports, and research on innovative materials testing methods. Finally, the request includes $15 million for the Airport Cooperative Research program.

This request is strengthened by the American Jobs Plan's further support of the nation's airports. Airport grants traditionally support projects that keep the pavement of our nation's airports in good, safe condition. The Plan includes an additional $10 billion that will allow the program to support projects that mitigate the effects airports have on our environment, as well as another $10 billion for projects that support airport terminal improvements and multimodal connections to airports.

Conclusion

The FAA's budget request of $18.5 billion, combined with the investments provided by the American Jobs Plan, will enable continued investments to safeguard and modernize the most complex airspace in the world. Thanks to this commitment, the FAA will be well positioned to succeed for years to come.

AMERICAN JOBS PLAN: BUILD WORLD-CLASS TRANSPORTATION INFRASTRUCTURE: FIX HIGHWAYS, REBUILD BRIDGES, AND UPGRADE PORTS, AIRPORTS, RAIL AND TRANSIT SYSTEMS

President Biden is calling on Congress to make a historic and overdue investment in our roads, bridges, rail, ports, airports, and transit systems. The President's plan will ensure that these investments produce good-quality jobs with strong labor standards, prevailing wages, and a free and fair choice to join a union and bargain collectively. These investments will advance racial equity by providing better jobs and better transportation options to underserved communities. These investments also will extend opportunities to small businesses to participate in the design, construction, and manufacturing of new infrastructure and component parts. President Biden's plan will deliver infrastructure Americans can trust, because it will be more resilient to floods, fires, storms, and other threats, and not fragile in the face of these increasing risks.

The President's plan invests an additional $621 billion in transportation infrastructure and resilience:

- Within this amount, **$540 Billion** would reside in the Department of Transportation for its programs allocated over a five-year period, and is in addition to the base amounts included in the FY 2022 Budget request.

- Separately, the American Jobs Plan also provides $50 billion make our infrastructure more resilient of which **$7.5 Billion** would be provided to the Department of Transportation.

- Aside from Department of Transportation funding, the American Jobs Plan calls for **$74 Billion** in additional infrastructure investments, including $8 Billion to the U.S. Army Corps of Engineers for Inland Waterways and Harbor Projects, $3 Billion to the General Services Administration for land ports of entry, $20 Billion to the Environmental Protection Agency for school bus electrification, and $43B for non-transportation resilience programs.

Detailed information about the American Jobs Plan can be found within the FY 2022 Budget Highlights located at:

https://www.transportation.gov/mission/budget/fiscal-year-2022-budget-highlights

JUSTICE40

Executive Order 14008, issued on January 27, 2021, created a government-wide "Justice40" Initiative with the goal of delivering 40 percent of the overall benefits of relevant federal investments to disadvantaged communities and tracking performance toward the goal through an Environmental Justice Scorecard.

The Justice40 Initiative has the potential to deliver benefits that could include increased access to renewable energy and energy efficiency improvements, public transit, water infrastructure, climate-resilient affordable housing, training and workforce development, reductions in legacy pollution, and equitable and just community development, among others. There are important considerations in the development, implementation, and evaluation of such a wide-reaching and complex initiative. To advance Justice40 goals the Department is considering options in areas such as, but not limited to, incorporating criteria in the Department's discretionary grant programs, developing implementable definitions for "investment benefit" and "disadvantaged communities" as it relates to programmatic activities, public engagement strategies with stakeholders to define and further understand "investment benefits" that can be targeted for disadvantaged and underserved communities, and developing a Department-wide Environmental Justice Scorecard.

In the coming months, the Department will be working to ensure that subsequent programs, targets, and metrics fulfill the ambition of the Justice40 Initiative to deliver meaningful and measurable benefits to disadvantaged and underserved communities.

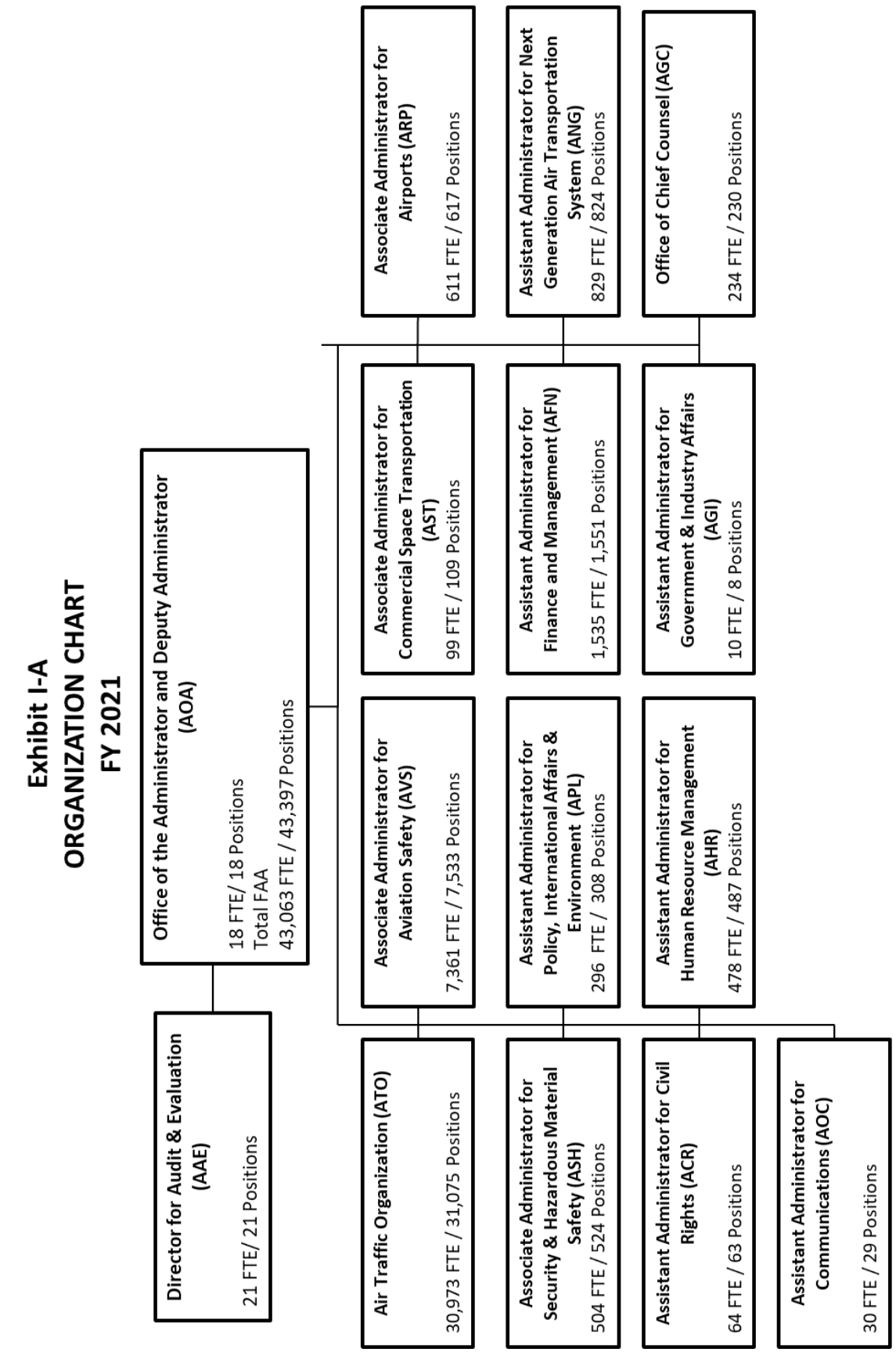
Exhibit I-A
ORGANIZATION CHART
FY 2021
Office of the Administrator and Deputy Administrator (AOA)
18 FTE/ 18 Positions
Total FAA
43,063 FTE / 43,397 Positions
Director for Audit & Evaluation (AAE)
21 FTE/ 21 Positions
Associate Administrator for Airports (ARP)
611 FTE / 617 Positions
Assistant Administrator for Next Generation Air Transportation System (ANG)
829 FTE / 824 Positions
Office of Chief Counsel (AGC)
234 FTE / 230 Positions
Associate Administrator for Commercial Space Transportation (AST)
99 FTE / 109 Positions
Assistant Administrator for Finance and Management (AFN)
1,535 FTE / 1,551 Positions
Assistant Administrator for Government & Industry Affairs (AGI)
10 FTE / 8 Positions
Associate Administrator for Aviation Safety (AVS)
7,361 FTE / 7,533 Positions
Assistant Administrator for Policy, International Affairs & Environment (APL)
296 FTE / 308 Positions
Assistant Administrator for Human Resource Management (AHR)
478 FTE / 487 Positions
Air Traffic Organization (ATO)
30,973 FTE / 31,075 Positions
Associate Administrator for Security & Hazardous Material Safety (ASH)
504 FTE / 524 Positions
Assistant Administrator for Civil Rights (ACR)
64 FTE / 63 Positions
Assistant Administrator for Communications (AOC)
30 FTE / 29 Positions

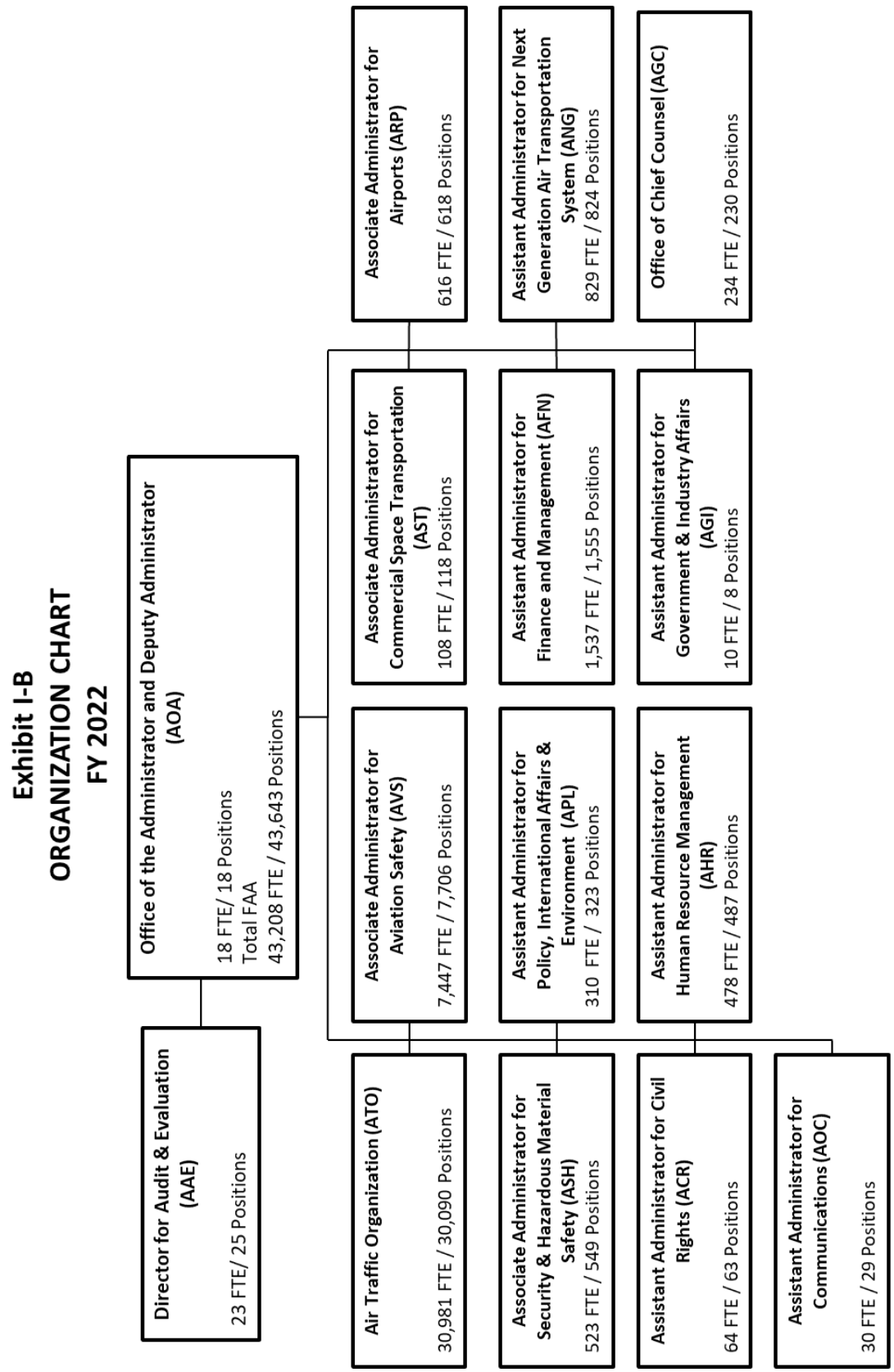
Exhibit I-B
ORGANIZATION CHART
FY 2022
Office of the Administrator and Deputy Administrator (AOA)
18 FTE/ 18 Positions
Total FAA
43,208 FTE / 43,643 Positions
Director for Audit & Evaluation (AAE)
23 FTE/ 25 Positions
Air Traffic Organization (ATO)
30,981 FTE / 30,090 Positions
Associate Administrator for Aviation Safety (AVS)
7,447 FTE / 7,706 Positions
Associate Administrator for Commercial Space Transportation (AST)
108 FTE / 118 Positions
Associate Administrator for Airports (ARP)
616 FTE / 618 Positions
Associate Administrator for Security & Hazardous Material Safety (ASH)
523 FTE / 549 Positions
Assistant Administrator for Policy, International Affairs & Environment (APL)
310 FTE / 323 Positions
Assistant Administrator for Finance and Management (AFN)
1,537 FTE / 1,555 Positions
Assistant Administrator for Next Generation Air Transportation System (ANG)
829 FTE / 824 Positions
Assistant Administrator for Civil Rights (ACR)
64 FTE / 63 Positions
Assistant Administrator for Human Resource Management (AHR)
478 FTE / 487 Positions
Assistant Administrator for Government & Industry Affairs (AGI)
10 FTE / 8 Positions
Office of Chief Counsel (AGC)
234 FTE / 230 Positions
Assistant Administrator for Communications (AOC)
30 FTE / 29 Positions

Section 2. Budget
Summary Tables

EXHIBIT II-1
FY 2022 BUDGET AUTHORITY
FEDERAL AVIATION ADMINISTRATION
($000)

ACCOUNT NAME	M/D	(A) FY 2020 ACTUAL	(B) FY 2020 CARES Act	(C) FY 2021 ENACTED	(D) FY 2021 CRRSA	(E) FY 2021 American Rescue Plan	(F) FY 2022 PRESIDENT'S BUDGET
Operations		$10,630,000		$11,001,500			$11,434,100
Emergency Supplemental							
Rescission							
Subtotal	**D**	**$10,630,000**		**$11,001,500**			**$11,434,100**
Facilities and Equipment		$3,045,000		$3,015,000			$3,410,000
Emergency Supplemental							
Rescission							
Subtotal	**D**	**$3,045,000**		**$3,015,000**			**$3,410,000**
Research, Engineering and Development		$192,665		$198,000			$258,500
Rescission							
Subtotal	**D**	**$192,665**		**$198,000**			**$258,500**
Grants-in-Aid for Airports							
Contract Authority (AATF)	**M**	$3,350,000		$3,350,000			$3,350,000
General Fund Appropriation	**D**	$400,000	$10,000,000	$400,000	$2,000,000		$0
Rescission							
Subtotal		**$3,750,000**	**$10,000,000**	**$3,750,000**	**$2,000,000**		**$3,350,000**
Relief for Airports	**M**					**$8,000,000**	
FAA Employee Leave Fund	**M**					**$9,000**	
Overflight Fees	**M**	$112,423		$80,664			$118,446
Property Disposal or Lease Proceeds	**M**	$1,541					
Overflight Fees (Transfer to EAS)	**M**	($112,423)		($80,664)			($118,446)
TOTALS							
Gross New Budget Authority		$17,619,206	$10,000,000	$17,964,500	$2,000,000	$8,009,000	$18,452,600
Rescissions		$0	$0	$0	$0	$0	$0
Transfers		$0	$0	$0	$0	$0	$0
Offsets		$0	$0	$0	$0	$0	$0
NET NEW BUDGET AUTHORITY:		**$17,619,206**	**$10,000,000**	**$17,964,500**	**$2,000,000**	**$8,009,000**	**$18,452,600**
[Mandatory BA]		$3,351,541	$0	$3,350,000	$0	$8,009,000	$3,350,000
[Discretionary BA]		$14,267,665	$10,000,000	$14,614,500	$2,000,000	$0	$15,102,600

EXHIBIT II-2
FY 2022 TOTAL BUDGETARY RESOURCES BY APPROPRIATION ACCOUNT
FEDERAL AVIATION ADMINISTRATION
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

ACCOUNT NAME	M/D	(A) FY 2020 ACTUAL	(B) FY 2020 CARES Act	(C) FY 2021 ENACTED	(D) FY 2021 CRRSA	(E) FY 2021 American Rescue Plan	(F) FY 2022 PRESIDENT'S BUDGET
Operations	**D**	**10,630,000**		**11,001,500**			**11,434,100**
Air Traffic Organization (ATO)		7,969,234		8,205,821			8,489,585
Aviation Safety (AVS)		1,404,096		1,479,039			1,536,298
Commercial Space Transportation (AST)		26,040		27,555			32,470
Finance & Management (AFN)		800,391		836,001			892,216
NextGen (ANG)		61,590		63,002			63,955
Security and Hazardous Materials Safety (ASH)		118,642		124,688			139,466
Staff Offices		250,007		265,394			280,110
Facilities & Equipment	**D**	**3,045,000**		**3,015,000**			**3,410,000**
Engineering, Development, Test and Evaluation		218,100		157,600			159,500
Air Traffic Control Facilities and Equipment		1,870,800		1,818,450			2,231,870
Non-Air Traffic Control Facilities and Equipment		203,400		256,250			269,130
Facilities and Equipment Mission Support		237,700		237,700			199,500
Personnel and Related Expenses		515,000		545,000			550,000
Research, Engineering & Development	**D**	**192,665**		**198,000**			**258,500**
Research, Engineering & Development		192,665		198,000			258,500
Grants-in-Aid for Airports		**3,750,000**	**10,000,000**	**3,750,000**	**2,000,000**		**3,350,000**
Grants-in-Aid for Airports	**M**	3,169,276		3,164,932			3,166,874
General Fund Appropriation	**D**	400,000	10,000,000	400,000	2,000,000		0
Personnel & Related Expenses	**M**	116,500		119,402			127,165
Airport Technology Research	**M**	39,224		40,666			40,961
Airport Cooperative Research Program	**M**	15,000		15,000			15,000
Small Community Air Service	**M**	10,000		10,000			0
Relief for Airports	**M**					**8,000,000**	
FAA Employee Leave Fund	**M**					**9,000**	
TOTAL BUDGETARY RESOURCES:		**17,617,665**	**10,000,000**	**17,964,500**	**2,000,000**	**8,009,000**	**18,452,600**
[Mandatory]		**3,350,000**	**0**	**3,350,000**	**0**	**8,009,000**	**3,350,000**
[Discretionary]		**14,267,665**	**10,000,000**	**14,614,500**	**2,000,000**	**0**	**15,102,600**
[Obligation Limitation]		**[3,350,000]**	**[0]**	**[3,350,000]**	**[0]**	**[0]**	**[3,350,000]**

EXHIBIT II-4
FY 2022 OUTLAYS
FEDERAL AVIATION ADMINISTRATION
($000)

	M / D	(A) FY 2020 ACTUAL	(B) FY 2020 CARES Act*	(C) FY 2021 ENACTED	(D) FY 2021 CRRSA*	(E) FY 2021 American Rescue Plan	(F) FY 2022 PRESIDENT'S BUDGET
Operations	**D**	**$ 10,525,010**		**$ 10,682,060**			**$ 12,334,128**
General		$ 162,010		$ 125,060			$ 3,164,028
AATF		$ 10,363,000		$ 10,557,000			$ 9,170,100
Facilities & Equipment	**D**	**$ 2,808,000**		**$ 2,700,873**			**3,180,083**
AATF							
- Discretionary		$ 2,808,000		$ 2,700,873			3,180,083
Aviation Insurance Revolving Account	**M**	**$ (29,788)**		**$ (33,000)**			**$ (10,000)**
Research, Engineering & Development	**D**	**$ 153,145**		**$ 227,087**			**$ 286,093**
Grants-in-Aid for Airports	**D**	**$ 3,446,525**	**$ 3,450,000**	**$ 3,615,102**	**$ 6,158,000**		**$ 5,883,615**
Relief for Airports	**M**					**$ 2,480,000**	**$ 4,400,000**
FAA Employee Leave Fund	**M**					**$ 9,000**	
Aviation User Fees (Overflight)	**M**	**$ 1,806**					
Franchise Fund	**D**	**$ 7,575**		**$ 3,000**			**$ 75,000**
TOTAL:							
[Mandatory]		$ (27,982)	$ -	$ (33,000)	$ -	$ 2,489,000	$ 4,390,000
[Discretionary]		$ 16,940,255	$ 3,450,000	$ 17,228,122	$ 6,158,000	$ -	$ 21,758,919
		$ 16,912,273	**$ 3,450,000**	**$ 17,195,122**	**$ 6,158,000**	**$ 2,489,000**	**$ 26,148,919**

* Amounts shown in columns B and D include all AIP outlays from the General Fund. It is not possible to delineate among outlays from "regular" AIP General Fund supplemental appropriations, CARES Act, and CRRSA funding.

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

Operations	FY 2020 Actual*	FY 2021 Enacted	Annualization of FY 2021 Pay Raise	Annualization of FY 2021 FTE	FY 2022 Pay Raise	FY 2022 FERS Increase	GSA Rent	WCF Increase/ Decrease	Other FY 2022 Base Adjustments	FY 2022 Baseline Estimate	Program Increases/ Decreases	FY 2022 Request
PERSONNEL RESOURCES (FTE)												
Direct FTE	39,112	39,384		16						39,400	124	39,524
FINANCIAL RESOURCES												
ADMINISTRATIVE EXPENSES												
Salaries and Benefits	$7,470,686	$7,691,975	$18,677	$2,743	$155,764	$71,051			$72,000	$8,012,210	$21,272	$8,033,482
Travel	$71,221	$72,590							$74,344	$146,934	$1,615	$148,549
Transportation	$19,441	$19,441								$19,441	$0	$19,441
GSA Rent	$120,270	$120,270								$120,270	$ 18,189	$138,459
Rental Payments to Other	$66,787	$66,787								$66,787	$ -	$66,787
Communications, & Utilities	$331,947	$331,947							$4,222	$336,169	$ -	$336,169
Printing	$2,617	$2,617								$2,617	$ -	$2,617
Other Services	$2,351,552	$2,479,612						$666	($96,536)	$2,383,742	$ 58,011	$2,441,753
Supplies	$119,610	$139,895								$139,895	$ 1,563	$141,458
Equipment	$73,817	$74,314								$74,314	$ 29,019	$103,333
Land and Strructure	$591	$591								$591	$ -	$591
Grants, Claims and Subsidies	$306	$306								$306	$ -	$306
Insurance Claims and Indemnities	$1,155	$1,155								$1,155	$ -	$1,155
Admin Subtotal	**$10,630,000**	**$11,001,500**	**$18,677**	**$2,743**	**$155,764**	**$71,051**	**$0**	**$666**	**$54,030**	**$11,304,431**	**$129,669**	**$11,434,100**
PROGRAMS												
Air Traffic Organization (ATO)	$7,969,234	$8,205,821	$14,281		$118,526	$56,383		($225)	$50,306	$8,445,092	$44,493	$8,489,585
Aviation Safety (AVS)	$1,404,096	$1,479,039	$2,964		$25,003	$9,953		($875)	$795	$1,516,879	$19,419	$1,536,298
Commercial Space Transportation (AST)	$26,040	$27,555	$44	$667	$383	$156				$28,805	$3,665	$32,470
Finance and Management (AFN)	$800,391	$836,001	$608		$5,164	$1,995		$368	$2,770	$846,906	$45,310	$892,216
NextGen (ANG)	$61,590	$63,002	$76		$639	$238				$63,955	$0	$63,955
Security and Hazardous Materials Safety (ASH)	$118,642	$124,688	$212	$1,005	$1,813	$727		$691	$159	$129,295	$10,171	$139,466
Staff Offices	$250,007	$265,394	$492	$1,071	$4,236	$1,599		$707		$273,499	$6,611	$280,110
Programs Subtotal	**$10,630,000**	**$11,001,500**	**$18,677**	**$2,743**	**$155,764**	**$71,051**	**$0**	**$666**	**$54,030**	**$11,304,431**	**$129,669**	**$11,434,100**
TOTAL	**$10,630,000**	**$11,001,500**	**$18,677**	**$2,743**	**$155,764**	**$71,051**	**$0**	**$666**	**$54,030**	**$11,304,431**	**$129,669**	**$11,434,100**

* The FY 2020 Actual amounts for the Air Traffic Organization (ATO) and Staff Offices include a one time transfer in funding of $1,500,000 from the ATO to the Office of Chief Counsel (AGC) as authorized by provisions in the Operations appropriations language.

EXHIBIT II-5
SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
Federal Aviation Administration

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

			Baseline Changes									
Facilities & Equipment	**FY 2020 Actual**	**FY 2021 Enacted**	**Annualization of Prior Pay Raises**	**Annualization of new 2021 FTE**	**2022 Pay Raises**	**FY 2022 FERS Increase**	**GSA Rent**	**WCF Increase/ Decrease**	**Other FY 2022 Base Adjustments**	**FY 2022 Baseline Estimate**	**Program Increases/ Decreases**	**FY 2022 President's Budget Request**
PERSONNEL RESOURCES (FTE)												
Direct FTE	2,849	2,851								2,851		2,851
FINANCIAL RESOURCES												
ADMINISTRATIVE EXPENSES												
Salaries and Benefits	486,664	507,352	1,217		10,271	3,972				522,812	-	522,812
Travel	16,626	19,989							508	20,497	-	20,497
Transportation	2,479	2,020								2,020	356	2,376
GSA Rent	698	678								678	151	829
Rental Payments to Others	40,682	40,650								40,650	(6,502)	34,148
Communications, & Utilities	47,089	45,670								45,670	10,298	55,968
Printing	30	28								28	4	32
Other Services:	2,073,790	2,022,440							(5,968)	2,016,472	316,551	2,333,023
-WCF	48	49								49	-	49
Supplies	29,676	34,615							(5,000)	29,615	5,817	35,432
Equipment	183,372	183,785								183,785	33,518	217,303
Lands and Structures	160,599	154,610								154,610	30,160	184,770
Grants, Claims, Subsidies and Interest	3,247	3,114								3,114	(353)	2,761
Admin Subtotal	**3,045,000**	**3,015,000**	**1,217**	**-**	**10,271**	**3,972**	**-**	**-**	**(10,460)**	**3,020,000**	**390,000**	**3,410,000**
PROGRAMS												
Engineering, Development, Test and Evaluation	218,100	157,600								157,600	1,900	159,500
Air Traffic Control Facilities and Equipment	1,870,800	1,818,450								1,818,450	413,420	2,231,870
Non-Air Traffic Control Facilities and Equipment	203,400	256,250								256,250	12,880	269,130
Facilities and Equipment Mission Support	237,700	237,700								237,700	(38,200)	199,500
Personnel & Related Expenses	515,000	545,000	1,217		10,271	3,972			(10,460)	550,000	-	550,000
Programs Subtotal	**3,045,000**	**3,015,000**	**1,217**	**-**	**10,271**	**3,972**	**-**	**-**	**(10,460)**	**3,020,000**	**390,000**	**3,410,000**
TOTAL	**3,045,000**	**3,015,000**	**1,217**	**-**	**10,271**	**3,972**		**-**	**(10,460)**	**3,020,000**	**390,000**	**3,410,000**

EXHIBIT II-5
SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
Federal Aviation Administration
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

			Baseline Changes										
Research, Engineering & Development	**FY 2020 Actual**	**FY 2021 Enacted**	**Annualization of Prior Pay Raises**	**Annualization of new FY 2021 FTE**	**FY 2022 Pay Raises**	**Adjustment for Compensable Days (261 days)**	**FY 2022 FERS Increase**	**GSA Rent**	**WCF Increase/ Decrease**	**Inflation and other adjustments to base**	**FY 2022 Baseline Estimate**	**Program Increases/ Decreases**	**FY 2022 President's Budget Request**
PERSONNEL RESOURCES (FTE)											0		0
Direct FTE	197	217									217		217
FINANCIAL RESOURCES													
ADMINISTRATIVE EXPENSES													
Salaries and Benefits	40,239	41,700	104		847		286				42,937		42,937
Travel	1,314	1,141								11	1,152		1,152
Transportation	69	28									28		28
GSA Rent	0	0									0		0
Communications, & Utilities	30	5									5		5
Printing	24	5									5		5
Other Services:													
-Advisory and Assistance Services	37,000	0									0		0
-Others	77,378	78,880								789	79,669	58,427	138,096
-WCF	0	0									0		0
Supplies	1,613	695								7	702		702
Equipment	2,774	2,467								25	2,492		2,492
Lands and Structures	0	432								4	436		436
Grants, Claims & Subsidies	32,224	72,647									72,647		72,647
Interest and Dividends	0	0									0		0
Admin Subtotal	**192,665**	**198,000**	**104**	**0**	**847**	**0**	**286**	**0**	**0**	**836**	**200,073**	**58,427**	**258,500**
PROGRAMS													
Research, Engineering and Development	192,665	198,000	104		847		286			836	200,073	58,427	258,500
Programs Subtotal	**192,665**	**198,000**	**104**	**0**	**847**	**0**	**286**	**0**	**0**	**836**	**200,073**	**58,427**	**258,500**
TOTAL	**192,665**	**198,000**	**104**	**0**	**847**	**0**	**286**	**0**	**0**	**836**	**200,073**	**58,427**	**258,500**

EXHIBIT II-5
SUMMARY OF REQUESTED FUNDING CHANGES FROM BASE
Federal Aviation Administration
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

			Baseline Changes										
Grants-in-Aid for Airports	**FY 2020 Enacted**	**FY 2021 Enacted**	**Annualization of Prior Pay Raises**	**Annualization of new 2021 FTE**	**2022 Pay Raises**	**Adjustment for Compensable Days (261 days)**	**FY 2022 FERS Increase**	**GSA Rent**	**WCF Increase/ Decrease**	**Other Base Adjustments**	**FY 2022 Baseline Estimate**	**Program Increases/ Decreases**	**FY 2022 Request**
PERSONNEL RESOURCES (FTE)													
Direct FTE	600	611		5							616	0	616
FINANCIAL RESOURCES													
ADMINISTRATIVE EXPENSES													
Salaries and Benefits	104,605	107,658	269	850	2,179		807				111,763	425	112,188
Travel	3,156	3,156									3,156		3,156
Transportation	124	124									124		124
GSA Rent	104	104									104		104
Rental Payments to Others	789	789									789		789
Communications, Rent & Utilities	265	265									265		265
Printing	27	27									27		27
Other Services:													
-WCF	133	228							33		261		261
-Advisory and Assistance Services	32,570	32,568									32,568	-5	32,563
-Other	34,077	35,277									35,277	3,500	38,777
Supplies	1,122	1,122									1,122		1,122
Equipment	1,236	1,236									1,236		1,236
Lands and Structures	496	496									496		496
Grants, Claims & Subsidies	13,561,276	5,556,931									5,556,931	-2,398,058	3,158,873
Insurance Claims and Indemnities	1	1									1		1
Interest and Dividends	19	19									19		19
Financial transfers	10,000	10,000									10,000	-10,000	0
Admin Subtotal	**13,750,000**	**5,750,000**	**269**	**850**	**2,179**	**0**	**807**	**0**	**33**	**0**	**5,754,138**	**-2,404,138**	**3,350,000**
PROGRAMS													
Grants	3,569,276	3,564,932									3,564,932	-398,058	3,166,874
Coronavirus Supplemental	10,000,000	2,000,000									2,000,000	-2,000,000	0
Personnel and Related Expenses	116,500	119,402	259	680	2,093		773		33		123,240	3,925	127,165
Airport Technology Research	39,224	40,666	10	170	82		33				40,961		40,961
Airport Cooperative Research	15,000	15,000			4		1				15,005	-5	15,000
Small Community Air Service	10,000	10,000									10,000	-10,000	
Programs Subtotal	**13,750,000**	**5,750,000**	**269**	**850**	**2,179**	**0**	**807**	**0**	**33**	**0**	**5,754,138**	**-2,404,138**	**3,350,000**
TOTAL	**13,750,000**	**5,750,000**	**269**	**850**	**2,179**	**0**	**807**	**0**	**33**	**0**	**5,754,138**	**-2,404,138**	**3,350,000**

EXHIBIT II-6
WORKING CAPITAL FUND
FEDERAL AVIATION ADMINISTRATION
($000)

	FY 2020 ACTUAL	FY 2021 ENACTED	FY 2022 REQUEST
DIRECT:			
Facilities & Equipment	48	49	49
Grants-in-Aid for Airports	107	202	234
Operations	53,016	53,505	54,170
TOTAL	**$ 53,171**	**$ 53,755**	**$ 54,453**

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

EXHIBIT II-7
FEDERAL AVIATION ADMINISTRATION
PERSONNEL RESOURCE -- SUMMARY
TOTAL FULL-TIME EQUIVALENTS

	FY 2020 ACTUAL	FY 2021 ENACTED	FY 2022 PRESIDENT'S BUDGET
DIRECT FUNDED BY APPROPRIATION			
Operations	39,112	39,384	39,524
Facilities & Equipment	2,849	2,851	2,851
Research, Engineering & Development	197	217	217
Grants-in-Aid for Airports	564	607	615
CARES Act	1	4	1
CRRSA Act	0	0	0
SUBTOTAL, DIRECT FUNDED	42,723	43,063	43,208
REIMBURSEMENTS / ALLOCATIONS / OTHER			
Reimbursements and 'Other'			
Operations	201	178	178
Aviation Insurance Revolving Fund	2	4	4
Facilities & Equipment	43	50	50
Grants-in-Aid for Airports	5	7	3
Administrative Services Franchise Fund	1,401	1,437	1,472
Allocations from other Organizations	0	0	0
SUBTOTAL, REIMBURSE./ALLOC./OTH.	1,652	1,676	1,707
TOTAL FTEs	**44,375**	**44,739**	**44,915**

EXHIBIT II-8
FEDERAL AVIATION ADMINISTRATION
RESOURCE SUMMARY – STAFFING
FULL-TIME PERMANENT POSITIONS

	FY 2020 ACTUAL	FY 2021 ENACTED	FY 2022 REQUEST
DIRECT FUNDED BY APPROPRIATION			
Operations	39,219	39,668	39,913
Facilities & Equipment	2,889	2,891	2,891
Research, Engineering & Development	194	221	221
Grants-in-Aid for Airports	573	612	617
CARES Act	2	5	1
CRRSA Act	0	0	0
SUBTOTAL, DIRECT FUNDED	42,877	43,397	43,643
REIMBURSEMENTS/ALLOCATIONS/ OTHER			
Reimbursements and 'Other'			
Operations	99	110	110
Aviation Insurance Revolving Fund	2	4	4
Facilities & Equipment	0	0	0
Grants-in-Aid for Airports	0	7	3
Administrative Services Franchise Fund	1,379	1,450	1,450
Allocations from other Organizations	0	0	0
SUBTOTAL, REIMBURSE./ALLOC./OTH.	1,480	1,571	1,567
TOTAL POSITIONS	**44,357**	**44,968**	**45,210**

EXHIBIT II-9
FEDERAL AVIATION ADMINISTRATION
USER FEES
($000)

	FY 2020 ACTUAL	FY 2021 ESTIMATE	FY 2022 ESTIMATE
USER FEE			
Civil Aviation Registry Fees	1,390	1,322	1,322
Foreign Repair Station/Certification Fees	8,351	6,564	10,940
Aeronautical Charting Fees	23	46	45
Overflight Fees	112,423	80,869	118,446
Unmanned Aircraft Systems Registry Fees	1,220	1,148	1,276
Total User Fees	**123,407**	**89,949**	**132,029**

EXHIBIT II-10
FEDERAL AVIATION ADMINISTRATION
NEXTGEN PORTFOLIO
($ in millions)

	FY 2020 ACTUAL	FY 2021 ENACTED	FY 2022 REQUEST
Facilities and Equipment	**$1,031.6**	**$794.5**	**$825.5**
NextGen - Separation Management Portfolio	20.5	21.2	23.5
NextGen – Traffic Flow Management Portfolio	19.8	8.0	13.0
NextGen - On Demand NAS Portfolio	8.5	10.5	9.0
NextGen - NAS Infrastructure Portfolio	11.5	15.0	10.5
NextGen – Support (NIEC, Test Bed) Portfolio	11.0	8.4	7.0
NextGen - System Safety Management Portfolio	24.5	21.5	18.3
NextGen – Unmanned Aircraft System (UAS)	51.9	22.0	24.0
NextGen – Enterprise, Concept Devel, Human Factors, and Demo Portfolio	19.0	19.0	10.6
Performance Based Navigation (PBN) Support Portfolio	5.0	8.0	8.0
Unmanned Aircraft Systems (UAS) Implementation	28.4	26.6	31.3
Enterprise Information Platform	10.0	10.0	17.6
Data Communications in Support of NextGen	136.2	110.0	110.3
En Route Automation Modernization (ERAM) - System Enhancements	106.0	66.9	104.5
System Wide Information Management (SWIM)	81.8	31.1	34.0
ADS - B NAS Wide Implementation	159.4	180.0	157.6
Air Traffic Management Implementation Portfolio	50.0	17.2	10.0
Terminal Flight Data Manager (TFDM)	135.5	79.1	85.4
Time Based Flow Management (TBFM)	20.0	20.0	13.3
Next Generation Weather Processor (NWP)	24.3	24.3	48.2
Reduced Oceanic Separation	32.3	15.5	7.0
Aeronautical Information Management Program (AIM)	5.3	7.5	8.9
Activity 5 F&E PCBT - NextGen Staffing	70.7	72.9	73.6
Research Engineering and Development (RE&D)	**$72.2**	**$72.9**	**$67.4**
NextGen - Alternative Fuels for General Aviation *	1.9	0.0	0.0
NextGen – Flight Deck Data Exchange Requirements	1.0	1.0	1.0
NextGen- Information Security	2.7	4.8	4.8
NextGen- Wake Turbulence *	5.0	3.7	0.0
NextGen - Air Ground Integration	5.3	6.0	3.0
NextGen - Weather in the Cockpit	3.1	2.0	3.0
NextGen - Environmental Research, Aircraft Technologies, Fuels and Metrics	29.2	31.5	33.5
Unmanned Aircraft Systems Research	24.0	24.0	22.1
Operations	**$122.7**	**$126.3**	**$142.0**
NextGen Staffing	38.7	39.9	40.3
NextGen Unmanned Aircraft System	63.1	65.3	88.5
Performance Based Navigation (PBN) Activities	20.9	21.1	13.2
Total NextGen Programs	**$1,226.5**	**$993.8**	**$1,034.9**

* RE&D Programs that are no longer categorized as part of the NextGen Portfolio.

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Section 3. Budget by
Appropriations Account

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, the lease or purchase of passenger motor vehicles for replacement only, **[**$11,001,500,000**]***$11,434,100,000*, to remain available until September 30, **[**2022**]** *2023*, of which **[**$10,519,000,000**]** *$8,434,100,000* shall be derived from the Airport and Airway Trust Fund: *Provided*, **[**That of the sums appropriated under this heading—**]**
[(1) not less than $1,479,039,000 shall be available for aviation safety activities;**]**
[(2) $8,205,821,000 shall be available for air traffic organization activities;**]**
[(3) $27,555,000 shall be available for commercial space transportation activities;**]**
[(4) $836,141,000 shall be available for finance and management activities;**]**
[(5) $62,862,000 shall be available for NextGen and operations planning activities;**]**
[(6) $124,928,000 shall be available for security and hazardous materials safety; and**]**
[(7) $265,154,000 shall be available for staff offices:**]** **[***Provided further*, That not to exceed 5 percent of any budget activity, except for aviation safety budget activity, may be transferred to any budget activity under this heading: *Provided further*, That no transfer may increase or decrease any appropriation under this heading by more than 5 percent: *Provided further*, That any transfer in excess of 5 percent shall be treated as a reprogramming of funds under section 405 of this Act and shall not be available for obligation or expenditure except in compliance with the procedures set forth in that section: *Provided further*,**]** That not later than 60 days after the submission of the 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 the Vision 100-Century of Aviation Reauthorization Act (49 U.S.C. 40101 note): **[***Provided further*, That the amounts made available under this heading shall be reduced by $100,000 for each day after 60 days after the submission of the budget request that such report has not been transmitted to Congress:**]** *Provided further*, That not later than 60 days after the submission of the 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 the amounts made available under this heading shall be reduced by $100,000 for each day after the date that is 60 days after the submission of the budget request that such report has not been submitted to Congress:**]** *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 made available by this Act shall be available for new applicants for the second career training program: **[***Provided further*, That none of the funds in this Act shall be available for the Federal Aviation Administration to finalize or implement any regulation that would promulgate new aviation user fees not specifically authorized by law after the date of the enactment of this Act:**]** *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 **[**: *Provided further*, That of the amounts made available under this heading, not less than $172,800,000 shall be used to fund direct operations of the current air traffic control towers in the contract tower program, including the contract tower cost share program, and any airport that is currently qualified or that will qualify for the program during the fiscal year: *Provided further*, That none of the funds made available by this Act for aeronautical charting and cartography are available for activities conducted by, or coordinated through, the Working Capital Fund: *Provided further*, That none of the funds appropriated or otherwise made available by this Act or any other Act may be used to eliminate the Contract Weather Observers program at any airport**]**. *(Department of Transportation Appropriations Act, 2021.)*

Program and Financing (in millions of dollars)

Identification code: 69-1301-0-1-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Obligations by program activity:			
0001	Air Traffic Organization (ATO)	7,987	8,255	8,492
0002	NextGen	61	67	64
0003	Finance & Management	825	843	896
0004	Regulation & Certification	1,412	1,516	1,547
0005	Commercial Space Transportation	27	29	33
0006	Security & Hazardous Materials Safety	122	128	139
0007	Staff Offices	253	268	280
0008	2017 Hurricanes / 2018 Supplemental	46	.....	.....
0100	Direct Program Activities Subtotal	10,733	11,106	11,451
0799	Total Direct Obligations	10,733	11,106	11,451
0801	Operations (Reimbursable)	130	130	130
0900	Total new obligations, unexpired accounts	10,863	11,236	11,581
	Budget resources:			
1000	Unobligated balance brought forward, Oct. 1	226	166	103
1021	Recoveries of prior year unpaid obligations	42	.....	.....
1050	Unobligated balance (total)	268	166	103
	Budget authority:			
	Appropriations, discretionary:			
1100	Appropriation	111	483	3000
	Spending authority from offsetting collections, discretionary,			
1700	Collected	10.493	10,715	9,341
1701	Change in uncollected payments, Federal sources	167	-25	-736
1750	Spending auth from offsetting collections, disc (total)	10,660	10,690	8,605
1900	Budget authority (total)	10,771	11,173	11,605
1930	Total budgetary resources available	11,039	11,339	11,708
	Memorandum (non-add) entries:			
1940	Unobligated balance expiring	-10	.....	.....
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	166	103	127
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct. 1	1,663	1,773	2,169
3010	New Obligations, unexpired accounts	10,863	11,236	11,581
3011	Obligations ("upward adjustments"), expired accounts	31	.....	.....
3020	Outlays (gross)	-10,706	-10,840	-12,505
3040	Recoveries of prior year unpaid obligations, unexpired	-42	.....	.....
3041	Recoveries of prior year unpaid obligations, expired	-36	.....	.....
3050	Unpaid obligations, end of year	1,773	2,169	1,245
	Uncollected payments:			
3060	Uncollected pymts, Fed sources, brought forward, Oct 1	-732	-877	-852
3070	Change in uncollected pymts, Fed sources, unexpired	-167	25	736
3071	Change in uncollected pymts, Fed sources, expired	22	.....	.....
3090	Uncollected pymts, Fed sources, end of year	-877	-852	-116
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	931	896	1,317
3200	Obligated balance, end of year	896	1,317	1,129
	Budget authority and outlays, net:			
	Discretionary:			
4000	Budget authority, gross	10,771	11,173	11,605
	Outlays, gross:			

Identification code: 69-1301-0-1-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
4010	Outlays from new discretionary authority	9,160	9,853	10,233
4011	Outlays from discretionary balances	1,546	987	2,272
4020	Outlays, gross (total)	10,706	10,840	12,505
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-10,508	-10,679	-9,305
4033	Non-Federal sources	-35	-35	-35
4034	Offsetting governmental collections	-1	-1	-1
4040	Offsets against gross budget authority and outlays (total)	-10,544	-10,715	-9,341
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pymts, Federal sources, unexpired	-167	25	736
4052	Offsetting collections credited to expired accounts	51	.....	.....
4060	Additional offsets against budget authority only (total)	-116	25	736
4070	Budget authority, net (discretionary)	111	483	3,000
4080	Outlays, net (discretionary)	162	125	3,164
4180	Budget authority, net (total)	111	483	3,000
4190	Outlays, net (total)	162	125	3,164

The 2022 Budget requests $11.434 billion 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 operations 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 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Direct obligations:			
	Personnel compensation:			
11.1	Full-time permanent	4,846	4,937	5,050
11.3	Other than full-time permanent	3	30	31
11.5	Other personnel compensation	410	431	513
11.9	Total personnel compensation	5,286	5,398	5,594
12.1	Civilian personnel benefits	2,201	2,309	2,438
13.0	Benefits for former personnel	2	2	2
21.0	Travel and transportation of persons	83	73	149
22.0	Transportation of things	22	19	19
23.1	Rental payments to GSA	122	133	151
23.2	Rental payments to others	71	54	54
23.3	Communications, utilities, and miscellaneous charges	349	332	336
24.0	Printing and reproduction	3	3	3
25.1	Advisory and assistance services	775	878	912
25.2	Other services from non-Federal sources	1,606	1,689	1,545
26.0	Supplies and materials	131	140	141
31.0	Equipment	80	74	105
32.0	Land and structures	1	1	1
42.0	Insurance claims and indemnities	1	1	1

99.0	Direct obligations	10,733	11,106	11,451
99.0	Reimbursable obligations	130	130	130
99.9	Total new obligations	10,863	11,236	11,581

Employment Summary

Identification code: 69-1301-0-1-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
1001	Direct civilian full-time equivalent employment	39,112	39,384	39,524
2001	Reimbursable civilian full-time equivalent employment	201	178	178

EXHIBIT III-1
OPERATIONS
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	(A) FY 2020 ACTUAL	(B) FY 2020 CARES Act	(C) FY 2021 ENACTED	(D) FY 2021 CRRSA	(E) FY 2021 American Rescue Plan	(F) FY 2022 PRESIDENT'S BUDGET
Air Traffic Organization (ATO)	$ 7,969,234		$ 8,205,821			$ 8,489,585
Aviation Safety (AVS)	$ 1,404,096		$ 1,479,039			$ 1,536,298
Commercial Space (AST)	$ 26,040		$ 27,555			$ 32,470
Finance & Management (AFN)	$ 800,391		$ 836,001			$ 892,216
NextGen (ANG)	$ 61,590		$ 63,002			$ 63,955
Security and Hazardous Materials Safety	$ 118,642		$ 124,688			$ 139,466
Staff Offices	$ 250,007		$ 265,394			$ 280,110
TOTAL	$ 10,630,000	$ -	$ 11,001,500	$ -	$ -	$ 11,434,100
FTEs						
Direct Funded	39,112		39,384			39,524
Reimbursable, allocated, other	201		178			178

Program and Performance Statement

This account provides funds for the operation, maintenance, communications and logistical support of the air traffic control and air

(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 2021 TO FY 2022
Appropriations, Obligations, Limitations, and Exempt Obligations
($000)

	$000	FTE
FY 2021 ENACTED	$11,001,500	39,384
ADJUSTMENTS TO BASE:		
Annualization of FY 2021 Pay Raise 1.0%	18,677	
Annualization of FY 2021 FTE	2,743	16
FY 2022 Pay Raise 2.7%	155,764	
FY 2022 FERS Increase	71,051	
Transition from F&E to Ops	53,280	
Working Capital Fund	666	
Financial Accounting Services	750	
SUBTOTAL, ADJUSTMENTS TO BASE	**302,931**	**16**
PROGRAM INCREASES		
Enterprise Information Management (EIM)	11,785	2
Improving Aviation Safety Oversight	17,443	81
Cybersecurity	38,000	
Expanded FAA International Presence	2,425	2
Unmanned Aircraft Systems (UAS) Integration	23,145	23
Remote Telecommunications Infrastructure Replacement (RTIR)	21,441	
Commercial Space Operational Staffing & Support	3,665	5
Safety Assurance System (SAS) Development & Risk Analysis	1,525	3
Community Noise Engagement	7,615	6
STEM/AVSED	2,300	2
FAA Office of Civil Rights: National External Operatons Program	325	
SUBTOTAL, PROGRAM INCREASES	**129,669**	**124**
BASE TRANSFERS	**0**	**0**
FY 2022 REQUEST	**11,434,100**	**39,524**

Operations Summary
($000)

	Dollars (in thousands)	FTP	OTFTP	FTE
FY 2021 Enacted	**$11,001,500**	**39,668**	**702**	**39,384**
Adjustments to Base	**$302,931**	-	-	16
Annualization of FY 2021 Pay Raise 1.0%	18,677	-	-	-
Annualization of FY 2021 FTE	2,743	-	-	16
FY 2022 Pay Raise 2.7%	155,764	-	-	-
FY 2022 FERS Increase	71,051	-	-	-
Transition from F&E to Ops	53,280	-	-	-
Working Capital Fund	666	-	-	-
Financial Accounting Services	750	-	-	-
Discretionary Adjustments	**129,669**	**245**	**-**	**124**
Enterprise Information Management (EIM)	11,785	4	-	2
Improving Aviation Safety Oversight	17,443	162	-	81
Cybersecurity	38,000	-	-	-
Expanded FAA International Presence	2,425	4	-	2
Unmanned Aircraft Systems (UAS) Integration	23,145	46	-	23
Remote Telecommunications Infrastructure Replacement (RTIR)	21,441	-	-	-
Commercial Space Operational Staffing & Support	3,665	9	-	5
Safety Assurance System (SAS) Development & Risk Analysis	1,525	5	-	3
Community Noise Enagement	7,615	11	-	6
STEM/ AVSED	2,300	4	-	2
FAA Office of Civil Rights: National External Operations Program	325	-	-	-
FY 2022 Request	**$11,434,100**	**39,913**	**702**	**39,524**

Staffing Summary -- FY 2020 - FY 2022

			Type	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Air Traffic Organization		ATO	FTP	28,713	28,906	28,921
			OTFTP	597	597	597
			FTE	28,753	28,850	28,858
Associate Administrator for Aviation Safety		AVS	FTP	7,276	7,406	7,579
			OTFTP	58	58	58
			FTE	7,128	7,237	7,323
Associate Administrator for Commercial Space Transportation		AST	FTP	93	109	118
			OTFTP	1	1	1
			FTE	91	99	108
Assistant Administrator for Finance and Management		AFN	FTP	1,348	1,399	1,403
			OTFTP	17	17	17
			FTE	1,358	1,383	1,385
Assistant Administrator for Next Generation Air Transportation System		ANG	FTP	172	177	177
			OTFTP	3	3	3
			FTE	174	177	177
Associate Administrator for Security and Hazardous Materials Safety		ASH	FTP	507	523	548
			OTFTP	2	2	2
			FTE	495	503	522
Staff Offices	Assistant Administrator for Human Resource Management	AHR	FTP	483	487	487
			OTFTP	5	5	5
			FTE	476	478	478
	Office of the Administrator and Deputy	AOA	FTP	14	18	18
			OTFTP	1	1	1
			FTE	16	18	18
	Assistant Administrator for Audit and Evaluation	AAE	FTP	20	21	25
			OTFTP	1	1	1
			FTE	20	21	23
	Assistant Administrator for Civil Rights	ACR	FTP	60	63	63
			OTFTP	1	1	1
			FTE	62	64	64
	Asst. Administrator for Government and Industry Affairs	AGI	FTP	8	8	8
			OTFTP	1	1	1
			FTE	10	10	10
	Assistant Administrator for Communications	AOC	FTP	25	29	29
			OTFTP	2	2	2
			FTE	28	30	30
	Office of Chief Counsel	AGC	FTP	222	230	230
			OTFTP	8	8	8
			FTE	229	234	234
	Asst. Administrator for Policy, International Affairs and Environment	APL	FTP	278	292	307
			OTFTP	5	5	5
			FTE	272	280	294
Total			FTP	39,219	39,668	39,913
			OTFTP	702	702	702
			FTE	39,112	39,384	39,524

Resource Summary -- FY 2020 - FY 2022 ($000)

			FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Air Traffic Organization (ATO)		pcb	$ 5,712,523	$ 5,853,149	$ 6,115,354
		o/o	$ 2,256,711	$ 2,352,672	$ 2,374,231
ATO Total			**$ 7,969,234**	**$ 8,205,821**	**$ 8,489,585**
Associate Administrator for Aviation Safety (AVS)		pcb	$ 1,185,429	$ 1,234,645	$ 1,287,820
		o/o	$ 218,667	$ 244,394	$ 248,478
AVS Total			**$ 1,404,096**	**$ 1,479,039**	**$ 1,536,298**
Associate Administrator for Commercial Space Transportation (AST)		pcb	$ 17,435	$ 18,932	$ 20,710
		o/o	$ 8,605	$ 8,623	$ 11,760
AST Total			**$ 26,040**	**$ 27,555**	**$ 32,470**
Assistant Administrator for Finance and Management (AFN)		pcb	$ 243,069	$ 255,043	$ 263,100
		o/o	$ 557,322	$ 580,958	$ 629,116
AFN Total			**$ 800,391**	**$ 836,001**	**$ 892,216**
Assistant Administrator for NextGen Air Transportation System (ANG)		pcb	$ 30,138	$ 31,550	$ 32,503
		o/o	$ 31,452	$ 31,452	$ 31,452
ANG Total			**$ 61,590**	**$ 63,002**	**$ 63,955**
Associate Administrator for Security and Hazardous Materials Safety (ASH)		pcb	$ 84,631	$ 89,467	$ 95,386
		o/o	$ 34,011	$ 35,221	$ 44,080
ASH Total			**$ 118,642**	**$ 124,688**	**$ 139,466**
Staff Offices	Assistant Administrator for Human Resource Management (AHR)	pcb	$ 75,783	$ 80,444	$ 82,876
		o/o	$ 29,029	$ 30,545	$ 31,199
	AHR Total		**$ 104,812**	**$ 110,989**	**$ 114,075**
	Office of the Administrator and Deputy (AOA)	pcb	$ 3,061	$ 3,492	$ 3,589
		o/o	$ 311	$ 311	$ 311
	AOA Total		**$ 3,372**	**$ 3,803**	**$ 3,900**
	Assistant Administrator for Audit and Evaluation (AAE)	pcb	$ 3,763	$ 3,853	$ 4,252
		o/o	$ 335	$ 735	$ 757
	AAE Total		**$ 4,098**	**$ 4,588**	**$ 5,009**
	Assistant Administrator for Civil Rights (ACR)	pcb	$ 9,855	$ 10,600	$ 10,914
		o/o	$ 2,401	$ 2,161	$ 2,486
	ACR Total		**$ 12,256**	**$ 12,761**	**$ 13,400**
	Assistant Administrator for Government and Industry Affairs (AGI)	pcb	$ 1,655	$ 1,703	$ 1,755
		o/o	$ 162	$ 162	$ 162
	AGI Total		**$ 1,817**	**$ 1,865**	**$ 1,917**
	Assistant Administrator for Communications (AOC)	pcb	$ 5,945	$ 6,378	$ 6,581
		o/o	$ 773	$ 1,273	$ 1,273
	AOC Total		**$ 6,718**	**$ 7,651**	**$ 7,854**
	Office of the Chief Council (AGC)	pcb	$ 43,436	$ 46,283	$ 47,684
		o/o	$ 3,893	$ 2,970	$ 3,004
	AGC Total		**$ 47,329**	**$ 49,253**	**$ 50,688**
	Assistant Administrator for Policy, International Affairs and Environment (APL)	pcb	$ 53,963	$ 56,436	$ 60,958
		o/o	$ 15,642	$ 18,048	$ 22,309
	APL Total		**$ 69,605**	**$ 74,484**	**$ 83,267**
Grand Total			**$ 10,630,000**	**$ 11,001,500**	**$ 11,434,100**

FY 2022 Discretionary Adjustments
(In thousands)

	ATO	AVS	AST	AFN	ANG	ASH	Staff Offices	Total
Enterprise Information Management (EIM) 4 FTP/2 FTE		$ 575		$11,210				**$ 11,785**
Improving Aviation Safety Oversight 162 FTP/81 FTE		$16,499				$ 641	$ 303	**$ 17,443**
Cybersecurity	$ 3,900			$34,100				**$ 38,000**
Expanded FAA International Presence 4 FTP/2 FTE							$ 2,425	**$ 2,425**
Unmanned Aircraft Systems (UAS) Integration 46 FTP/23 FTE	$ 13,295	$ 1,845				$ 8,005		**$ 23,145**
Remote Telecommunications Infrastructure Replacement (RTIR)	$ 21,441							**$ 21,441**
Commercial Space Operational Staffing & Support 9 FTP/5 FTE			$3,665					**$ 3,665**
Safety Assurance System (SAS) Development & Risk Analysis 5 FTP/3 FTE						$ 1,525		**$ 1,525**
Community Noise Engagement 11 FTP/6 FTE	$ 5,857						$ 1,758	**$ 7,615**
STEM/AVSED 4 FTP/2 FTE		$ 500					$ 1,800	**$ 2,300**
National External Operations Program							$ 325	**$ 325**
Total, Discretionary Adjustments	**$ 44,493**	**$19,419**	**$3,665**	**$45,310**	**$ -**	**$ 10,171**	**$ 6,611**	**$ 129,669**

Enterprise Information Management (EIM)

Office of Finance and Management (AFN), Aviation Safety (AVS)

(In thousands)

	FY 2022
Enterprise Information Management (EIM)	**$11,785**
PC&B	$290
Non-Pay	$11,495
FTE	**2**

1. Describe the problem or circumstance that prompted the need for this additional funding.

The FAA's aging information technology (IT) infrastructure and existing application for accessing data resources requires enhancements in order for the agency to take full advantage of available advances within IT. The current limited ability to access data efficiently across lines of businesses and staff offices presents constraints on data sharing, thus limiting our data analysis capabilities, and increasing costs.

In response to these challenges, the FAA has initiated the Enterprise Information Management (EIM) program. The Facilities & Equipment (F&E) component of EIM established an associated governance framework and key technology components to improve the data infrastructure to help the Agency adopt modern analytical practices. This EIM program created a cloud-based data platform which can be leveraged by multiple programs, including the analyst community within the FAA. This positions the agency for accelerated adoption of modern technology and faster delivery of business insights. An example of this would be: Adding the ability to incorporate a more diverse set of operational data in our safety analysis for regulatory oversight.

2. Describe the strategy and the proposed solution you are using to address the situation.

EIM enhancements will provide FAA workforce and stakeholders with a suitable framework for efficiently accessing and exploiting relevant data resources to meet their requirements while reducing duplicate functions. The EIM program will build out and extend current capabilities by supporting and enabling technology transfers from discrete programs to the cloud-hosted solutions that scale to support requirements of new and modernized systems, while minimizing overall costs by reducing redundant development, deployment, and operations of common enterprise data and information management infrastructure and services across the FAA. EIM will deliver improved development, test, staging, and production environments, and provide continuation of the system's development life cycle, including systems analysis, system design, and system security.

Addressing the transformation of outdated analytical practices within the agency allows personnel to take full advantage of the technological improvements EIM is developing. It will include training FAA staff on improved Machine Learning/Artificial Intelligence skills and converting legacy analytical practices from desktop-based tools to cloud-based big data

platforms. This will require additional contractor support for EIM's Systems Engineering, Program Management, Technical Writing, Communications and Outreach, and Administrative functions.

The EIM strategy also seeks to improve on the FAA's safety analytical capabilities. The EIM program will work with the Office of Aviation Safety's Safety Data Action Team (SDAT) to establish the design, specifications, requirements, and business processes for the EIM architecture and vision for future safety data sharing. The SDAT focuses on making data analysis across the FAA smarter and more efficient.

3. How much are you requesting? Provide a detailed justification for the increase.

The FAA is requesting $11.785 million to improve its data and information management capabilities. The funds will be used to procure necessary tools from the cloud service provider and to staff the support team required to continue to operate these capabilities.
For the **Office of Finance and Management** (AFN) the FAA is requesting **$11.210 million.** The request consists of the following elements:

- $290,000 for 4 FTP/2 FTE
- $1 million for training
- $3.42 million for additional licenses
- $500,000 for program management
- $5 million for legacy data and capability migration
- $1 million for improving data quality and governance

For the **Office of Aviation Safety (AVS)** the FAA is requesting **$575,000.** The request will cover costs associated with SDAT.

- The SDAT will establish a virtual, enterprise-wide, Safety Data Training Center that will train FAA employees on how to access data and provide guidance on how to analyze, interpret, display, or generally use FAA's safety data and tools. Investment in training resources empowers the workforce to take an active role in using and trusting safety data.

Improving Aviation Safety & Oversight

Aviation Safety (AVS), Security and Hazardous Materials Safety (ASH), and Office of Audit and Evaluation (AAE)

(In thousands)

	FY 2022
Improving Aviation Safety & Oversight	**$17,443**
PC&B	$14,366
Non-pay	$3,077
FTE	**81**

1. Describe the problem or circumstance that prompted the need for this additional funding.

The FAA is continuing its multiyear efforts to refine and enhance the safety lifecycle. These efforts are in large part driven by the Aviation Safety (AVS) Strategic Plan, recommendations from independent reviews such as the Special Committee (Spec Comm) and Joint Authorities Technical Review (JATR), and the Aircraft Certification Safety and Accountability Act. Collectively, these require significant efforts for the AVS organization to design, implement, and deliver against the requirements.

The Aircraft Certification Safety and Accountability Act enacts several major changes to US aviation law and mandates adjustments to regulations and policy. It establishes over 40 unique requirements aimed primarily at adjusting the process for certifying new and amended aircraft designs, overseeing US transport airplane manufacturers, and ensuring systems safety and human factors are effectively accounted for in the design and operation of aircraft. The Act includes requirements for FAA technical experts to more directly participate in the approval, qualifications review, and mentorship of ODA unit members. It also addresses opportunities for improvements in the aviation system that may have been identified following the 737 MAX accidents. In addition, it also contains provisions on international collaboration, workforce development, and the expansion of Safety Management Systems.

The Aircraft Certification Safety and Accountability Act also contained requirements for other offices within the FAA. It directs the FAA Administrator to redesignate the current ASH Office of Investigation as the **Office of Investigations and Professional Responsibility (OPR)** and expand its responsibilities to improve FAA's oversight of whistleblower allegations. The new office will ensure proper execution of the investigative process and increase agency accountability through focused investigations, reviews, and data management of internal misconduct including whistleblower retaliation.

Additionally, the Act also requires the establishment of an Ombudsman function in the FAA's **Office of Audit and Evaluation (AAE)** to serve as an independent resource for agency employees to discuss their rights and remedies for any allegations of misconduct.

2. Describe the strategy and the proposed solution you are using to address the situation.

The FAA has developed an Action Plan in response to the recommendations of the Special Committee and requirements from the Aircraft Certification Safety and Accountability Act. The plan discusses in depth the FAA's actions, both planned and underway, to address the recommendations. Importantly, the FAA developed its plan not solely in response to the Special Committee recommendations, but also in the context of the other recommendations received from the JATR, NTSB, and the Indonesian National Transportation Safety Committee, as well as FAA's own findings. The plan is responsive to all recommendations received and apply to the entirety of the FAA's approach to aircraft certification. The plan reflects the FAA's commitment to improving our certification process domestically, and to improving aviation safety globally.

The FAA Action Plan addresses specific areas of focus, including the following:

1. **Safety Systems:** The Committee found that the FAA should improve its gathering, analysis, use, and accessibility of safety data, making use of machine learning and artificial intelligence to identify emerging safety issues where possible. This recommendation applies to the following systems:

    a. **Aviation Safety Information Analysis and Sharing (ASIAS)** is a collaborative government/industry initiative to share and analyze data in order to proactively discover systemic safety concerns before incidents occur. It integrates aviation safety data/information across FAA and the aviation community, enabling users to leverage leading edge technologies to conduct safety analysis to support risk-based decisions. ASIAS provides access to aggregated safety information from multiple airlines, fleets, and regions of the global air transportation system.

    b. **Systems Safety Management Transformation** (**SSMT**) estimates the risk associated with system change. The system applies the analysis of historical events to risk assessments of changes to procedures, regulations, or policies. By identifying precursors that contribute to risk, SSMT helps the FAA anticipate where and when risk might increase instead of recognizing and correcting failures after the fact.

    c. **Aviation Safety Reporting Program** The Aviation Safety Reporting System is a program that allows pilots and other aircraft crew members to report near misses and close calls in the interest of improving air safety. This reporting is voluntary and confidential and administered by NASA under an interagency agreement.

2. **Aviation Safety Designee Oversight:** The FAA will use the Organization Designation Authorization (ODA) Office to help improve performance and consistency in the ODA program. The Office will promote actions that result in consistent delegation determinations based on standardized risk methodologies and

inform and oversee the implementation of a consistent FAA ODA program strategy. The ODA office will promote understanding of what constitutes undue pressure, clarify the communication expectations between FAA and ODA personnel, and systemically address any actual undue pressure on ODA personnel.

3. **Targeted AVS Hiring:** The FAA's goal is to recruit, hire, maintain, and retain a workforce with the technical expertise, capabilities, and adaptability needed to continue to meet the safety needs of a rapidly-evolving aerospace system. To this end, the FAA is implementing several initiatives to better target personnel requirements, foster cultural change, and advance workforce development. We will focus our personnel initiatives on approaching aircraft certification activities holistically. The Aircraft Certification Safety and Accountability Act requires AVS to recruit and retain expertise to support the evolving safety lifecycle, from the certification of aircraft and evaluation of new and emerging technologies, to the oversight of the operational system. The needed skills include, but are not limited to: various engineering discipline, safety inspectors, data analysts, human-machine interface specialists, medical, chief scientific and technical advisors, and software and cybersecurity experts.

   The request will enable AVS to begin addressing the requirements of the Aircraft Certification Safety and Accountability Act. We will continue to assess the scope of transformations to the overall safety lifecycle, as well as the necessary resources to implement the changes.

The expanded **OPR** will ensure proper execution of the FAA's internal investigative process, as well as provide accountability for agency actions following the investigative process. These investigations include but are not limited to, management inquires and internal misconduct, including whistle blower retaliation. Office will review and revise existing policies governing the investigation of misconduct by managers and focus on improving agency oversight and accountability of internal investigations. **AAE** will establish an Ombudsman function to provide services to FAA employees and leadership. The Ombudsman will educate FAA employees and managers about prohibitions against acts of retaliation, serve as an independent confidential resource for FAA employees to discuss any specific retaliation allegation, and develop training within the Agency to mitigate the potential for retaliation and promote timely and appropriate processing of any protected disclosure or allegation of materially adverse acts of retaliation.

3. How much are you requesting? Provide a detailed justification for the increase.

The FY 2022 Budget request includes $17.4 million and 81 FTE to support the following areas of the FAA Action Plan:

- **AVS: $16.5 million and 152 FTP/76 FTE.**

  1. **Safety Systems:** The FAA requests **$2.3 million** for enhancements to safety systems.

a. **Aviation Safety Information Analysis and Sharing** enhancements will align additional data sources and expanded analytical capabilities to support in-time safety analysis for FAA and other stakeholders.

b. **Enhancements to Systems Safety Management Transformation** enhancements will improve risk assessment models to improve the FAA's ability to identify precursor events and align the FAA's risk models with EUROCONTROL.

c. **Aviation Safety Reporting Program** enhancements will create an interface program to capture all safety-critical reports, including 100 percent of general aviation reports, and reports associated with emerging safety issues. The total number of reports received by Aviation Safety Reporting System has grown significantly each year, and the total number of reports received through CY2020 was nearly 1.8 million.

2. Aviation Safety Designee Oversight: AVS requests **$3.9 million** for **37 FTP/19 FTE** for the Organization Designation Authorization Office. These efforts will continue to support standardized outcomes and improvements across the ODA program to resolve the concerns raised by the FAA, industry stakeholders and others.

3.Targeted AVS Hiring: AVS requests **$10.3 million** for **115 FTP/57 FTE**:

	FTP	**FTE**
AVP- Office of Accident Investigation & Prevention	5	3
AAM- Office of Aerospace Medicine	6	3
AFS- Flight Standards	57	28
AIR- Aircraft Certification	45	22
ARM- Office of Rulemaking	2	1
Total	**115**	**57**

- **ASH: $641,000 and 6 FTP/3 FTE.**
  - $641,000 for 6 FTP/3 FTE to stand up the **OPR** and includes funding for the associated travel, training, equipment, and supplies.
- **AAE: $303,000 and 4 FTP/2 FTE.**
  - $303,000 for 4 FTP/2 FTE to establish an Ombudsman function to address the requirements of the Aircraft Certification and Accountability Act.

Cybersecurity

Office of Finance and Management (AFN) and
Air Traffic Organization (ATO)

(In thousands)

	FY 2022
Cybersecurity	**$38,000**
PC&B	0
Non-pay	$38,000
FTE	**0**

1. Describe the problem or circumstance that prompted the need for this additional funding.

The FY 2022 President's Budget allocates resources to nine agencies that were impacted by the SolarWinds incident, one of which is the Federal Aviation Administration. The funding request targets critical cybersecurity needs at these nine agencies which prioritizes basic cybersecurity enhancements, including: cloud security, Security Operations Center (SOC) enhancements, encryption, Multi-Factor Authentication , increased logging functions, and enhanced monitoring tools. As part of the FAA's strategy we will increase our security capabilities by increasing: capacity to support incident analysis and validation, ability to detect and contain security threats, SOC maturity, and capacity to eradicate and evict cyber adversaries. This effort will be led by the FAA's Office of Information and Technology Services (AIT), within the Office of Finance and Management (AFN).

As the threat of security incidents increases and the need for security operations grows, the FAA needs to implement additional security controls and capabilities to protect its information technology systems and ensure uninterrupted operations. Specifically, any significant disruptions to one of the Air Traffic Organization's (ATO) high impact systems would severely impede ATO's ability to perform the critical safety functions that are essential to the continuous operation of the national airspace.

2. Describe the strategy and the proposed solution you are using to address the situation.

AIT will increase its capacity to support incident analysis and validation by focusing on Cyber Threat Intelligence, Digital Forensics, and Improved Logging. Cyber Threat Intelligence will compile data from multiple sources into a single platform and enhance the organization's ability to defend and detect. Digital Forensics provides a key capability to identify activity that may have occurred on physical or logical systems, which are needed to preserve chain of custody and insure the integrity of the data. Improved Logging will help the FAA address the increasing challenge of log collection caused by the sprawl of systems and the expanding requirements for retention. As the FAA moves towards more cloud services, it is vital for its organizations to plan for extended logging solutions.

The FAA will be able to better detect and contain security threats by implementing Cloud Access Security Broker solutions. The Cloud Access Security Broker solution allows security infrastructure operations teams to centralize policies and monitor activities associated with cloud based solutions. For E-Mail security, the level of logging and access to various capabilities in Microsoft 365 varies depending on the level of licensing acquired by the customer. The FAA will implement Microsoft G5 licenses in order to have increased visibility and access to extended security features and logs.

The FAA will increase its Security Operations Center maturity by expanding its Security Information and Event Management (SIEM) solution. As the requirement for increased logging capacity grows, the FAA will need to expand the ingestion rate of the SIEM solution to keep pace.

Another facet of the FAA's strategy is to focus on the **ATO's** safety critical systems connected to the operational Internet Protocol networking infrastructure. The FAA performed an extensive analysis in an effort to assess Security Categorization Ratings for all ATO systems in accordance with federal information processing standards. This analysis identified an additional 48 ATO systems that were categorized as high impact systems. Any significant disruption to one of these high impact systems would severely impede ATO's ability to perform safety and/or efficiency critical functions essential to the smooth operation of the national airspace. To implement the high security controls, we will analyze their application within these targeted system infrastructures, develop and propose the necessary system configuration changes required, test the system with the new controls, and, integrate these controls into operational activities.

3. How much are you requesting? Provide a detailed justification for the increase.

The FAA is requesting $38.0 million in total for this increase. The funding will be used for the following items:

For AFN, the FAA is requesting **$34.1 million.**

- $4.0 million for Support Incident Analysis and Validation, focusing on areas of Cyber Threat Intelligence, Digital Forensics and Improved Logging.
- $24.1 million for Detection and Containment, increasing the ability to detect and contain security threats with improved Cloud Access Security Broker solutions and upgraded E-Mail security.
- $1.0 million for Security Operations Center (SOC) enhancements that expand the Security Information and Event Management (SEIM) solution.
- $5.0 million to increase the capacity to support adversarial Eradication and Eviction by increasing contract personnel (specifically Technical Subject Matter Experts) and replacing hardware and software.

For ATO, the FAA is requesting **$3.9 million.**

- $3.9 million for the implementation of required high security controls for high impact systems, which includes: Contractor/vendor support for analysis, development, testing, and operational integration; hardware and software procurement; and facility security improvements.

Expanded FAA International Presence
Office of Policy, International Affairs and Environment (APL)

(In thousands)

	FY 2022
Expanded FAA International Presence	**$2,425**
PC&B	$843
Non-pay	$1,582
FTE	**2**

1. Describe the problem or circumstance that prompted the need for this additional funding.

The FAA is the longstanding leader in aviation safety regulation and oversight, provision of air navigation services, and integration of innovative new capabilities. FAA has a mission to support a global aviation system for U.S. stakeholders that is equally as safe and efficient as flying in U.S. airspace. To accomplish this mission, the FAA relies heavily on a cadre of employees stationed overseas to enhance its ability to engage with foreign authorities in order to influence their adoption of aviation standards and policies that align to U.S. interests. The workload to properly represent U.S. policy globally has already exceeded the existing bandwidth of current staff.

- United Kingdom (UK) – The UK has the largest aviation industry in Europe and a geographic position that is strategic for the U.S. Twenty-five percent of trans-Atlantic flights are between the U.S. and UK. With the UK exiting the European Union (EU), the FAA must now establish new legal and working arrangements with the UK as it is no longer covered under existing U.S./EU agreements. This is a considerable workload to create, maintain, and manage, but is also an opportunity to strengthen the U.S./UK aviation strategic relationship.

- Poland – Eastern Europe is rapidly growing into an important and influential force within the region with record air transport industry growth. With an increasing number of U.S. stakeholders transiting this region, the FAA needs to engage and drive enhancements to regional aviation safety and air navigation services. While the FAA has a Senior Representative stationed in Moscow, this representative is already fully engaged in overseeing safety and air traffic cooperative programs and regional harmonization activities with Russia, including facilitation of critical access to cross-polar air routes for U.S. air carriers and cargo operators. The projected workload to address Eastern Europe cannot be effectively assumed by the representative in Moscow.

- Mexico – Mexico is one of the FAA's most important bilateral partners due to its proximity to the U.S., the large shared airspace boundary, and the high number of daily commercial and cargo operations to and from the U.S. The FAA and Mexico are already partnering on critical navigation and surveillance infrastructure programs that provide significant benefits to the

FAA and U.S. stakeholders. Engagements and collaboration with Mexico are on the rise in almost every aspect of civil aviation, including air passenger safety, air traffic efficiency, certification of aerospace products, regulatory harmonization, and airport certification, design, and runway safety. This portfolio now requires more time and seniority than the current junior-level officer at FAA Headquarters can provide.

- Southeast Asia – The Southeast Asian region is experiencing significant aviation growth, yet the region continues to have safety, air navigation services, and aerodrome deficiencies that are negatively impacting U.S. stakeholders. The FAA is working to increase engagement in the region to improve safety and compliance with international standards, improve airspace efficiency in the Pacific oceanic environment, strengthen partnerships with influential authorities as well as the Association of Southeast Asian Nations, and support harmonization and implementation of innovative U.S. technologies. While the FAA has a Senior Representative in Singapore, the growth in U.S. engagement have quickly exceeded the representative's bandwidth.

2. Describe the strategy and the proposed solution you are using to address the situation.

The FAA is seeking to add a Senior Representatives in the United Kingdom, Poland, Mexico, and Southeast Asia. These representatives will allow the FAA to effectively collaborate with external stakeholders to encourage policy alignment, harmonize regulatory systems, and enable effective implementation of U.S. international strategic objectives with these influential global partners. This will in turn lead to more support for U.S. positions and policies in International Civil Aviation Organization (ICAO) global standards setting bodies and ICAO Regional Office implementation programs.

3. How much are you requesting? Provide a detailed justification for the increase.

The FAA is requesting $2.42 million for 4 FTP/2 FTE in FY 2022 to establish Senior Representative positions in the United Kingdom, Poland, Mexico, and Southeast Asia. These permanent overseas positions will provide the necessary seniority, workforce and resource bandwidth, skill sets, and collaboration capabilities to successfully engage the international civil aviation community and effectively influence and drive global aviation standards, policy, direction, and modernization based on U.S. positions. This overall cost includes:

- $843,000 for personnel compensation, benefits costs, and overseas allowances such as post allowance, education allowance, and housing/utilities as provided in the Department of State Standardized Regulations.

- $1.58 million for office support costs in the four locations, including the establishment of permanent offices, affiliated mission travel, relocation costs, International Cooperative Administrative Support Services, Capital Security Cost Sharing Program costs, local hire support staff, and other routine administrative support costs.

Unmanned Aircraft Systems (UAS)
Aviation Safety (AVS), Security and Hazardous Materials Safety (ASH), and
Air Traffic Organization (ATO)

(In thousands)

	FY 2022
Unmanned Aircraft Systems	**$23,145**
PC&B	$3,727
Non-pay	$19,418
FTE	**23**

1. Describe the problem or circumstance that prompted the need for this additional funding.

As the pace of UAS integration accelerates and the number of users increases, FAA resources constrain our ability to review and grant airspace access requests, proactively respond to external stakeholder concerns, and implement the security requirements from the 2018 FAA Reauthorization Act. To address these critical rulemaking efforts such as Remote Identification, the FAA is requesting an increase to enhance our analysis of data collected from all FAA partnerships, which is needed to ensure the safe and successful integration of UAS.

Due to the rapid growth of UAS work, the FAA has often relied on reassignments of existing staff and short-term assignments (i.e. details, NTE appointments) to quickly fulfill critical positions such as the UAS Integration Pilot Program. As UAS priorities continue to evolve and grow, the FAA must be able to quickly address them. In order to do so, the FAA is requesting additional resources to continue to address public concerns on issues such as triaging waiver applications and airspace access.

2. Describe the strategy and the proposed solution you are using to address the situation.

To assess UAS integration efforts, the following actions will ensure that resources are aligned to avoid duplication and meet the evolving needs for UAS:

- Address future emerging concepts including urban air mobility and Air Traffic Management – National Airspace System Integration without inhibiting technological innovation.
- Continue and permanently expand partnerships with state, local, and tribal governments. Permanent resources will ensure that the information gained from these programs will be used to inform regulatory decisions and rulemaking efforts associated with this high-demand, rapidly expanding technology.
- Offer proactive outreach and support as well as improved customer service to the UAS stakeholders by responding to inquiries in near-real time and developing innovative

methods to reach existing and new audiences. This will increase waiver request quality and decrease wait time, mitigate general public safety concerns, and increase compliance rates. These efforts combined will facilitate advanced UAS operations.

- Address operational mission and evolving needs for UAS operational integration. ATO will conduct assessment and prioritization of UAS integration efforts against existing enterprise plans, and maintain alignment and integration.
- Continue to develop the Law Enforcement Assistance Program (LEAP) and the FAA Hazardous Materials Safety Program to proactively respond to issues as they occur. LEAP agents, who were already taxed before the onset of drone investigations, are responsible for providing information on oversight of drone operations and registration matters and update outreach materials for 18,000 federal, state and local law enforcement entities. The FAA is responsible for ensuring the approval and safety of UAS cargo operation of dangerous goods, which are expected to increase in the coming years.
- Ensure that the FAA acts as the entry point and facilitator for new and innovative concepts as industry develops the UAS and mobility technologies of the future. This will enable future concepts such as urban air mobility, which entails highly automated passenger or cargo-carrying air transportation services in and around urban areas, as well as hardware/software tech supply chain initiatives.
- Manage the implementation of new and increasingly complex rules, legislation requirements and directives, and other internal policies (e.g. Remote ID, UAS Traffic Management (UTM)). Developing and implementing new rules is labor intensive, and requires the FAA to ensure that they keep up with technological advances while not inhibiting innovation.

3. How much are you requesting? Provide a detailed justification for the increase.

The total request is $23.1 million and 46 FTP/23 FTE across the following FAA organizations.

- AVS: $1.8 million and 21 FTP/10 FTE.
    - Funds the permanent expansion of government partnerships and rulemaking needed to further UAS integration efforts.
    - Expedites the processing of requests from industry, increasing stakeholder outreach, and allowing for more complete data and trend analysis.
- ASH: $8 million and 14 FTP/7 FTE.
    - $5.24 million for contract support in the areas of systems engineering and analysis, program management, technical expertise (specific to UAS and Counter-UAS capabilities).

  - $1.2 million for 14 FTP/7 FTE to address FAA Reauthorization Act requirements, interagency efforts, expand capacity to conduct safety oversight, analyze surveillance data, identify emerging hazards, refine safety systems and - automation to identify hazards and mitigate risks, oversee design elements of the certificate holder approval process, and ensure continued operational safety.
  - $750,000 for modernizing existing ASH forensic laboratories to meet the demands of UAS digital forensic analysis, ensuring continued maintenance, and provide technical expertise in UAS digital analysis.
  - $815,000 will support training and education of the UAS user community, engagement and outreach with industry, law enforcement, and international stakeholders, and performing critical in-person support functions for high profile public events.

- ATO: $13.3 million and 11 FTP/6 FTE.
  - $357,000 for 4 FTP/2 FTE to lead the technical and operational UAS integration efforts across the ATO.
  - $276,000 for 5 FTP/3 FTE supporting rulemaking, related litigation, national security issues associated with FAA actions, preemption, and the various airspace and air traffic issues relative to UTM and UAS integration at the state and local level.
  - $162,000 for 2 FTP/1 FTE for educating the public on providing safe and efficient entry of UAS into the national airspace, which will increase outreach and education for state, local, and tribal governments, as well as law enforcement and the public.
  - $12.5 million for contract support across the following areas:
    - Support the assessment of policy procedures and processes that enable Remote ID, routine operations over people and critical infrastructure protection.
    - Processing of waivers for operations Beyond Visual Line of Sight.
    - Safety planning to ensure ATO UAS integration activities maintain current or higher levels of safety assurance.
    - Develop operational concepts to enable scalable national UAS operations.
    - Inform the public and stakeholders on UAS, including webinars, online chats and live engagements at events and trade shows.

Remote Telecommunications Infrastructure Replacement (RTIR)
Air Traffic Organization (ATO)

(In thousands)

	FY 2022
Remote Telecommunications Infrastructure Replacement (RTIR)	**$21,441**
PC&B	0
Non-pay	$21,441
FTE	**0**

1. Describe the problem or circumstance that prompted the need for this additional funding.

The FAA's national airspace systems rely on commercial telecommunication carriers at over 4,000 FAA locations (including all FAA air traffic control facilities) and at all major airports. These commercial carriers have been using an infrastructure based on Time Division Multiplexing (TDM) technology. TDM is a 1960s technology that is largely reliant upon copper wires, and increasingly outdated, unsupportable equipment that is labor intensive and costly to sustain. Consequently, telecommunication service providers (e.g., AT&T, Century Link, Sprint and Verizon) are phasing out their support of low speed TDM services. The performance has declined and no longer meets performance requirements. The FAA has already received TDM discontinuance notifications that will affect approximately 1,500 FAA locations.

2. Describe the strategy and the proposed solution you are using to address the situation.

The FAA will establish the Remote Telecommunication Infrastructure Replacement (RTIR) program to address telecommunication carrier discontinuances. RTIR will evaluate technical solutions (carrier ethernet or alternative technologies) and select the best replacement option for each site based on air traffic criticality, cost, and risk. Where feasible, the preferred solution is to use modern replacement services (e.g., carrier ethernet over fiber) at critical sites to avoid future TDM discontinuance risk. When this solution is not feasible, alternative solutions, including high-speed TDM services and wireless, will be considered. Using alternative solutions will depend on the requirements of the specific site and the infrastructure available from vendors.

3. How much are you requesting? Provide a detailed justification for the increase.

The FAA is requesting $21.44 million for FY 2022. This funding will provide support for addressing approximately 1,500 sites by FY 2025. Cost estimates include:

- $3.506 million - Labor to install new network components at FAA sites.

- $11.20 million - New equipment to be installed at each FAA site and network access points. This equipment is required to provide higher capacity access services, network security, and TDM conversion to sustain current operational FAA interfaces and services.
- $725,000 - Additional vendor support needed to manage the new security and TDM conversion equipment.
- $4.73 million - Increased costs for backbone connections and higher bandwidth/carrier ethernet to connect each site.
- $1.28 million - Software licenses and hardware maintenance required for new equipment.

Commercial Space Operational Staffing & Support
Office of Commercial Space Transportation (AST)

(In thousands)

	FY 2022
Commercial Space Operational Staffing & Support	**$3,665**
PC&B	$528
Non-pay	$3,137
FTE	**5**

1. **Describe the problem or circumstance that prompted the need for this additional funding.**

   The FAA has a critical need for additional resources to address the anticipated growth within the commercial space transportation industry. In FY 2021, the FAA plans to support a total of 40-56 launches. Launch forecast projections indicate a launch cadence of 121-242 launches in FY 2022 and increasing to even higher levels in FY 2023. This number of launches would be far greater than the FAA is currently supporting.

2. **Describe the strategy and the proposed solution you are using to address the situation.**

   The FAA proposes to increase federal staffing and contractors to support efforts of the Office of Commercial Space Transportation in regulatory safety activities, ongoing rulemaking, legal reviews of applications for commercial space licenses, license orders, waiver requests, and environmental efforts. The FAA also continues to develop performance based licensing for launch and reentry. Transforming the current launch and re-entry licensing process to a performance based, single license regime for all types of launch and re-entry vehicle operations will increase the FAA's capability to meet the growing demands of this industry. Lastly, The FAA proposes utilizing contractor support to enable the FAA to satisfy Federal, state, and local environmental laws and regulations associated with issuing licenses, permits, rules, and grants. This will allow the FAA to process an increasing number of environmental assessments while meeting the federally mandated timeframes for commercial space licenses and permits.

3. **What are you requesting? Provide a detailed justification for the increase.**

   The FAA is requesting $3.665 million and 9 FTP/5 FTE for the following activities:

   - $528,000 for 9 FTP/5 FTE to support safety regulation activities, ongoing rulemaking, legal reviews, environmental efforts, and mission support services to

include safety inspections, flight and system safety reviews, application processing and policy support.

- $3.14 million to support license and permit evaluations, conduct analyses and independent assessments, tool development and maintenance, and training.

Safety Assurance System (SAS) Development & Risk Analysis
Security and Hazardous Materials Safety (ASH)

(In thousands)

	FY 2022
Safety Assurance System (SAS) Development & Risk Analysis	**$1,525**
PC&B	$400
Non-pay	$1,125
FTE	**3**

1. Describe the problem or circumstance that prompted the need for this additional funding.

The FAA's Office of Security and Hazardous Materials Safety conducts oversight of the entire aviation supply chain, to include certificate holders, shippers, and freight forwarders. ASH relies on the Safety Assurance System to share data with the FAA's Flight Standards Service and to conduct interoperable, risk-based safety oversight. However, this system requires updates to keep pace with changes at the FAA and in industry, including changes in the FAA's surveillance and oversight models (e.g., organization designation) and changes in business models for the design and manufacture of aircraft and products (e.g., supply chains). Without updates to the system, it will become increasingly difficult for the FAA to identify and evaluate aviation safety risks related to hazardous materials, limiting the program's ability to remain proactive and effective.

2. Describe the strategy and the proposed solution you are using to address the situation.

Enhancements to SAS's capabilities will address the increase in hazardous materials cargo and increase stakeholder outreach when risks are identified. This will greatly aid ASH in basing safety oversight decisions on system-level risks and ensuring our stakeholders are informed of, and have information about, those risks. In addition, reaching out to stakeholders and sharing risks identified by SAS will promote stakeholder partnerships and a reciprocal flow of information, insight, and resources. This will enable us to expand SAS influence and encourage stakeholders to embrace their Safety Management System responsibilities.

3. How much are you requesting? Provide a detailed justification for the increase.

The budget request includes $1.52 million, distributed as follows:

- $500,000 for SAS updates and modifications to support data and risk-based oversight decisions for surveillance and safety promotion;

- $625,000 for safety promotion activities that target cargo and passenger risks identified though SAS data analysis; and

- $400,000 for 5 FTP/3 FTE to support SAS development, use, and data analysis.

Community Noise Engagement

Office of Policy, International Affairs, and Environment (APL) and
Air Traffic Organization (ATO)

(In thousands)

	FY 2022
Community Noise Engagement	**$7,615**
PC&B	$778
Non-pay	$6,837
FTE	**6**

1. Describe the problem or circumstance that prompted the need for this additional funding.

FAA is seeing an increase in communities expressing concerns and complaints around aircraft noise. Communities are demanding higher levels of engagement, improved data, and are seeking to establish roundtables to address their concerns with performance based navigation. Communities have also been filing more lawsuits against the FAA over the past ten years. FAA personnel cannot keep pace with the increased demands.

2. Describe the strategy and the proposed solution you are using to address the situation.

The FAA's strategy involves a combination of personnel, contractor support, and technical toolsets that will allow the FAA to continue proactively educating local community roundtables and government officials to support the development of solutions to growing concerns regarding noise. The agency will fulfill its commitment to meaningfully engage with the public through new tools, national policy development, national and regional guidance, litigation preparation and research regarding community engagement.

3. How much are you requesting? Provide a detailed justification for the increase.

For the **Air Traffic Organization**, the FAA is requesting **$5.86 million.**

- $1.0 million to develop a web-accessible system to provide real-time flight visualization and analysis of aircraft positions and altitudes relative to the user. This will allow the FAA to actively engage with and provide 24-hour real time engagement with the members of the community via the website. This tool will address frequently asked questions, direct the public to more resources and explain current traffic and proposed new flight routes in relation to specific addresses.

- $500,000 for specialized environmental work required by the National Environmental Policy Act.

- $1.0 million for support to provide on-demand information via automation regarding flight data, airport operations, and proposed airspace changes. This will allow the FAA to better support communities by responding in a timely manner with data driven information.

- $2.78 million for contractor support for community engagement activities, including:
  - Plan and conduct Airport Roundtable Community and elected official meetings;
  - Provide environmental workshops to the public;
  - Provide expert services for technical and analytical support services for air traffic operations and newly implemented instrument flight procedures;
  - Collect, track and respond to input received during community engagement events.

- $357,000 for contract technical support in the analysis of environmental documentation, technical airspace design analysis in support of ongoing and increased litigation, and technical analysis to public response to noise and airspace actions, as well as augmenting communication personnel and strategies.

- $220,000 for 4 FTP/2 FTE to provide legal support to develop and finalize agency rules and regulations, as well as comply with appropriate statutes.

For the **Office of Policy** , the FAA is requesting **$1.76 million**.

- $558,000 for 7 FTP/4 FTE to support:
  - Address the continuing growth in the volume of community concerns across the regions in a responsive and efficient manner. The additional resources will enhance at a higher level the necessary internal coordination across the FAA any time that the FAA engages with external stakeholders such as officials and community roundtables/forums, or in providing responses to community complaints;
  - Address the increased litigation demands and outcomes that drive more community engagement request by stakeholders and the public;
  - Rollout of FAA's Noise Complaint portal in nine regions;
  - Dedicated FAA headquarters resources to support noise and community issues.

- $1.2 million for support in the development and implementation of a public web-accessible application that addresses community aviation noise issues, to include relevant Frequently Asked Questions and a dashboard for reporting noise complaints and concerns around aircraft noise.

Science, Technology, Engineering, and Math Aviation and Space Education (STEM AVSED) Program
Office of Policy, International Affairs, and Environment (APL) and Aviation Safety (AVS)

(In thousands)

	FY 2022
STEM AVSED	**$2,300**
PC&B	$340
Non-pay	$1,960
FTE	**2**

1. Describe the problem or circumstance that prompted the need for this additional funding.

Tremendous opportunity and competition exists for today's students, especially in engineering, cybersecurity, human factors, and technical jobs. However, these students often lack awareness of aviation as a career path. Increasing requirements for licenses, certifications, training, and experience necessary for these highly technical occupations have compounded the challenge of attracting, hiring, and retaining a robust workforce. Additionally, the current aviation workforce lacks diversity, with females representing only 7 percent of pilots and 2.4 percent of mechanics. The overwhelming majority (71.6 percent) of workers in the industry are Caucasian. As more of the FAA's workforce becomes eligible to retire, reaching diverse audiences becomes critical.

2. Describe the strategy and the proposed solution you are using to address the situation.

The FAA is requesting additional funding to develop a measurable, sustainable, and meaningful program that provides outreach and develops connections with targeted populations. The FAA's STEM AVSED strategic plan targets specific training, tools and events that will yield targeted and measurable outcomes. The FAA will focus on student populations such as Adopt-a-School (aimed at underserved communities) and Girls in Aviation in order to achieve its objective of a more diverse workforce. The funding requested will go toward additional staff, website and database development, marketing, communications, reporting, and outreach to target under representative groups.

The additional staff will develop the tools needed to ensure targeted populations are reached, and that meaningful engagement is provided. The additional staff will support STEM AVSED activities across all FAA organizations, be a resource to them, and conduct activities, projects, programs and events to inform pre-K through postgraduate students about jobs and careers available in aviation, the aerospace industry, the drone industry, and other emerging technologies. This program will create STEM AVSED awareness and opportunities in communities across the nation, in coordination with strategic partners in industry, academia, and government while ensuring involvement from all FAA Lines of Business/Staff Offices.

3. How much are you requesting? Provide a detailed justification for the increase.

The total request is $2.3 million and 4 FTP/2 FTE for the following activities.

- $340,000 in APL for 4 FTP/2 FTE to expand the Aviation Workforce and Education Program Office. The program office will support a robust STEM AVSED outreach program to address the future shortage of aviation and aerospace technical professionals.
- $760,000 in APL for contract services for the development and implementation of:
    - a data tool to track and collect all STEM AVSED related activity;
    - media and exhibit design, promotional materials, website design and maintenance;
    - and program communications for active engagement with students.
- $200,000 in APL to support workshops and events across the nation to keep apprised of the latest innovative interaction tools and provide outreach to students.
- $1 million ($500,000 in APL and $500,000 in AVS) for the development of materials and routine educational supplies to introduce students to scientific concepts in ways that are exciting and educational while exploring aerodynamics, physics and an endless world of aviation. Takeaway materials will introduce and excite students about aviation and aerospace, from drones to rocket launches. These items will keep aviation and aerospace on their minds and within easy reach to connect them to the FAA education website.

National External Operations Program
Office of Civil Rights (ACR)

(In thousands)

	FY 2022
National External Operations Program	**$325**
PC&B	0
Non-Pay	$325
FTE	**0**

1. Describe the problem or circumstance that prompted the need for this additional funding.

Executive Order 13985, signed by the President on January 20, 2021, instructs the Federal Government to allocate resources to address the historic failure to invest sufficiently, justly, and equally in underserved communities. This request for additional resources is aligned with the directives of Executive Order 13985 and directly supports the FAA's ability to ensure the government's investments in our nation's airport ecosystem do not perpetuate historic failures to serve all communities sufficiently, justly, and equally.

FAA's Office of Civil Rights National External Operations Program (NEOP) was specifically created to address the equity challenges identified in the Executive Order for small disadvantaged businesses, persons with disabilities, people of various ages, sexes, gender identity, sexual orientation, racial, national origin, religious, ethnic, and other backgrounds with a history of discrimination that are at substantial risk of encountering significant barriers to airport access and business opportunities.

The NEOP's oversight responsibilities include: (1) the Disadvantaged Business Enterprise (DBE) and Airport Concession DBE (ACDBE) Compliance Programs; (2) the Airport Disability Compliance Program that enforces the Americans with Disabilities Act and related requirements (hereafter "ADA requirements"); (3) the Airport Nondiscrimination Compliance Program that enforces Title VI of the Civil Rights Act of 1964 and related requirements (hereafter "Title VI requirements"); and (4) the National External Policy Program that develops regulations and guidance to support the compliance programs.

Prior to the Executive Order, the NEOP oversight responsibilities were already extensive, and recently expanded by the 2018 FAA Reauthorization Act, DOT Title VI Orders, and other airport sponsor DBE/ACDBE program compliance oversight requirements, originating from three Congressionally mandated audits and Department of Justice and DOT Office of Inspector General (OIG) recommendations. The DOT Departmental Office of Civil Rights advised FAA in March 2021 that the Department intends to expand airport sponsor obligations to ensure equity in grant-funded programs, which the NEOP anticipates will require extensive new data collection, analysis and reporting responsibilities. Taken together, the Executive Order and other

expanded oversight responsibilities exceed what the NEOP is able to fully achieve without automated data management.

2. Describe the strategy and the proposed solution you are using to address the situation.

Additional funds will be used to enhance the FAA Civil Rights Connect System to collect additional data that is required to measure equity, progress towards and reporting on increasing equity in our DBE/ACDBE, ADA/504, and Title VI compliance programs.

3. How much are you requesting? Provide a detailed justification for the increase.

For the Office of Civil Rights $325,000 is requested to improve operational execution as outlined below:

- Additional funding for contractor support: $325,000
    - Continue development and improvement of FAA Civil Rights Connect system, approximately $325,000

FY 2022 Explanation of Funding Changes

Annualization of FY 2021 Pay Raise: This increase is required to provide for costs associated with base salary increases (October - December) resulting from the government-wide pay raise. The factor used is 0.25 of 1.0 percent.

Annualization of FY 2021 FTE: This increase is required to provide for costs associated with the annualization of salaries of the full time equivalent (FTE) employees from FY 2021.

FY 2022 Pay Raise: This increase is required to provide for costs associated with base salary increases resulting from the proposed government-wide pay raise of 2.7 percent.

FY 2022 FERS Increase: This increase is required to provide for costs associated with the agency's contribution rates to the Federal Employees Retirement System (FERS). The agency FERS contribution increased for both Air Traffic Controllers and regular agency employees.

Transition from Facilities and Equipment to Operations: This increase allows the operational costs of new systems acquired under the Facilities and Equipment account to transition to the Operations account. Systems that go through this transition include everything from radars and ground based navigational aids to major software systems that provide air traffic control capabilities. The ongoing operational costs can include in-service management for hardware maintenance, software maintenance, software licenses, telecommunications, logistics support, and training. Under FAA policy, these operational costs transition to the Operations account two years after a system has been installed. However, the FY 2021 budget request delayed the transition of these costs by one year. This budget request therefore includes the transition of costs that would have otherwise occurred under the FY 2021 budget request and the FY 2022 transition costs.

Working Capital Fund: This cost adjustment funds the Department of Transportation's Working Capital Fund estimates for the FAA.

Financial Accounting Services: This increase is required to provide for costs associated with enhancements to the agency's financial systems.

AFN - Enterprise Information Management (EIM): This increase provides for improvements to the FAA's data and information management capabilities. Enhancements will provide FAA workforce and stakeholders with a suitable framework for efficiently accessing and leveraging relevant data resources to meet their requirements while reducing duplicate functions.

AVS - Enterprise Information Management (EIM): This increase allows the AVS Safety Data Action Team (SDAT) to establish a virtual, enterprise-wide, Safety Data Training Center that will train FAA employees on how to access data and provide guidance on how to analyze, interpret, display, or generally use FAA's safety data and tools. This investment in training resources empowers the workforce to take an active role in using and trusting safety data.

AVS - Improving Aviation Safety Oversight: This increase supports the Office of Aviation's Safety's plan reflects to improve FAA's certification process domestically, and to improve aviation safety globally in the areas of: Safety Systems, Aviation Safety Designee Oversight and Targeted AVS Hiring. The funding request will enable AVS to address recommendations from the Special Committee and Joint Authorities Technical Review (JATR) and requirements from the Aircraft Certification Safety and Accountability Act.

AAE - Improving Aviation Safety Oversight - Ombudsman: This increase supports the establishment an Ombudsman organization within the Office of Audit and Evaluation, AAE that will aid in educating the FAA workforce on prohibitions against whistleblower retaliation.

ASH - Improving Aviation Safety Oversight - Office of Investigations and Professional Responsibilities: This increase supports the expansion of the Office of Investigations and Professional Responsibility (OPR) to improve FAA's oversight of whistleblower allegations. The addition of OPR responsibilities will increase agency accountability through focused investigations, reviews, and data management of internal misconduct including whistleblower retaliation.

ATO - Cybersecurity: This increase supports the implementation of an additional set of cybersecurity controls to bring high impact information technology systems into compliance with the National Institute of Standards and Technology's standards.

AFN - Cybersecurity: The funding request will increase FAA's capacity to support cybersecurity incident analysis and validation, improve FAA's ability to detect and contain cybersecurity threats, mature the Security Operations Center , and enhance FAA's capacity to eradicate and evict cyber adversaries. FAA's will focus on cyber threat intelligence, digital forensics, and improved logging.

APL - Expanded FAA International Presence: This increase allows FAA to establish permanent Senior Representatives in the United Kingdom, Poland, Mexico, and Southeast Asia. FAA has a mission to support a global aviation system for U.S. stakeholders that is equally safe and efficient as flying in U.S. airspace.

AVS - Unmanned Aircraft Systems (UAS) Integration: This increase provides for the expansion of government partnerships and rulemaking needed to further UAS integration efforts. It will also expedite the processing of requests from industry, increasing stakeholder outreach, and allowing for more complete data and trend analysis.

ASH - UAS Integration: This increase supports UAS and Counter-UAS activities, addresses security requirements from the 2018 FAA Reauthorization Act, modernizes existing ASH forensic laboratories, and provides training and education of the growing UAS user community.

ATO - UAS Integration: This increase supports the assessment of policy procedures and processes that enable Remote ID, routine operations over people and critical infrastructure protection; processing of waivers for operations Beyond Visual Line of Sight, and safety

planning to ensure ATO UAS integration activities maintain current or higher levels of safety assurance.

ATO - Remote Telecommunications Infrastructure Replacement (RTIR): This increase supports the establishment of the RTIR program. The FAA's national airspace system relies on commercial telecommunication carriers at over 4,000 FAA locations (including all FAA air traffic control facilities) and at all major airports. These commercial carriers have been using an infrastructure based on Time Division Multiplexing (TDM) technology. TDM is a 1960s outdated, unsupportable technology. Consequently, telecommunication service providers (e.g., AT&T, Century Link, Sprint and Verizon) are discontinuing their support of low speed TDM services. The performance has declined and no longer meets performance requirements. The FAA has already received TDM discontinuance notifications that will affect approximately 1,500 FAA locations. This funding will be used to install new network components, equipment, and network access points to over 1,500 sites by FY 2025.

AST - Commercial Space Operational Staffing & Support: This increase supports a critical need for additional resources to address the anticipated growth within the commercial space transportation industry. Additional support is needed to support safety activities, ongoing rulemaking, legal reviews of applications for commercial space licenses, license orders, waiver requests, and environmental efforts.

ASH - Safety Assurance System (SAS) Development & Risk Analysis: This increase will allow for system enhancements to the SAS. These system changes are required to address the increase in hazardous materials cargo. This funding will also support safety promotion activities that target cargo and passenger risks identified though SAS data analysis.

ATO - Community Noise Engagement: This increase will provide additional resources to increase FAA's engagement with communities expressing concern over aircraft noise. The FAA will be better equipped to address issues and concerns through the development and implementation of a web-accessible system to provide real-time flight visualization and analysis of aircraft positions and altitudes relative to the user, specialized environmental work, tool integration, contractor/technical and legal support.

APL - Community Noise Engagement: This increase will provide additional resources to increase FAA's engagement with communities expressing concern over aircraft noise. The funding request supports the rollout of FAA's Noise Complaint Initiative portal in nine regions and provides dedicated FAA resources to support noise and community issues nationwide.

APL - Science, Technology, Engineering, and Math Aviation and Space Education (STEM AVSED) Program: This increase is to develop a measurable, sustainable and meaningful program that provides outreach and connections with targeted populations. It will allow for an increase in staffing in the Aviation Workforce and Education Program Office, support the development and implementation of a data tool to track and collect all STEM AVSED related activity, and provide workshops and materials to target under representative groups to introduce students to scientific concepts.

AVS - STEM AVSED Program: This increase provides for the development of materials and routine educational supplies to introduce students to scientific concepts in ways that are exciting and educational while exploring aerodynamics, physics and an endless world of aviation.

ACR - National External Operations Program: This increase will provide additional resources to enhance the FAA Civil Rights Connect System to collect additional data that is required to measure equity and progress towards reporting on increasing equity in our Disadvantaged Business Enterprise (DBE) and Airport Concession DBE (ACDBE), Americans with Disabilities Act, 504 compliance, and Title VI compliance programs.

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Air Traffic Organization (ATO)

Detailed Justification for the Air Traffic Organization (ATO)

FY 2022 - Air Traffic Organization Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	5,712,523	5,853,149	6,115,354
Program Costs	2,256,711	2,352,672	2,374,231
Total	**$7,969,234**	**$8,205,821**	**$8,489,585**
FTE	**28,753**	**28,850**	**28,858**

Funding details for ATO's various service units:

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Air Traffic Services (AJT)	4,202,268	4,309,028	4,503,543
Technical Operations (AJW)	1,726,578	1,790,151	1,812,685
System Operations (AJR)	279,157	288,366	285,858
Safety and Technical Training (AJI)	197,771	203,932	204,114
Mission Support Services (AJV)	265,985	276,323	300,496
Management Services (AJG)	223,884	226,044	226,600
Program Management (AJM)	965,481	1,000,288	1,045,445
Flight Programs (AJF)	108,110	111,689	110,844
Total	**$7,969,234**	**$8,205,821**	**8,489,585**

What is this program and what does this funding level support?

The Air Traffic Organization (ATO) operates the most complex and technically advanced air traffic control system in the world. In FY 2022, ATO is required to sustain and improve effective and efficient air traffic control throughout U.S. airspace. The funding requested will enable ATO to train FAA's 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), review and update navigational information to promote more efficient air transportation, and effectively control air traffic, which is a major contributor to the 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, ATO is also taking steps to enable growth and changes in aviation.

ATO is a performance-based organization providing safe, secure, and cost-effective air traffic control services to commercial, private aviation and the military. In FY 2020, ATO was comprised of almost 29,000 Operations-funded professional employees committed to providing safe and efficient air traffic control services. Many ATO employees, including approximately 14,200 air traffic controllers, 4,100 air traffic supervisors and air traffic managers, 2,200 engineers, and 5,800 maintenance technicians, directly serve FAA's customers. The remaining employees work in a wide variety of professions to sustain the smooth operations of ATO. They research, plan, and build air traffic control equipment and programs; manage payroll and benefits programs; maintain productive relationships with the aviation industry and the general public; and ensure that the environment and ATO employees are protected.

ATO provides air traffic services for the Nation and is fully committed to the agency's mission. ATO handles over 27,000 scheduled passenger flights per day at U.S. airports and helps transport over 743 million passengers per year, a vital part of the Nation's economy. In total, the ATO handled over 46,300 Instrument Flight Rules flights per day, and managed over 155,000 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 more than 5.1 percent of U.S. Gross Domestic Product. Approximately 10.6 million people are employed in aviation-related fields, and earn over $446.8 billion a year.

ATO's eight service organizations include:

Air Traffic Services (AJT): Air Traffic Services provides air traffic control operations from en route, terminal, and combined control facilities in the United States, Puerto Rico, and Guam. Air Traffic Services also controls more than 29 million square miles of airspace. This represents more than 17 percent of the world's airspace, and includes all of the United States and large portions of the Atlantic and Pacific Oceans and Gulf of Mexico. Every day FAA ensures thousands of positively-controlled aircraft are directed to the safest, most efficient pathway to their destinations.

The en route domain provides air traffic control services at 21 air route traffic control centers or ARTCCs, and four 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 313 FAA facilities and 257 FAA Contract Towers located at the Nation's airports.

Terminal area operations are conducted by controllers at 25 stand-alone Terminal Radar Approach Control (TRACON) facilities and 124 combined Tower/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 that 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, communications, 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 Occupational Safety and Health Administration 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.

Core work is performed by personnel at System Support and Technical Operations Control Centers. The Centers focus on optimizing NAS performance through prioritization of response

based on multiple factors, including the 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. Technical Operations coordinates threat information sharing and inter-agency collaboration and tailors 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.

System Operations Services (AJR): Leads the FAA in a broad range of operational services as part of the ATO. All national air traffic flow management initiatives are provided by System Operations (SysOps), along with policy and concept development for our new airport surface flow management programs. SysOps is the focal for stakeholder interaction through formal Collaborative Decision Making venues and serve as FAA's Customer Advocate. SysOps is responsible for all national flight service functions and operational oversight to National Airspace System (NAS) security issues. Additionally, SysOps provides the ATO with system performance analysis, including trending and forecasting, and we manage the FAA's data policy and orders. SysOps delivers critical operational benefits to keep the system functioning efficiently and safely during planned or unplanned impacts to the NAS.

AJR provides air traffic operational contingency oversight to ensure NAS operations continue efficiently and safely during planned or unplanned NAS impacts. AJR protects the United States Air Domain from threats and other major incidents by working to mitigate the impact of threats and associated response measures on the safety and efficiency of the nation's aviation system.

AJR leads the Joint Air Traffic Operations Command (JATOC) integrating Service Units at all levels, enabling a unified ATO response effort to significant incidents and other major events or natural disasters that adversely impact the NAS or national security. The JATOC addresses constraints, risks, and threats to the NAS and communicates this information to ATO leadership and appropriate stakeholders. The Chief Operating Officer has designated the Vice President of System Operations Services as the ATO Incident Director, the ATO senior leader responsible for developing, sustaining, and executing an effective significant incident response program.

Safety and Technical Training (AJI): AJI provides safety, technical training, policy and performance, and strategic outreach necessary to help enable air traffic controllers, technicians, engineers and support personnel's daily efforts to keep the NAS safe, and efficient.

AJI Safety and Policy and Performance programs are responsible for ensuring the safety of the NAS through measuring, analyzing, mitigating, and monitoring risks. This strategy includes implementing corrective actions to mitigate identified hazards, gathering safety information from operational employees and systems, and deploying technology to better qualify risk. AJI serves as the focal point for the ATO's Safety Management System; 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 and integration capability. Additionally, AJI manages safety policy development, reduces fatigue risks through a comprehensive fatigue risk management system,

facilitates an ongoing ATO safety culture transformation that leads to improved safety performance, and is the focal point for reducing the risk of runway collisions and excursions in the NAS.

AJI is the organization within ATO that provides technical training to controllers, technicians, and engineers. AJI strives to craft ATO's learning approach to be more efficient and effective through development and implementation of the Mobile Learning Platform, Instructor Led, Virtual and Blended Training. These initiatives continue to increase the flexibility and accessibility of training solutions. AJI increases the value to the FAA by integrating simulations, and gamification of learning concepts, and the use of electronic training devices for the delivery and near real-time update of course curriculum. AJI manages the course curriculum for more than 800 national courses and educates and prepares more than 14,200 air traffic controllers, 5,200 Airway Transportation Systems Specialists, and 2,200 engineers with knowledge and skill transfer to make aviation safer and smarter.

Mission Support Services (AJV): Mission Support Services provides technical and administrative shared services to Air Traffic Organization (ATO) operational service units. Services provided include subject matter expertise and analyses, strategic planning, regulatory policy, international collaboration, aeronautical data services, and staff support.

The Service Unit supports ATO operations in four distinct areas:

- Strategy: Ensures ATO priorities are strategically met by aligning needs, opportunities, and recommendations from ATO stakeholders. Provides strategic leadership, configuration control, and management of airspace modernization.
- Policy: Develops regulatory policy and provides ATC procedural support to users throughout the NAS. Provides guidance on matters involving ATC standards and procedures and creates rules, policies, and standards for the use of navigable airspace.
- International: Represents the ATO and delivers consistent, well-coordinated leadership in support of Global Leadership Initiatives to achieve collaborative international harmonization and operational priorities.
- Execution: Implements and coordinates the ATO's prioritized goals at the field facility level. Service include aeronautical data services, quality control, operations support, planning and requirements, and resource management.

Management Services (AJG): The Management Services organization provides leadership and guidance in the areas of financial management, people services, business planning, technical labor relations, employee development, customer service, and employee engagement for the ATO. This shared services model was designed to increase overall operational efficiency and effectiveness and to decrease the administrative deficiencies with the ATO's Service Units. 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.

Management Services directly supports the workforce by providing technical requirements, forecasting, and onboarding, along with the personnel and organizational policies that meet the needs of ATO's highly skilled workforce. AJG ensures performance stays on track by providing the framework to integrate ATO's plans, programs, and activities. AJG serves as a centralized point of contact for other FAA partners to develop strategies for implementing solutions within.

Program Management Organization (AJM): The Program Management Organization (PMO) provides program and acquisition management for the FAA infrastructure programs that transform, modernize and sustain the NAS, including:

- The air traffic operation
- Mission support systems
- Business support systems
    - Aviation safety
    - Commercial Space Transportation
    - Unmanned Aircraft Systems (UAS)

The PMO implements the majority of the FAA's Next Generation Air Transportation System (NextGen) initiatives and leads the development of the multi-agency Spectrum Efficient National Surveillance Radar, also known as the SENSR program. The PMO ensures greater visibility, tighter alignment, and closer integration of innovative, complex, interdependent initiatives and technologies by managing a portfolio of 150 Facilities and Equipment and Operations programs.

The PMO comprises four directorates that support two functional areas:

- Engineering and acquisition
- Second-Level Engineering (SLE) software maintenance for the FAA's automation systems

The PMO's executes its SLE function at air traffic control facilities throughout the NAS and at the FAA William J. Hughes Technical Center in Atlantic City, New Jersey.

Flight Program Operations (AJF): Flight Program Operations is responsible for all aspects of FAA Flight Program safety, administration, operations, training, and maintenance for all FAA. Flight Program Operations conducts multiple missions in FAA aircraft (owned, leased, rented, UAS etc.) to include aviation safety training; flight inspection; research, development, test and evaluation support; and transportation. AJF is structured around four directorates: Aircraft Operations, Aircraft Maintenance, Flight Program Safety, and Flight Program Administration.

The service unit's core business is safe flight operations in support of four primary missions:

- Aviation Safety Training: Provide training and currency/proficiency services to Office of Aviation Safety personnel, including aviation safety inspectors and flight test personnel.

- Flight Inspection: Ensure the integrity of instrument approaches and airway procedures that constitute the NAS infrastructure and the agency's international commitments, including 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 procedures and surveillance systems are evaluated for accuracy, aeronautical data, human factors flyability, and obstacle clearance. Flight Program Operations also performs inspections of Department of Defense navigational facilities.

- Research, Development, Test & Evaluation Support: Conduct flights directly related to research development, test, and evaluation of new electronic aids, air traffic procedures, and aircraft improvement, under established agency projects.

- Critical Event Response/Transportation: Provide transportation required to accomplish official FAA responsibilities in times of emergency or disaster such as hurricane response, as well as support the National Transportation Safety Board in carrying out its duties.

Flight Program Operations operates agency aircrafts at eight facilities across the country. Flight Program Operations implemented a single safety management system, established standards equivalent to industry and Title 14 of the Code of Federal Regulations, and integrated all missions under the same flight control system.

Transition from Facilities and Equipment to Operations:

Transition to Operations and Maintenance funding covers the operational cost of new systems acquired under the FAA's Facilities and Equipment Capital budget. Once new systems are installed in the NAS, the ongoing operational costs are transferred to the Operations appropriation. If legacy systems are being replaced or undergoing upgrading ("tech refresh"), the request is the net of current operating costs and the anticipated cost of the replacement system. New capabilities do not usually have offsetting costs.

The funding provides the ongoing support of contractor-provided hardware and software maintenance, licensing fees, telecommunications costs, logistics support, utilities, and the cost flight procedures and inspection for new systems.

Transition from Facilities and Equipment to Operations: FY 2022	Amount ($000)
Advanced Technologies and Oceanic Procedures (ATOP)	$124
Aircraft Collission Avoidance System (ACAS) X Segment 1	$1,200
Aircraft Related Equipment (ARE)	$130
Airport Surface Surveillance Capability (ASSC)	$81
Approach Lighting System with Flasher (ALS/ALSF)	$10
Communication Facilities Sustainment (CFS)	$13
Common Terminal Digitizer (CTD)	$1,367
Communication Facilities Enhancement (CFE)	$82
Data Comm Stage 1 Phase 2	$5,039
Distance Measuring Equipment (DME)	$193
Electrical Power Systems	$111
Instrument Landing System (ILS)	$96
Intelligent Traffic Monitor (ITM)	$779
Interim Voice Switch Replacement (IVSR)	$69
Mobile Asset Management Program (MAMP)	$411
Next Generation Air/Ground Communications Program (NEXCOM)	$218
Power Systems Group (PSG) Environmental Remote Monitoring Systems (ERMS)	$2
Precision Approach Path Indicator (PAPI)	$13
Runway Status Light (RWSL)	$131
Standard Terminal Automation Replacement System (STARS) and Terminal Automation Modernization and Replacement (TAMR)	$33,259
System Wide Information Management (SWIM)	$1,832
Terminal Flight Data Manager (TFDM)	$58
Time-Based Flow Management (TBFM) Enhancement 1	$4,177
Weather System Processor (WSP)	$468
Wide Area Augmentation System (WAAS)	$459
ATO Grand Total	**$50,306**

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ATO Grand Total	**$50,306**

FY 2022 Anticipated Accomplishments:

Function/Office	FY 2022 Anticipated Accomplishments
Air Traffic Organization	• Maintain and sustain core infrastructure to ensure that terminal and enroute controllers have all critical parts of the NAS infrastructure available for the safe and efficient delivery of air traffic services. • Develop and execute policies for emerging technologies integration for the flight inspection mission, to include augmentation of the infrastructure inspections using UAS. • Continue to implement NextGen technologies that drive industry benefits, including Data Communications, Terminal Flight Data Manager, Time-Based Flow Management, and SWIM. • Continue to prepare the NAS for new entrants, including UAS and Commercial Space. • Reduce runway incursions, excursions, and other airport surface safety events through use of the Surface Safety Risk Index. • Provide continuous NAS information to external aviation partners. • Develop strategic plans, conduct analyses, and perform systems engineering efforts to align with Trajectory Based Operations (TBO) and the Performance Based Navigation (PBN) NAS Navigation Strategy. • Optimize the process for delivering possible vehicle/pedestrian deviations by moving the entire process nationally to the Comprehensive Electronic Data Analysis and Reporting platform. • Foster an environment to improve NAS safety, operational efficiency and modernization by increasing organizational effectiveness and shared service delivery skills, broadening employee engagement, and ensuring ATO goals and strategies stay on track. • Increase focused efforts around Air Traffic Control Specialist training, resulting in increased Certified Professional Controllers at over 313 facilities. • Continue to implement an enterprise framework for the integration of UAS security features into the NAS, specifically including Counter-UAS and UAS detection capabilities.

Function/Activity	FY 2022 Anticipated Accomplishments
NextGen and Operational Related:	• Develop and coordinate the annual publication of the NextGen Implementation Plan. • Provide analytical studies and related safety monitoring services that support the continued use of and further reductions in separation standards within U.S. sovereign airspace. Airspace to include international airspace where FAA has delegated authority to provide air traffic services. • Conduct an annual safety analysis of Reduced Vertical Separation Minimum Operations (RVSM) in North America (United States, Canada, and Mexico) and within U.S. delegated oceanic airspace per International Civil Aviation Organization Requirements. • Conduct maintenance and operations of independent performance based monitoring for Altimetry System Error, a key component to the continued safe operation of RVSM.

Program Increases:

The FY 2022 budget request for ATO includes additional funding for the following programmatic initiatives.

Discretionary Adjustments	Amount ($000)	FTP	FTE
Cybersecurity	3,900	-	-
Unmanned Aircraft Systems (UAS) Integration	13,295	11	6
Remote Telecommunications Infrastructure Replacement	21,441	-	-
Community Noise Engagement	5,857	4	2
ATO Total	**$44,493**	**15**	**8**

Cybersecurity: The FY 2022 funding request of $3.9 million supports the FAA's implementation of an additional set of security controls to bring high impact information technology systems into compliance with the National Institute of Standards and Technology's standards. The FAA performed an extensive analysis in an effort to assess Security Categorization Ratings for all ATO systems in accordance with federal information processing standards. This analysis identified an additional 48 ATO systems that were categorized as high impact systems. With the requested funding, ATO will focus its efforts on safety critical systems connected to the operational Internet Protocol networking infrastructure.

Unmanned Aircraft Systems (UAS) Integration: As the pace of Unmanned Aircraft Systems (UAS) integration has accelerated and the number of users have increased, FAA resources have constrained our ability to review and grant airspace access requests, proactively respond to external stakeholder concerns, and implement the security requirements from the 2018 FAA Reauthorization Act. The FY 2022 funding request of $13.3 million and 11 FTP/6 FTE supports the assessment of policy procedures and processes that enable remote ID, routine operations over people and critical infrastructure protection, processing of waivers for operations Beyond Visual Line of Sight, and safety planning to ensure ATO UAS integration activities maintain current or higher levels of safety assurance.

Remote Telecommunications Infrastructure Replacement (RTIR): The FY 2022 funding request of $21.44 million supports the establishment of the RTIR program. The FAA's national airspace systems rely on commercial telecommunication carriers at over 4,000 FAA locations (including all FAA air traffic control facilities) and at all major airports. These commercial carriers have been using an infrastructure based on Time Division Multiplexing (TDM) technology. TDM is a 1960s technology that is largely reliant upon copper wires and increasingly outdated, unsupportable equipment that is labor intensive and costly to sustain. Consequently, telecommunication service providers (e.g., AT&T, Century Link, Sprint and Verizon) are phasing out their support of low speed TDM services. The performance has declined and no longer meets performance requirements. Funding will provide support for addressing approximately 1,500 sites that have already received TDM discontinuance notifications.

Community Noise Engagement: The FY 2022 funding request of $5.86 million and 4 FTP/2 FTE will provide additional resources to increase FAA's engagement with communities expressing concern over aircraft noise. The FAA will be better equipped to address issues and concerns through the development and implementation of a web-accessible system to provide real-time flight visualization and analysis of aircraft positions and altitudes relative to the user, specialized environmental work, tool integration, contractor/technical and legal support.

(See also "Operations Summary" and "FY 2022 Discretionary Increase Request" for a detailed description of the Program Increase requests.)

What benefits will be provided to the American public through this request and why is this program necessary?

The ATO continues in its efforts to provide the American public, in keeping with our mission to ensure the safest, most efficient aerospace system in the world. In addition, ATO is providing an organized and expeditious flow of air traffic and supporting the National Security and Homeland Defense. As part of the NextGen modernization effort, ATO is introducing new airspace innovations every day. These innovations include satellite-based (or performance-based) navigation that enables more point-to-point flying which reduces fuel usage and emissions. ATO will continue to monitor the deployment progress for the Data Communication services into the NAS. Changes like these are making flying more efficient and environmentally friendly, while ensuring that all safety needs are met.

The ATO 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. By developing and coordinating FAA operational metrics, system operations develop recommendations for improving NAS capacity and system efficiency to reduce delays at specific airports and in high volume corridors. The flying public benefits directly by minimizing NAS delays and congestion, which delivers an efficient and safe mode of transportation to travelers. It will also lead to efficiencies that will save fuel and provide a better flying experience to the public.

The ATO's responsibilities also include environmental assessments and policies to manage effective airspace use, and complete regulatory development for UAS operations over urban areas. This will expand the use of unmanned aircraft while deliberation on UAS rulemaking actions are completed.

The ATO creates standardization and provides synergy and efficiencies across the operations missions. The organization supports various programs and projects, and contributes to the user benefits of safety and flight efficiency to ensure the existing NAS infrastructure remains within established specifications.

The safety of American aviation is unparalleled. The FAA coordinated more than 45,000 flights per day throughout FY 2019, transporting over 2.7 million passengers safely to their destinations. This outstanding record is attributable to FAA's efforts at reducing fatal accident rates, deploying systems and procedures to reduce serious runway incursions, and conducting training programs aimed at reducing operational errors.

Controller Workforce: FY 2017 - FY 2019 End of Year Actuals
(FY 2020 - FY 2022 Forecasts from the FY 2020 Controller Workforce Plan)

FY 2017 Actual	14,481
FY 2018 Actual	14,695
FY 2019 Actual	14,375

FY 2020 Forecast	14,117
FY 2021 Forecast	13,694
FY 2022 Forecast	13,441

Air Traffic Organization (ATO)
($000)

	Dollars (in Thousands)	FTP	OTFTP	FTE
FY 2021 Enacted	**$8,205,821**	**28,906**	**597**	**28,850**
Adjustments to Base	**$239,271**	-	-	-
Annualization of FY 2021 Pay Raise 1.0%	14,281	-	-	-
Annualization of FY 2021 FTE	-	-	-	-
FY 2022 Pay Raise 2.7%	118,526	-	-	-
FY 2022 FERS Increase	56,383	-	-	-
Transition from F&E to Ops	50,306	-	-	-
Working Capital Fund	(225)	-	-	-
Discretionary Adjustments	**$44,493**	**15**	**-**	**8**
Cybersecurity	3,900	-	-	-
Unmanned Aircraft Systems (UAS) Integration	13,295	11	-	6
Remote Telecommunications Infrastructure Replacement (RTIR)	21,441	-	-	-
Community Noise Enagement	5,857	4	-	2
FY 2022 Request	**$8,489,585**	**28,921**	**597**	**28,858**

See Operations Summary for a detailed description of the explanation of funding changes.

Aviation Safety (AVS)

Detailed Justification for the Aviation Safety Organization (AVS)

FY 2022 - Aviation Safety Organization Budget Request ($000)

Program Activity	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	1,185,429	1,234,645	1,287,820
Program Costs	218,667	244,394	248,478
Total	**$1,404,096**	**$1,479,039**	**$1,536,298**
FTE	**7,128**	**7,237**	**7,323**

Funding details for AVS services and offices:

Program Activity	FY 2020 Actuals	FY 2021 Enacted	FY 2022 Request
Flight Standards Service	907,185	931,346	966,909
Aircraft Certification Service	261,210	282,227	292,722
Office of Aerospace Medicine	72,372	74,262	75,237
Office of Rulemaking	7,865	8,394	8,277
Air Traffic Safety Oversight Service	32,581	33,286	33,973
Office of Accident Investigation and Prevention	30,718	34,145	37,028
Office of Unmanned Aircraft Systems Integration	33,614	34,607	42,511
Office of Quality, Integration and Executive Services	58,551	73,772	69,500
Organization Designation Authorization (ODA) Office	-	7,000	10,141
Total	**$1,404,096**	**$1,479,039**	**$1,536,298**

What is this program and what does this funding level support?

The request allows Aviation Safety (AVS) to provide essential services for certification,

production approval, and continued airworthiness of aircraft as well as the certification of pilots, mechanics, and others in safety-related positions; and to maintain essential safety data reporting capabilities.

AVS is responsible for setting the safety standards for every product, person, and organization that manufactures and operates aircraft in the National Airspace System (NAS). Through its approximately 7,600 employees, AVS provides the following services:

- Development and establishment of safety and certification standards for the civil aviation industry.
- Surveillance and oversight of certificate holders, air carriers, general aviation operators, repair stations, manufacturers and airmen.
- Issuance or denial of certifications.
- Ongoing and wide-ranging transformation of the NAS encompassed by NextGen
- Conducts independent safety oversight of ATO's air traffic services

AVS services and offices include:

Flight Standards Service (AFS): AFS promotes safe air transportation by setting the standards, providing certification, and conducting oversight of airmen, air operators, air agencies, and designees.

Aircraft Certification (AIR): AIR develops and administers safety standards and procedures governing the design, production and airworthiness of civil aeronautical products. Certification staff oversee design, production, and airworthiness certification programs to ensure compliance with prescribed safety standards. AIR includes approximately 1,400 employees in five divisions and an executive support staff that develop safety standards, policies, and guidance that govern the design, production, and airworthiness of aircraft, engines, and propellers. AIR also issues approvals and provides oversight of approval holders, designees, and delegated organizations.

Aerospace Medicine (AAM): AAM oversees a broad range of medical programs and services for both the domestic and international aviation communities. AAM performs medical certification/qualification of airmen and other persons associated with safety in flight, inspects and oversees aviation industry drug and alcohol testing programs, manages the FAA employee substance abuse testing programs, and performs aerospace medicine and human factors research.

Rulemaking (ARM): ARM 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.

Air Traffic Safety Oversight (AOV): AOV Service conducts independent safety oversight of the ATO's 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, Safety Management System (SMS) principles, and certification/credentialing programs. AOV approves the Air Traffic Organization'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.

Accident Investigation and Prevention (AVP): AVP manages the NAS safety risk portfolio by investigating aviation accidents and incidents and collecting, analyzing, and sharing safety information with U.S. and international stakeholders. AVP leads the implementation and evolution of safety management at both the FAA and AVS levels, develops research planning needs, and manages the agency's National Transportation Safety Board and FAA safety recommendations programs.

Unmanned Aircraft Systems Integration (AUS): UAS Integration is responsible for facilitating the safe, efficient, and timely integration of UAS into the NAS.

Quality, Integration, and Executive Services (AQS): The Office of Quality, Integration, and Executive Services provides executive oversight and direction of consolidated management support services for all of AVS. AQS manages all phases of planning, financial management, Information Technology (IT) liaison services, and administrative activities for the immediate office of the Associate Administrator.

Organization Designation Authorizations (ODA): The ODA Office will continue enhancing the promotion of standardized development, improving implementation, and application of coordinated national ODA program policy, supporting standardized outcomes and improvements across the ODA program.

FY 2022 Anticipated Accomplishments:

Function/Office	FY 2022 Anticipated Accomplishments
Aviation Safety	• Facilitate government/industry safety teams to identify emerging system risk and to implement risk mitigation strategies utilizing the Aviation Safety Information Analysis and Sharing and System Safety Management Transformation programs that provide data-driven safety analysis to reduce aviation risk in the NAS worldwide.

Function/Office	FY 2022 Anticipated Accomplishments

Aviation Safety	• Champion the evolving rulemaking efforts to modernize regulations in order to incorporate safety management principles into design and manufacturing environments. • Continue the implementation of the FAA and Industry Certification Process Guide in a consistent and sustainable manner to educate all stakeholders about needs/expectations in the certification process, reinforce that education through follow-up activities, and measure the effectiveness of application. • Establish baseline and ongoing levels of confidence in foreign Civil Aviation Authorities based on equivalency/compatibility of standards, policies and procedures and technical competency of each authority. • The ODA Office will promote standardized development, implementation, and application of coordinated national ODA program policy. It will have focused ODA oversight on high-risk areas and support appropriate expansion of the ODA program, both in scope and utilization, in consideration of the rapidly changing aviation industry.

Transition to Operations and Maintenance funding covers the operational cost of new systems acquired under the FAA's Facilities and Equipment Capital budget. Once new systems are installed in the NAS, the ongoing operational costs are transferred to the Operations appropriation.

System Safety Management Transformation (SSMT) is a stakeholder-driven, cross-functional program with capabilities needed to address critical and emergent safety issues. This request aligns with the increased need to include new substantive analytical capabilities in and expanded operational uses of the program's toolset. This request will provide for ongoing first level engineering, second level engineering, and licenses.

Regulation and Certification Infrastructure for System Safety (RCISS) is the capital investment that delivers IT infrastructure utilized by the AVS safety workforce. RCISS continues to modernize and enhance the AVS IT infrastructure with solutions focused around improved security, migration to the cloud, and access to tools and applications to support the safety workforce. This request will provide for ongoing second level engineering and licenses.

Transition from Facilities and Equipment to Operations: FY 2022	
Systems Safety Management Transformation (SSMT)	$294
Regulation and Certification Infrastructure for System Safety (RCISS)	$502
AVS Total	**$795**

Program Increases:

The FY 2022 budget request for AVS includes additional funding for the following programmatic initiatives.

Discretionary Adjustments	Amount ($000)	FTP	FTE
Enterprise Information Management	575	-	-
Improving Aviation Safety Oversight: Safety Systems	2,300	-	-
Improving Aviation Safety Oversight: Aviation Safety Designee Oversight	3,900	37	19
Improving Aviation Safety Oversight: Targeted AVS Hiring	10,300	115	57
Unmanned Aircraft Systems (UAS) Integration	1,845	21	10
Science, Technology, Engineering and Math Aviation and Space Education (STEM AVSED) Program	500	-	-
AVS Total	**19,419**	**173**	**86**

Enterprise Information Management: The FY 2022 request of $575,000 allows the AVS Safety Data Action Team to establish a virtual, enterprise-wide, Safety Data Training Center that will train FAA employees on how to access data and provide guidance on how to analyze, interpret, display, or generally use FAA's safety data and tools. This investment in training resources empowers the workforce to take an active role in using and trusting safety data.

Improving Aviation Safety Oversight: The FY 2022 request includes $16.5 million and 152 FTP/76 FTE to support the Action Plan developed in response to the recommendations of the Special Committee, and the Aircraft Certification, Safety and Accountability Act. The plan discusses in depth the FAA's actions, both planned and underway, to address the recommendations not only of the Special Committee, but also in the context of the other recommendations received from the Joint Authorities Technical Review, the National

Transportation Safety Board, the Indonesian National Transportation Safety Committees, Cert Reform Act, as well as FAA's own findings. The actions described in the FAA's Action Plan are responsive to all recommendations received and apply to the entirety of the FAA's approach to aircraft certification. The plan reflects the FAA's commitment to improving our certification process domestically, and to improving aviation safety globally.

This initiative consists of three components:

- **Safety Systems:** The FAA requests $2.3 million for enhancements to safety systems.
    - Aviation Safety Information Analysis and Sharing enhancements will align new rotorcraft operators, anticipated studies, additional data sources, and expanded analytical capabilities to support in-time safety analysis for FAA and other stakeholders.
    - Enhancements to SSMT enhancements will improve risk assessment models to improve the FAA's ability to identify precursor events. These enhancements will align the FAA's risk models with EUROCONTROL.
    - Aviation Safety Reporting Program enhancements will create an interface program to capture all safety-critical reports, including 100 percent of general aviation reports, and reports associated with emerging safety issues. The number of reports submitted to the Aviation Safety Reporting System has doubled in the past five years, to approximately over 1.5 million total reports in FY 2019.
- **Aviation Safety Designee Oversight:** FAA requests $3.9 million for 37 FTP/19 FTEs for designee oversight. These efforts will continue to support standardized outcomes and improvements across the ODA program to resolve the concerns raised by the FAA, industry stakeholders, and others.
- **Targeted AVS Hiring**: FAA requests $10.3 million for 115 FTP/57 FTE, of which 57 FTP/ 28 FTE is for Flight Standards Service, and 45 FTP/22 FTE is for Aircraft Certification Service. The FAA will focus its efforts on hiring candidates from a variety of engineering disciplines, including human machine interface, systems, and aerospace, and with competencies in project management, problem solving, and communication.

UAS Integration: As the pace of UAS integration has accelerated and the number of users have increased, FAA resources have constrained our ability to review and grant airspace access requests, proactively respond to external stakeholder concerns, and implement the security requirements from the 2018 FAA Reauthorization Act. The FY 2022 funding request of $1.8 million and 21 FTP/10 FTE provides for the permanent expansion of government partnerships and rulemaking needed to further UAS integration efforts. It will also expedite the processing of requests from industry, increasing stakeholder outreach, and allowing for more complete data and trend analysis.

Science, Technology, Engineering, and Math Aviation and Space Education (STEM

AVSED) Program: In partnership with the Office of Policy, International Affairs, and Environment, FAA is requesting funding to develop a measurable, sustainable and meaningful program that provides outreach and connections with targeted populations. The FY 2022 funding request of $500,000 provides for the development of materials and routine educational supplies to introduce students to scientific concepts in ways that are exciting and educational while exploring aerodynamics, physics and an endless world of aviation. Takeaway materials will introduce and excite students about aviation and aerospace, from drones to rocket launches.

(See also "Operations Summary" and "FY 2022 Discretionary Increase Request" for a detailed description of the Program Increase requests.)

What benefits will be provided to the American public through this request and why is this program necessary?

AVS will provide the American public safety and economic benefits by maintaining an enhanced 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 airspace system.

Staffing Information

	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Direct Full Time Equivalents (FTE)	**7,128**	**7,237**	**7,323**
Flight Standards Service	5,029	5,005	5,033
Aircraft Certification Service	1,300	1,398	1,421
Office of Aerospace Medicine	405	410	413
Office of Rulemaking	37	42	43
Air Traffic Safety Oversight Service	118	131	131
Office of Accident Investigation and Prevention	74	81	84
Office of Unmanned Aircraft Systems Integration	85	80	90
Office of Quality, Integration & Executive Services	80	77	77
Organization Designation Authorization (ODA) Office	-	13	31
Full Time Permanent Employment (FTP)	**7,276**	**7,406**	**7,579**
Flight Standards Service	5,140	5,150	5,207
Aircraft Certification Service	1,354	1,434	1,479
Office of Aerospace Medicine	409	410	416
Office of Rulemaking	34	42	44
Air Traffic Safety Oversight Service	119	130	130
Office of Accident Investigation and Prevention	73	81	86
Office of Unmanned Aircraft Systems Integration	77	75	96
Office of Quality, Integration & Executive Services	70	71	71
Organization Designation Authorization (ODA) Office	-	13	50

Aviation Safety Organization (AVS)
($000)

	Dollars (in Thousands)	FTP	OTFTP	FTE
FY 2021 Enacted	**$1,479,039**	**7,406**	**58**	**7,237**
Adjustments to Base	**$37,840**	-	-	-
Annualization of FY 2021 Pay Raise 1.0%	2,964	-	-	-
FY 2022 Pay Raise 2.7%	25,003	-	-	-
FY 2022 FERS Increase	9,953	-	-	-
Transition from F&E to Ops	795	-	-	-
Working Capital Fund	(875)	-	-	-
Discretionary Adjustments	**19,419**	**173**	**-**	**86**
Enterprise Information Management (EIM)	575	-	-	-
Improving Aviation Safety Oversight	16,499	152	-	76
Unmanned Aircraft Systems (UAS) Integration	1,845	21	-	10
STEM/ AVSED	500	-	-	-
Base Transfers	**-**	**-**	**-**	**-**
FY 2022 Request	**$1,536,298**	**7,579**	**58**	**7,323**

See Operations Summary for a detailed description of the explanation of funding changes.

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Commercial Space
Transportation(AST)

Detailed Justification for the Office of Commercial Space (AST)

FY 2022 – Office of Commercial Space Transportation Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	17,435	18,932	20,710
Program Costs	8,605	8,623	11,760
Total	**$26,040**	**$27,555**	**$32,470**
FTE	**91**	**99**	**108**

What is this program and what does this funding level support?

The Commercial Space Launch Act authorized the Department of Transportation (DOT) to license and monitor the safety of commercial space launches and to promote the industry. Executive Order 12465 designated DOT as the lead Federal agency for enabling private-sector launch capability.

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. Recent years have witnessed dramatic growth in both the number of commercial space transportation companies and total operations. From FY 2017 to FY 2019 alone, AST witnessed a 50 percent increase in launch activities. In addition, the National Space Policy of 2010, the National Space Transportation Policy of 2013, and the 2017 Space Policy Directive 1 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.

In FY 2018, AST developed a proposal to streamline launch and re-entry licensing requirements, that would fundamentally change how the FAA licenses launches and reentries. On December 10, 2020, the Streamlining Launch and Reentry Licensing Requirements final rule was published in the Federal Register to establish a new Part 450 for commercial space vehicle operators. When Part 450 became effective on March 21, 2021, any launch or reentry vehicle operator may apply to conduct launch and reentry operations under the new Part 450. The Part 450 regulatory regime consolidates different regulatory regimes for expendable and reusable launch and/or reentry vehicles into a single streamlined regulation for all vehicle and operations types.

The streamlining effort is coupled with a body of Advisory Circulars or standards that

collectively provide at least one acceptable means of compliance for all performance-based regulations in Part 450. This action would also enable flexible timeframes, remove unnecessary ground safety regulations, redefine when launch begins to allow specified pre-flight operations prior to license approval, and allow applicants to seek a license to launch from multiple sites.

AST accomplishes its safety mission through the execution of its licensing, permitting, and safety inspection functions. Key focus areas include:

- Safety oversight: Primarily through on-site inspections, AST ensures 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. Additionally, key activities including dress rehearsals and the testing and installation of flight termination systems are also inspected. Finally, each year AST conducts inspections of all licensed launch sites.

- License and Permits: AST has 180 days to evaluate a license application or 120 days to evaluate a permit application. These evaluations are complex in nature, and require an in-depth safety evaluation, which also includes a policy review, interagency review, and a computation of maximum probable loss for determining an applicant's financial responsibility.

- Pre-application Consultation: AST conducts a 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. In FY 2020, there are five launch sites in pre-application consultation with AST.

- Spaceports: AST is responsible for licensing the following operation of launch sites or "spaceports":

    - California Spaceport at Vandenberg Air Force Base, California
    - Spaceport Florida at Cape Canaveral Air Force Station, Florida
    - Mid-Atlantic Regional Spaceport at Wallops Flight Facility, Virginia
    - Mojave Air and Space Port, California
    - Kodiak Launch Complex on Kodiak Island, Alaska
    - Oklahoma Spaceport in Burns Flat, Oklahoma
    - Spaceport America near Las Cruces, New Mexico
    - Cecil Field in Jacksonville, Florida
    - Houston Airport System Spaceport at Ellington Airport, Texas
    - Midland International Airport in Midland, Texas
    - Colorado Air and Spaceport in Watkins, Colorado
    - Space Coast Regional Spaceport, Titusville, Florida

FY 2022 Anticipated Accomplishments:

Function/Office	FY 2022 Anticipated Accomplishments
Commercial Space	• Enhanced and revised regulatory framework, including continual engagement with those developing new projects, in order to keep regulations flexible to address the increasing complexity and diversity of suborbital and orbital operations. • Completed licensing and permitting evaluations within statutory time limits. • Completed environmental assessments for all launches/reentry sites. • Completed additional safety approval applications, which evaluate space-related components, processes, or services.

Program Increases:
The FY 2022 budget request for AST includes additional funding for the following programmatic initiatives.

Discretionary Adjustments	Amount ($000)	FTP	FTE
Commercial Space Operational Staffing & Support	3,665	9	5
AST Total	**$3,665**	**9**	**5**

Commercial Space Operational Staffing & Support: The FY 2022 funding request of $3.665 million and 9 FTP/ 4 FTE supports a critical need for additional resources to address the anticipated growth within the commercial space transportation industry. To keep pace with the growing volume of license applications for authorization and operations, the FAA continues to develop performance based licensing for launch and reentry. Additional support is also needed to support safety activities, ongoing rulemaking, legal reviews of applications for commercial space licenses, license orders, waiver requests, and environmental efforts.

(See also "Operations Summary" and "FY 2022 Discretionary Increase Request" for a detailed description of the Program Increase request.)

What benefits will be provided to the American public through this request and why is this program necessary?

Since AST's transfer to the FAA in 1995, through May 2019, the Office has licensed or permitted 377 commercial space launches and reentries. The continued rapid pace of growth in commercial space transportation brings challenges beyond increasing launch rates. 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.

Additionally, the National Aeronautics and Space Administration is increasingly relying on the commercial sector to provide cargo services for the International Space Station, and someday, astronauts and spaceflight participants. Finally, with the unanimous recommendation and support of the National Space Council, the current administration signed the *[1]WHITE House National Space Policy Directive 1.

This Directive provides for an integrated government–led program, working with private sector partners, for a return to the Moon, and possibly follow-on missions to Mars. The Office of Commercial Space Transportation will play a vital role in assuring the successful implementation of such a directive.

There also continues to be a growing need to ensure the safe integration of space and air traffic, both domestically and internationally. Recognizing these needs, the FAA is developing and implementing a strategy to ensure the efficient integration of commercial space into the NAS. This work is being performed in partnership with the Air Traffic Organization and other FAA organizations. This request will allow AST to keep pace with the rapidly increasing tempo of commercial space operations anticipated in the next few years and effectively evaluate complex vehicles, systems, and operations.

[1] Footnote: Presidential Memorandum on Reinvigorating America's Human Space Exploration Program, Issued Dec 11, 2017; https://www.whitehouse.gov/presidential-actions/presidential-memorandum-reinvigorating-americas-human-space-exploration-program/

Office of Commercial Space Transportation (AST)
($000)

	Dollars (in Thousands)	FTP	OTFTP	FTE
FY 2021 Enacted	**$27,555**	**109**	1	**99**
Adjustments to Base	**$1,250**	-	-	4
Annualization of FY 2021 Pay Raise 1.0%	44	-	-	-
Annualization of FY 2021 FTE	667	-	-	4
FY 2022 Pay Raise 2.7%	383	-	-	-
FY 2022 FERS Increase	156	-	-	-
Discretionary Adjustments	**$3,665**	**9**	-	**5**
Commercial Space Operational Staffing & Support	3,665	9	-	5
Base Transfers	**-**	**-**	**-**	**-**
FY 2022 Request	**$32,470**	**118**	1	**108**

See Operations Summary for a detailed description of the explanation of funding changes.

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Finance and Management(AFN)

Detailed Justification for the Office of Finance and Management (AFN)

FY 2022 – Office of Finance and Management – Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	243,069	255,043	263,100
Program Costs	557,322	580,958	629,116
Total	**$800,391**	**$836,001**	**$892,216**
FTE	**1,358**	**1,383**	**1,385**

What is this program and what does this funding level support?

The Office of Finance and Management (AFN) is responsible for providing the agency's common business services through a consolidated, integrated approach. AFN oversees the delivery of financial operations, acquisition services, information technology, property management, and technical training to internal and external customers across the agency.

AFN manages the FAA's enacted budget and plans for future budget requirements, handles more than 26,000 contract actions for more than $5.1 billion in goods and services annually, and supports over 55,000 technology users. AFN leads the FAA's efforts to identify cost savings, leverage technology, and optimize resources in order to position the agency to achieve the aviation safety mission.

Each year, AFN averts cyber incidents by detecting and prioritizing over 100 million cyber alerts for the National Airspace System (NAS) and non-NAS systems throughout the FAA and the DOT and provides critical crisis response capability for all cyber incidents. In addition, AFN manages leases and real property assets that house 24,356 personnel in approximately 6.9 million square feet of office space and provides management and oversight for over $8.6 billion in personal property assets.

AFN's four service organizations include:

Financial Services (ABA)
The Office of Financial Services enables the FAA to meet its aviation safety mission by formulating, justifying, executing, and managing budgets for each of the agency's lines of business and staff offices. ABA ensures that funding is available to support FAA's mission and advocates for funding to support FAA's critical Aviation Safety and Air Traffic

personnel, programs, and initiatives. ABA serves as the agency's Chief Financial Officer and leads the FAA in identifying cost savings, providing responsible financial management of budget appropriations, and managing the agency's workforce planning.

ABA provides three core services:

Budget and Program Services identifies and defines the agency's budgetary needs to meet agency goals. This organization tracks the status of major projects and monitors agency spending to ensure compliance with appropriation law and other federal laws. It also serves as the liaison to Congress for funding and appropriation matters.

Financial Management develops and maintains corporate FAA-wide management systems and manages the capitalization of FAA's capital assets. The organization also implements accounting and financial management policies for the agency and assures the adequacy of internal controls for compliance with laws, regulations, and policies.

Financial Analysis facilitates the agency's cost reduction efforts and implements cost control initiatives; develops agency policy; oversees financial guidance and advisory services for agency contracts; ensures that business decisions are sound by analyzing the financial impact of proposed agency labor contracts; develops agency policy for spending and authorization controls; and develops the controller and aviation safety workforce plans.

ABA FY 2022 Anticipated Accomplishments:

Function	FY 2022 Anticipated Accomplishments
Budget and Programming	• Ensure that required funding needs for agency programs are available. • Ensure agency funds and resources are utilized effectively and that FAA maintains compliance with the Anti-Deficiency Act.
Financial Management	• Lead the agency on all accounting operations and provide financial oversight and information to assist FAA organizations with making business decisions. • Ensure an unmodified audit opinion on agency FY 2021 financial statements.
Financial Analysis	• Employ business case discipline to any cost/contract reviews for large investments as the agency investment analysis process stewards. • Provide Controller and Aviation Safety Workforce plans.

Acquisitions and Business Services (ACQ)

ACQ provides contracting expertise, acquisition lifecycle support, and property management that enables the FAA to achieve its aviation safety mission by procuring goods and services that leverage emerging technologies and industry best practices. Procurements are negotiated at best value providing significant cost savings. In FY 2020, ACQ contracted for more than $5.1 billion in goods and services and generated $52 million in cost savings through its Strategic Sourcing of Acquisition of Various Equipment program, for purchases like office supplies, office equipment, IT hardware and software, aircraft navigational charting services, and video teleconferencing equipment.

ACQ develops the FAA's Acquisition Workforce Profile, which serves as the FAA's blueprint for developing and sustaining a high-performing acquisition workforce. This includes critical positions such as Contracting Officers/Specialists, Real Estate Contracting Officers, Program/Project Managers, Contracting Officer Representatives, Researchers, Engineers/System Engineers, Test and Evaluation Specialists, Financial Specialists, and other professionals providing specialized support. ACQ maintains the competency models for core acquisition disciplines.

ACQ manages certification programs that provide acquisition professionals opportunities throughout the acquisition lifecycle to achieve and maintain professional development and certifications. Because of the commitment to maintaining a strong framework for the agency's acquisition workforce, ACQ is consistently one of the top performers among its peer group across the government.

ACQ oversees and manages real and personal property for the agency. Real property includes management of administrative space at FAA Headquarters and other facilities in the National Capital Region; the space needs of more than 24,300 personnel from every FAA line of business and staff office housed in over 6.9 million square feet of FAA office space across the country.

ACQ provides five core services:

Procurement advises, plans, negotiates and awards FAA organizations' cost-effective, best value contracts, purchase orders, delivery orders, agreements, and aviation research grants for FAA headquarters, William J. Hughes Technical Center, Mike Monroney Aeronautical Center (MMAC), and the Service Areas.

Acquisition Workforce Planning and Development updates the FAA's Acquisition Workforce Profile and provides a comprehensive program of career development guidance and competency-based training and certification programs for acquisition personnel.

Acquisition Policy and Oversight develops and maintains agency-wide lifecycle acquisition policy, guidance, and tools that comprise and support the FAA's Acquisition Management System. ACQ also analyzes acquisition data to formulate trends and traceable

metrics that identify areas for improvement to leverage government-leading practices, recommends improvements regarding agency policies and processes based on lessons learned, potential deficiencies, and best practices. In addition, ACQ administers the Joint Resources Council, which makes and oversees corporate-level investment decisions for agency acquisition programs.

Real Property Management maintains the agency-wide inventory of real property and the data and performance measures associated with more than 50,704 buildings, structures, and land parcels which include administrative offices, structures, and land leases for National Airspace System operational sites. ACQ oversees administrative space leases within each of the regions and field facilities for the agency's Air Traffic Organization (ATO), Airports, Aviation Safety (AVS), and the Security, and Hazardous Materials Safety organizations.

Personal Property Management and Oversight provides support in leading and integrating logistics initiatives within the FAA and DOT. As part of ACQ's personal property responsibilities, ACQ establishes and oversees the agency's property management system for the management and physical control of over 76,400 assets valued at $9 billion in global agency assets throughout the NAS and international facilities.

ACQ FY 2022 Anticipated Accomplishments:

Function	FY 2022 Anticipated Accomplishments
Procurement Actions	• Ensure contractor performance is in accordance with contract terms and conditions, issue contract modifications, and monitor contract deliverables. • Develop and implement best practices in acquisition to deliver best value for the taxpayer and increase efficiency and effectiveness of procurement methods. • Conduct internal and external small business outreach/training and target at least 25 percent of total direct procurement dollars as small business awards.
Acquisition Training and Certification	• Manage training and certification programs for acquisition personnel, including program/project managers, contracting officers/specialists, contracting officer's representatives, systems engineers, test and evaluation specialists, and logistics specialists.

Acquisition Oversight	• 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 contracts with estimated values below $100 million. • Conduct Integrated Baseline Reviews on investment programs along with validations of contractor Earned Value Management Systems. • Conduct investment program post-implementation reviews.
Personal Property Management	• Enhance management performance targets that measure adequacy of property management policies and procedures, staffing and training, performance review and improvement program. • Implement performance targets that measure the quality and effectiveness of property management activities, staff productivity, and adequacy of checks and balances. • Optimize the agency fleet size by reducing the number of FAA's underutilized administrative Fleet Vehicles.

Information and Technology Services (AIT)

AIT operates as the agency's information and technology backbone by providing and overseeing all aspects of the agency's IT enterprise. This concept allows all lines of business and staff offices, including ATO and AVS, to connect, interact, respond to customers, stakeholders, colleagues, and access data and resources necessary to perform their daily operations in support of the FAA mission. AIT keeps the FAA's network safe from cyber threats, maintains a comprehensive cyber threat intelligence analysis capability, and supports innovative technology and tools to provide quick reliable information and data access to our customers while continuing the agency on a path of increased efficiency and innovation.

AIT is responsible for providing comprehensive IT services to over 55,000 technology users across the FAA. AIT maintains a current inventory of over 345 Federal Information Security Management Act reportable systems, of which 63 are identified as mission critical. Public facing systems such as FAADroneZone[1], Low Altitude Authorization and Notification Capability, and FAA.gov (https://www.faa.gov/) are developed and maintained to

[1] (https://faadronezone.faa.gov/)

ensure ease of access and transparency for our public users. AIT's Federal Identity, Credential, and Access Management program continues to support millions of internal and public users to ensure content accuracy and security.

AIT provides three core services:

Shared Services and Modernization delivers effective customer-driven solutions to enhance and modernize core services that meet mandates, and initiatives, while evolving as technology advances and the needs of our stakeholders change. AIT supports and maintains the lifecycle of FAA devices, IT infrastructure components, enterprise software, and specialized software application solutions and sustainment.

AIT empowers enhanced work performance and efficiencies throughout the workforce, which includes telework readiness capabilities and the enhancement of standardized collaboration tools.

Cybersecurity ensures the confidentiality, integrity, and availability of its information, information systems, and mission from evolving cyber threats.

AIT oversees cybersecurity across the FAA enterprise including air traffic control, research & development, and mission support systems. This includes collaboration with the Department of Homeland Security Continuous Diagnostics and Mitigation (CDM) program. CDM provides the FAA network and systems with tools that continuously identify cybersecurity risks, prioritizes these risks based on potential impacts, and enables cybersecurity personnel to mitigate the most significant problems first.

In addition, AIT is leading the effort to develop a well-informed and skilled workforce that will enable the FAA to execute federal level cybersecurity initiatives and ensure secure operations of FAA systems and services. In an ever-changing cyber landscape, continuous improvement of cybersecurity services ensures resilience of FAA's mission and essential services.

Enterprise Information Management (EIM) capability is a modern cloud-based scalable enterprise platform that provides common information management capabilities and services across the FAA and eliminates the need to acquire and sustain dedicated and redundant information management capabilities for individual systems.

EIM creates an environment that enables the integration and development of diverse operational systems, critical data assets, and unique applications by providing a common framework for data, application re-use, and agency-wide collaboration. The unified data layer enables analysts and data scientists to rapidly, and efficiently conduct data mining and advanced analysis across FAA data, in order to provide insight and answers to new, emerging, and ad hoc scenarios.

AIT FY 2022 Anticipated Accomplishments:

Function	FY 2022 Anticipated
Shared Services and Modernization: *Optimize Information Access through Technology Innovation*	• Maximize the capabilities of the Integrated Service Center to provide improved services to FAA stakeholders. • Maximize employee efficiencies by implementing process improvements in core services, including onboarding, off boarding, and helpdesk services. • Continue the implementation of the Technology Business Management framework in the FAA to support the transparency of IT spending. • Develop the capability to migrate applications to the Cloud. • Implement additional solutions to improve the mobile customer experience. • Optimize and standardize video collaboration services across the enterprise.
Cybersecurity: *IT Risk Management & Information Systems Security*	• Implement security operations orchestration and automation technologies to improve the speed and accuracy of detection and response capabilities. • Conduct incident response exercises, both domestically and internationally, to identify process gaps and coordinate remediation activities. • Implement hiring, retention and training strategies for the agency's cybersecurity workforce, in alignment with the National Academy of Science recommendations. • Expand CDM capabilities to implement additional authentication and role-based access control. • Incorporate security measures into the software development lifecycle to minimize risk and vulnerabilities.

Function	FY 2022 Anticipated
Enterprise Information Management: *Enable FAA's Employees to Work Smarter, Resource Optimization*	• Enable advanced geospatial capabilities to manage and exploit the growing volume and variety of Geographic Information Systems data. • Integrate and enable intelligent computing engines to provide insights and optimization of responses on voluminous FAA data. • Integrate technologies and services to enable machine learning. • Continue to expand and evolve EIM Data Platform operations capabilities; provide the cloud-based platform in the Mission Support environment. • Deliver capabilities and services to enable the agency to move away from silo-centric applications, toward a unified, secure, and integrated EIM environment.

Transition to Operations and Maintenance:
Transition to Operations and Maintenance funding covers the operational cost of new systems acquired under the FAA's Facilities and Equipment Capital budget. Once new systems are installed in the NAS, the ongoing operational costs are transferred to the Operations appropriation.

The EIM Data Platform is a cloud-based platform in the Mission Support environment designed to deliver capabilities and services including big data capabilities, to enable the agency to move away from silo-centric applications, toward a unified, secure, data and integrated Enterprise Information Management environment. This request will provide for ongoing first level engineering, second level engineering, enterprise licenses, software license, software support and maintenance, coaching and monitoring services.

Transition from Facilities and Equipment to Operations: FY 2022	Amount ($000)
EIM	$2,020

Program Increases:

The FY 2022 budget request for AFN includes additional funding for the following programmatic initiative.

Discretionary Adjustments	Amount ($000)	FTP	FTE
EIM	11,210	4	2
Cybersecurity	34,100	-	-
AFN Total	**$45,310**	**4**	**2**

EIM: The $11.2 million funding request will further build out and extend the scope of current EIM capabilities through the transfer of legacy data to the new cloud-hosted solutions, which can scale to support the requirements of new and modernized systems. The funds will be used to procure tools and security from the cloud service provider and to staff the support team needed to operate the expanding enterprise capability. The funding will also be used to improve data quality, as well as enhance the governance of these critical data assets, which currently have limited data sharing capabilities and are not well cataloged or documented.

Cybersecurity: The FY 2022 President's Budget allocates resources to nine agencies that were impacted by the SolarWinds incident, one of which is the FAA. The $34.1 million funding request will increase FAA's security capabilities by increasing its capacity to support incident analysis and validation, improve FAA's ability to detect and contain security threats, mature the Security Operations Center (SOC), and enhance FAA's capacity to eradicate and evict cyber adversaries. The FAA will increase its capacity to support incident analysis and validation by focusing on areas such as Cyber Threat Intelligence, Digital Forensics and Improved Logging. The FAA will improve its ability to detect and contain security threats by implementing Cloud Access Security Broker solutions and upgrading E-Mail security. The FAA will improve its SOC maturity by expanding its Security Information and Event Management solution.

(See also "Operations Summary" and "FY 2022 Discretionary Increase Request" for a detailed description of the Program Increase request.)

Mike Monroney Aeronautical Center (MMAC or AMC)

The Aeronautical Center, located in Oklahoma City, is home to the largest number of FAA employees located outside the Washington, D.C. area, with over 6,300 employees, students, and contractors from every line of business within the FAA. In addition, the Center hosts approximately 11,000 visitors annually. The Center is comprised of 137 buildings with over 3.4 million square feet of space and is located on 1,057 acres.

AMC provides facility oversight, operations, architecture and engineering design, construction, space management, maintenance, environmental and safety support for the entire Center. Tenants supported by AMC at the Aeronautical Center include the Civil Aerospace Medical Institute, the FAA Logistics Center, Flight Program Operations, Aeronautical Information Services, National Airway Systems Engineering Division, Transportation Safety Institute, and a variety of staff support offices. Additionally, the Aeronautical Center is home to the FAA's $500 million Franchise Fund, composed of six organizations that provide shared services across the federal government. Services include financial management, supply chain and logistics, information technology services, technical and leadership training, flight program maintenance operations, and acquisition. MMAC franchise fund operations provide products and services to the entire Department of Transportation and over 30 other different federal agencies.

AMC provides core services:

Technical Training: The FAA Academy (AMA) oversees and manages the delivery of technical training for all five lines of business within the FAA, supporting over 50,000 employees annually in resident and through distant learning platforms. The Academy is leading the agency's transformation to remote and virtual training delivery across key platforms. AMA plays a vital role in meeting the agency's controller workforce plan and the aviation safety workforce plan. AMA trains over 16,000 air traffic controllers, NAS Technicians, and aviation safety inspectors.

Financial Management Services: The Enterprise Services Center (ESC) is an OMB designated Financial Management Center of Excellence and Shared Services Provider. ESC provides financial management services to over 30 federal agencies including all DOT modes of operation and multiple other federal agencies. ESC processes approximately 420,000 commercial vendor invoices, 40,000 grants payments, 200,000 travel vouchers, 320,000 Accounts Receivable receipts for collections and 42,000 Accounts Receivable invoice-billing transactions annually. ESC provides turnkey financial services including financial statement and reporting packages for numerous customers. ESC is at the forefront of implementing intelligent automation, with Web Application Desktop Integrator and Enterprise Data Quality tools in production and a DATA Act Robotic Process.

Information Technology Services: As part of federal shared services, ESC is an accredited Fed RAMP Third Party Assessment Organization that provides a variety of Independent Assessment, Vulnerability Scanning/Penetration Testing and Cybersecurity Support services to federal agencies. ESC provides services to over 30 federal customers assisting them in achieving Federal Information Security Management Act compliance and better managing risk in today's cyber-centric environment.

ESC also provides oversight and management of a National Wireless Program providing best in government life-cycle management for cellular and satellite devices. The program provides over 20,000 wireless devices to federal agencies which results in an estimated annual savings of over $2.2 million.

AMC FY 2022 Anticipated Accomplishments:

Function	FY 2022 Anticipated Accomplishments
FAA Academy and Air Traffic Control Training	• Ensure the FAA's workforce of the future is equipped with the technical skills necessary to maintain and operate the national airspace.
Facilities	• Reduce energy intensity by 2.5 percent annually through the end of FY 2025 to meet goals in FAA Order 1053.1C Energy and Water Management for FAA Buildings and Facilities as compared to FY 2015 baseline.
Information Technology / Financial Services at AMC	• Maintain 99.5 percent availability for IT systems as defined in customer agreements detailing specific commitments. • Improve service provision through timely mitigation of audit findings focusing on strengthening processes and closing process gaps.
Franchise Fund Oversight and Management	• Manage over 2,000 active agreements worth $500 million of activity across FAA and other Federal agencies. 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 and why is this program necessary?

AFN's shared services approach to delivering the agency's common finance, acquisitions, information technology, property, technical training, 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 benefits to all customers and stakeholders.

AFN continues to find new and innovative ways to lessen the administrative burden on the agency's employees, allowing them to meet their individual responsibilities to support the safety of the national airspace.

The requested funding for FY 2022 will support all of FAA's 14 lines of businesses and staff offices and key initiatives that include:

- Overseeing the FAA's annual budget and operating financial, cost accounting, and procurement systems;

- Protecting and updating the agency's IT infrastructure;
- Competing, negotiating, awarding, and managing more than $5.1 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.

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

	Dollars (in Thousands)	FTP	OTFTP	FTE
FY 2021 Enacted	**$836,001**	**1,399**	**17**	**1,383**
Adjustments to Base	**$10,905**	**-**	**-**	**-**
Annualization of FY 2021 Pay Raise 1.0%	608	-	-	-
FY 2022 Pay Raise 2.7%	5,164	-	-	-
FY 2022 FERS Increase	1,995	-	-	-
Transition from F&E to Ops	2,020	-	-	-
Working Capital Fund	368	-	-	-
Financial Accounting Services	750	-	-	-
Discretionary Adjustments	**$45,310**	**4**	**-**	**2**
Enterprise Information Management (EIM)	11,210	4	-	2
Cybersecurity	34,100	-	-	-
Base Transfers	**-**	**-**	**-**	**-**
FY 2022 Request	**$892,216**	**1,403**	**17**	**1,385**

See Operations Summary for a detailed description of the explanation of funding changes.

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Detailed Justification for NextGen and Operations Planning (ANG)

FY 2022 – NextGen and Operations Planning – Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	30,138	31,550	32,503
Program Costs	31,452	31,452	31,452
Total	**$61,590**	**$63,002**	**$63,955**
FTE	**174**	**177**	**177**

What is this program and what does this funding level support?

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.

ANG maintains facilities and support services for all properties at the WJHTC including land, buildings, and infrastructure. 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.

The FAA's Federal Laboratory, the WJHTC is the principal source for conducting Next Generation Air Transportation (NextGen) research, testing, and evaluation. The WJHTC specializes in sustaining and modernizing air traffic control automation, communications, surveillance, navigation, traffic flow management, and weather systems, and supports advancements in airport and aircraft safety, human factors, and separation standards. The WJHTC also provides around the clock operational support to en route, terminal, and other air traffic control facilities throughout the Nation. Annual operations and maintenance costs for the WJHTC are approximately 40 percent of ANG's Operations budget.

FY 2022 Anticipated Accomplishments:

Function/Activity	FY 2022 Anticipated Accomplishments
Facility Related:	• Provide the technical platform for research in aircraft safety (fire, structural, unmanned aircraft systems, etc.), airport technologies (safety and capacity), human factors, and weather. • Provide laboratory systems for conducting integrated concept evaluations, modeling and simulations, and testing and evaluating all NextGen technologies in the national airspace. • Provide 24 hours a day, 7 days a week, 365 days a year field support for all operational systems within the national airspace. • 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:	• 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 that support the continued use of and further reductions in separation standards within U.S. sovereign airspace, international airspace where FAA has delegated authority to provide air traffic services, and international airspace where the U.S. and its citizens have safety-related interests. • Conduct an annual safety analysis of Reduced Vertical Separation Minimum Operations (RVSM) in North America (United States, Canada, and Mexico) and within U.S. delegated oceanic airspace per International Civil Aviation Organization Requirements. • Conduct maintenance and operations of independent performance based monitoring for Altimetry System Error, a key component to the continued safe operation of RVSM.

What benefits will be provided to the American public through this request and why is this program necessary?

Civil aviation accounts for over $1.8 trillion in economic activity and employs approximately 11 million people in aviation-related fields. The FAA has enabled the continued growth of the aviation industry 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, ensuring that safety critical operational systems are constantly maintained and improved. The technical expertise provided by the labs is also key to the implementation of future NextGen capabilities.

NextGen and Operations Planning (ANG)
($000)

	Dollars (in Thousands)	FTP	OTFTP	FTE
FY 2021 Enacted	**$63,002**	**177**	**3**	**177**
Adjustments to Base	**$953**	-	-	-
Annualization of FY 2021 Pay Raise 1.0%	76	-	-	-
FY 2022 Pay Raise 2.7%	639	-	-	-
FY 2022 FERS Increase	238	-	-	-
Base Transfers	**-**	**-**	**-**	**-**
FY 2022 Request	**63,955**	**177**	**3**	**177**

See Operations Summary for a detailed description of the explanation of funding changes.

Security and Hazardous
Materials Safety (ASH)

Detailed Justification for Security and Hazardous Materials Safety (ASH)

FY 2022 – Security and Hazardous Materials Safety Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	84,631	89,467	95,386
Program Costs	34,011	35,221	44,080
Total	**$118,642**	**$124,688**	**$139,466**
FTE	**495**	**503**	**522**

What is this program and what does this funding level support?

The Office of Security and Hazardous Materials Safety (ASH) ensures aviation safety, supports national and homeland security, and promotes an efficient airspace system through development and execution of its safety and security policies and programs. ASH programs protect the flying public, airmen, FAA employees, contractors, information, facilities, and assets. ASH provides agency crisis management coordination, manages continuity of operations and government plans, and executes and supports FAA and other government agencies' national security responsibilities.

ASH protects the flying public and U.S. certificated airmen through identification and analysis of security threats to the FAA, the national airspace, and United States civil aviation operating worldwide; regulatory oversight of safe air transport of hazardous materials; and investigation of airmen and employee misconduct.

Office of Hazardous Materials Safety (AXH) is responsible for ensuring and promoting the safe air transportation of high-risk cargo, including hazardous materials through:

- Setting standards for certification and oversight for operators of manned and unmanned aircraft
- Investigating major incidents to identify safety deficiencies
- Focusing operators' documented hazardous materials safety program to promote safe operations
- Evaluating the effectiveness of operators' risk mitigation strategies
- Coordinating the collaborative efforts of government and industry safety teams
- Overseeing and monitoring safe integration of unmanned aircraft systems (UAS) transporting hazardous materials in the national airspace
- Evaluating and analyzing the effectiveness of existing ASH certification, regulatory, and compliance systems
- Collaborating with internal and external stakeholders to identify, analyze, mitigate,

and manage safety risks

Office of Personnel Security (AXP) promotes the safety and security of over 88,000 personnel in the workplace, ensuring that vetted personnel are granted access to critical FAA operational activities and information by administering Personnel Security Program policy guidance, oversight, and evaluations for:

- Personnel Security Program
- Identification Media and Credential Program

Office of Infrastructure Protection (AXF) supervises nationwide Facility Security programs and provides program policy guidance, oversight, and evaluations for 1,100-staffed facilities, and supports the security needs of over 10,000 unstaffed facilities. Such programs include:

- Facility Security Management Program
- Information Security Program

Office of National Security Programs and Incident Response (AXE) is responsible for ensuring agency-level emergency readiness and response, crisis management, threat identification and analysis, and national security support to promote and ensure national airspace and aviation safety and security. Programs supported by AXE include:

- Washington Operations Center Complex
- Current Intelligence and Threat Evaluation Watch Operations
- Special Operations and Law Enforcement Support
- Command, Control, and Communications
- Emergency Preparedness and Response; Incident Management
- Regulatory Investigations
- Law Enforcement Assistance Program (LEAP)
- Unmanned Aircraft Systems Security

Office of Investigations (AXI) conducts administrative and civil investigations involving FAA employees, contractors, and non-employees suspected of violating FAA orders and policy. ASH provides services in the following areas: cyber and UAS investigations and analysis, insider threat detection and mitigation, e-discovery, and defensive counter-intelligence services, including foreign travel briefings and de-briefings. Examples of activities they conduct include:

- Internal Misconduct and Whistleblower Retaliation Investigations
- Standards and Policy production -
- Threat Analysis and Mitigation
    - Defensive Counter-Intelligence
    - Insider Threat Detection & Mitigation
    - International Travel Security
- Technical Investigations
    - E-Discovery
    - Computer Cyber Investigations
    - UAS forensics and analysis

FY 2022 Anticipated Accomplishments:

Function/Office	FY 2022 Anticipated Accomplishments
Office of Hazardous Materials Safety (AXH)	▪ Improve industry compliance with aviation safety regulations and standards through inspections, data analyses, and risk management. ▪ Continue the full implementation of the Safety Assurance System to improve ASH's ability to identify hazards and risks before they result in major incidents and accidents. ▪ Conduct risk-based safety oversight of the aviation industry, targeting the highest-risk operators to ensure continued operational safety. ▪ Implement new programs and revised approaches directed by safety recommendations. ▪ Automate and standardize the safety oversight and inspection process. ▪ Manage and coordinate UAS activities for ASH and ensure alignment with FAA and DOT initiatives. ▪ Develop new and innovative stakeholder engagement approaches to inform the aviation community and industry of trends and emerging risks. ▪ Improve the effectiveness of existing ASH certification, regulatory, and compliance systems.
Office of Personnel Security (AXP)	▪ Provide oversight to ensure the FAA workforce complies with federal personnel security requirements. ▪ Continue implementing the recently increased Federal Investigation Standards requiring 5-year background re-investigations for all employees and contractors in Moderate Risk positions (much of the FAA). Ensuring phased implementation of a continuous evaluation program, designed to replace re-investigations. ▪ Process background investigations and fingerprint checks for FAA employees and contractors to ensure only those who merit the public trust are hired and retained. ▪ Continued deployment and issuance of identification media in compliance with Homeland Security Presidential Directive (HSPD-12).

Function/Office	FY 2022 Anticipated Accomplishments
Office of Infrastructure Protection (AXF)	▪ Assess the security risks of FAA facilities and develop security countermeasure mitigation strategies for each assessed facility. ▪ Ensure FAA facilities are compliant with facility and information security requirements that protect agency employees, visitors, information, systems, and facilities through a robust oversight and inspection program. ▪ Continue to mature the Facility Security Management Program to improve the security posture of the NAS's critical infrastructure and better inform future security investment decisions. ▪ Enhance standards, programmatic safeguards and controls for protecting classified national security and controlled, unclassified information from loss, compromise, or unauthorized disclosure.
Office of National Security Programs and Incident Response (AXE)	▪ Manage the Washington Operations Center Complex and support the Air Traffic Security Coordinators who manage the Domestic Events Network; provide leadership at FAA, DOT, and the White House with situational awareness of all incidents affecting civil aviation and the national airspace, including a 24/7 intelligence fusion capability. ▪ Provide threat identification and analysis to support FAA decision-making regarding emerging threats to aviation safety, to include emerging technologies and capabilities, such as UAS. ▪ Support interagency efforts to safely integrate UAS into the national airspace; collaborate with national security partners to address UAS security concerns; facilitate Counter-UAS testing and employment. ▪ Ensure the safe integration of Counter-UAS technologies into the national airspace. ▪ Support agency investigations of non-compliant UAS operations.

Function/Office	FY 2022 Anticipated Accomplishments
	▪ Maintain emergency operations network capability and ensure continued situational awareness of daily operations and emergency events. ▪ Support continuity of operations by maintaining the Primary Alternate Facility to enable FAA relocation in an emergency; ensure continuity of operations to maintain mission essential functions, to include continuous monitoring of the national airspace. ▪ Investigate airmen with alcohol- and drug-related motor vehicle actions to ensure incidents are reported in accordance with the Code of Federal Regulations. ▪ Initiate enforcement action, when warranted, to remove airmen who pose a risk to the national airspace. ▪ Coordinate incident management response; provide timely and relevant information to leadership and stakeholders throughout the national airspace; coordinate and support preparedness and response policy development across the Agency and with DOT; support recovery operations. ▪ Manage the FAA's LEAP by assisting and supporting federal, state, local, territorial, tribal, and international law enforcement agencies with investigations and interdictions involving illicit use of aircraft for narcotics, weapons, and human trafficking. ▪ Draft and promulgate national FAA policy to support regulatory investigations and LEAP activities, such as aircraft registration violations. ▪ Develop standards to enhance LEAP mission effectiveness. ▪ Develop, implement, and integrate Cyber Threat Intelligence capabilities into the FAA's cyber security architecture.

Function/Office	FY 2022 Anticipated Accomplishments
Office of Investigations (AXI)	▪ Conduct internal investigations of FAA employees and contractors for misconduct. ▪ Conduct administrative and civil investigations/inquiries that fall under the FAA's jurisdiction, including whistleblower retaliation. ▪ Develop standards and policy to enhance the efficiency and effectiveness of all ASH investigative programs. Draft and implement national FAA policy and unit procedures ensuring consistent execution of ASH program duties. ▪ Develop and execute FAA's Defensive Counter-Intelligence Program to protect the agency personnel, systems, and networks from influence and targeting from Foreign Intelligence Services, including Counter-Intelligence cyber threat analysis, Insider Threat Detection and Mitigation Program, International Travel Security Program, e-Discovery, and Cyber and UAS investigations/forensics/Analysis Programs.

Transition to Operations and Maintenance funding covers the operational cost of new systems acquired under the FAA's Facilities and Equipment Capital budget. Once new systems are installed in the NAS, the ongoing operational costs are transferred to the Operations appropriation.

The National Air Space (NAS) Recovery Communications (RCOM) program provides the FAA with survivable, secure, and redundant communications and facilities that assure the Agency's ability to respond to emergencies, assist in the minimum essential restoration of the NAS, and enable the continuity of FAA operations. This ensures that FAA decision makers have command and control communications during times of crisis. This request will provide for ongoing first level engineering, second level engineering, licenses, recurring training, and integrated logistics.

Transition from Facilities and Equipment to Operations: FY 2022	Amount ($000)
NAS Recovery Communications (RCOM)	$159

Program Increases:

The FY 2022 budget request for ASH includes additional funding for the following programmatic initiatives.

Discretionary Adjustments	Amount ($000)	FTP	FTE
Improving Aviation Safety: Office of Professional Responsibility (OPR)	641	6	3
Unmanned Aircraft Systems (UAS) Integration	8,005	14	7
Safety Assurance Systems (SAS) Development & Risk Analysis	1,525	5	3
ASH Total	**$10,171**	**25**	**13**

Improved Aviation Safety – Office of Professional Responsibility (OPR): The funding request of $641 thousand and 6 FTP/3 FTE supports the expansion of the Office of Investigations and Professional Responsibility (OPR) to improve FAA's oversight of whistleblower allegations. The addition of OPR responsibilities will increase agency accountability through focused investigations, reviews, and data management of internal misconduct including whistleblower retaliation. The Aircraft Certification, Safety, and Accountability Act directs the FAA Office of the Administrator to redesignate the current ASH Office of Investigation as the Office of Investigations and Professional Responsibility.

Unmanned Aircraft Systems (UAS) Integration: As the pace of UAS integration accelerates and the number of users increase, FAA resources constrain our ability to proactively respond to external stakeholder concerns and implement the security requirements from the 2018 FAA Reauthorization Act. The FY 2022 funding request of $8 million and 14 FTP/7 FTE supports UAS and Counter-UAS activities, addresses FAA Reauthorization Act requirements, modernizes existing ASH forensic laboratories, and provides training and education for the growing UAS user community.

Safety Assurance System (SAS) Development & Risk Analysis: The FY 2022 funding request of $1.52 million and 5 FTP/3 FTE will allow for system enhancements to the Safety Assurance System. These system changes are required to address the increase in hazardous materials cargo. This funding will also support safety promotion activities that target cargo and passenger risks identified though SAS data analysis.

(See also "Operations Summary" and "FY 2022 Discretionary Increase Request" for a detailed description of the Program Increase requests.)

What benefits will be provided to the American public through this request and why is this program necessary?

ASH is responsible for the FAA's critical infrastructure protection, personnel security, emergency operations, threat identification and analysis, contingency planning and crisis response, investigations of employees, contractors, and airmen who may present a safety or security risk to the NAS, and the safe transportation of hazardous materials in air commerce. Protecting our critical infrastructure is a national and homeland security priority, which continues to demand a high level of attention and innovation.

In recognition of the criticality of the national airspace in our country's transportation infrastructure and economic stability, ASH develops and executes policies and programs to protect FAA employees, contractors, facilities, and assets, as well as airmen, aircraft, and the flying public. The FAA is committed to continuously improving the safety, security, and efficiency of flight, and continues to work with all of our partners and stakeholders to focus our experience, expertise, and new technology to ensure a safer and more secure global airspace.

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

	Dollars (in Thousands)	FTP	OTFTP	FTE
FY 2021 Enacted	**$124,688**	**523**	**2**	**503**
Adjustments to Base	**$4,607**	-	-	6
Annualization of FY 2021 Pay Raise 1.0%	212	-	-	-
Annualization of FY 2021 FTE	1,005	-	-	6
FY 2022 Pay Raise 2.7%	1,813	-	-	-
FY 2022 FERS Increase	727	-	-	-
Transition from F&E to Ops	159	-	-	-
Working Capital Fund	691	-	-	-
Discretionary Adjustments	**$10,171**	**25**	**-**	**13**
Improving Aviation Safety Oversight	641	6	-	3
Unmanned Aircraft Systems (UAS) Integration	8,005	14	-	7
Safety Assurance System (SAS) Development & Risk Analysis	1,525	5	-	3
Base Transfers	**-**	**-**	**-**	**-**
FY 2022 Request	**$139,466**	**548**	**2**	**522**

See Operations Summary for a detailed description of the explanation of funding changes.

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Staff Offices

Detailed Justification for - Staff Offices

FY 2022 - Staff Offices – Budget Request
($000)

Program Activity			
Salaries and Expenses	197,461	209,189	218,609
Program Costs	52,546	56,205	61,501
Total	**$250,007**	**$265,394**	**$280,110**
FTE	**1,113**	**1,135**	**1,151**

What is this program and what does this funding level support?

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

The **Office of Audit and Evaluation** (AAE) performs audit and investigative review functions primarily for internal safety disclosures and concerns, including the FAA Whistleblower Protection Program.

The **Office of Civil Rights** (ACR) advises, represents, and assists the FAA Administrator on civil rights and equal opportunity matters.

The **Office of Government and Industry Affairs** (AGI) serves as the Administrator's principal adviser and representative on matters concerning relationships with the Congress, aviation industry groups, and other governmental organizations, as well as with developing and reviewing plans and strategies involving these groups to enhance aviation safety.

The **Office of Communications** (AOC) is responsible for the policy, direction, and management of the agency's communications programs for the news media and FAA's employees nationwide.

The **Office of Policy, International Affairs, and Environment** (APL) serves as the principle advisor to the Administrator on international matters, and manages the FAA's Regional Offices.

The **Human Resources Management** (AHR) organization provides human resource services to all operating lines of business and staff offices at the headquarters and to all the FAA regions including the two centers and overseas.

What benefits will be provided to the American public through this request and why is the program necessary?

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.

Staff Offices provide services and resources necessary for the FAA's agency operations. 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, Staff Offices make a significant contribution to the mission of FAA.

Detailed Justification for – Office of the Administrator (AOA)

FY 2022 – Office of the Administrator – Budget Request
($000)

Program Activity			
Salaries and Expenses	3,061	3,492	3,589
Program Costs	311	311	311
Total	**$3,372**	**$3,803**	**$3,900**
FTE	**16**	**18**	**18**

What is this program and what does this funding level support?

The Office of the Administrator (AOA) 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.

AOA directs and controls the operations of the FAA and acts as principal adviser to the Office of the Secretary (OST) on civil aviation matters and air transportation. Throughout FY 2022, AOA will continue to lead FAA toward achieving the agency's performance goals and targets.

In leading the 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.

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

What benefits will be provided to the American public through this request and why is this program necessary?

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. AOA also houses the Executive Secretariat function using the electronic document management system application and supports the lines of business and staff offices to provide timely responses to the Department of Transportation and other agencies, the White House, Congress, the aviation community, and the general public.

Detailed Justification for – Audit and Evaluation (AAE)

FY 2022 – Audit and Evaluation (AAE) – Budget Request
($000)

Program Activity			
Salaries and Expenses	3,763	3,853	4,252
Program Costs	335	735	757
Total	**$4,098**	**$4,588**	**$5,009**
FTE	**20**	**21**	**23**

What is this program and what does this funding level support?

The Office of Audit and Evaluation (AAE) has two primary functions: safety audit/investigation and hotline operations.

Safety audit and investigation 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 Department of Transportation (DOT), Office of Inspector General, General Accounting Office and United States Office of Special Counsel generated audits, investigations and evaluations.

Hotline operations provides reporting and data 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.

The office provides an impartial agency venue for investigation and early resolution of safety disclosures. The FY 2022 funding will support the enhancement and upgrade of the FAA's Hotline and Whistleblower Protection Program system to a cloud solution while continuing to provide a centralized Agency focus for internally and externally generated safety-related complaints, critical audits, and investigations. Planned enhancements include increased analytics, searching, reporting, and improved case management.

Program Increases:

The FY 2022 budget request for AAE includes additional funding for the following programmatic initiative.

Discretionary Adjustments			
Improving Aviation Safety Oversight: Ombudsman	303	4	2
Total	**$303**	**4**	**2**

Improving Aviation Safety - Ombudsman: The FY 2022 funding request of $303 thousand and 4 FTP / 2 FTE supports the establishment of an Ombudsman organization within the Office of Audit and Evaluation that will aid in educating the FAA workforce on prohibitions against whistleblower retaliation. This effort will add functions to address the requirements of the Aircraft Certification and Accountability Act and position the FAA to effectively implement objectives around accountability and workplace of the future.

(See also "Operations Summary" for a detailed description of the Program Increase requests.)

What benefits will be provided to the American public through this request and why is this program necessary?

AAE has established itself as a viable forum for raising and addressing internal safety concerns and 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.

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

AAE 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 received.

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 safely and constructively raise, address, and resolve safety complaints, concerns or whistleblower contributions.

Detailed Justification for – Civil Rights (ACR)

FY 2022 – Civil Rights (ACR) – Budget Request
($000)

Program Activity			
Salaries and Expenses	9,855	10,600	10,914
Program Costs	2,401	2,161	2,486
Total	**$12,256**	**$12,761**	**$13,400**
FTE	**62**	**64**	**64**

What is this program and what does this funding level support?

The Office of Civil Rights (ACR) administers several critical federally mandated programs under Titles VI and VII of the Civil Rights Act of 1964, the Rehabilitation Act of 1973, the Americans with Disabilities Amendments Act, the Genetic Information Nondiscrimination Act, the Age Discrimination and Employment Act, and the Equal Pay Act.

Internally, the ACR mission is to aid in the prevention of unlawful discrimination because of race, color, national origin, sex, age, religion, sexual orientation, and individuals with disabilities employed by the FAA. In addition, ACR works to proactively prevent complaints and resolve potential conflicts early and at the lowest possible level in order to reduce potential legal liability to the FAA. ACR also dedicates resources towards building a fully diverse and inclusive workforce and understanding potential barriers to Equal Employment Opportunity (EEO). The Office of Civil Rights implements a robust internal training program for the purpose of educating the workforce on adhering to EEO policies and guidelines, inclusion, diversity and reducing EEO complaints.

Externally, ACR's 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.

FY 2022 Anticipated Accomplishments:

Function/Office	
Internal Civil Rights Services • EEO Complaint Services/Alternative Dispute Resolution Services • Model EEO Program • Diversity and Inclusion • EEO Training • Reasonable Accommodations Request Processing	• Process 100 percent 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 increase the hiring of people with targeted disabilities. • Ensure that reasonable accommodation requests are processed timely and equitably. • Assist the agency in building a Model EEO Workplace through outreach, consultations, collaboration and educational partnerships. • 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 with 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)/Airport Concession Disadvantaged Business Enterprise (ACDBE) Compliance	• Conduct DBE/ACDBE, ADA/504 and Title VI/LEP/EJ compliance reviews, and ensure that small and disadvantaged business enterprises are able to compete with larger companies for airport construction projects and concessions. • 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. https://faa.dbesystem.com/ • 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 the Nation's airports.

Program Increases:

The FY 2022 budget request for ACR includes additional funding for the following programmatic initiative.

Discretionary Adjustments			
National External Operations Program	325	-	-
ACR Total	**$325**	**-**	**-**

National External Operations Program: The FY 2022 funding request of $325 thousand will allow FAA to support the Executive Order 13985 that instructs the Federal Government to allocate resources to address the historic failure to invest sufficiently, justly, and equally in underserved communities. These additional resources are aligned with the directives of the order and will continue the development and improvement of FAA Civil Rights Connect system.

What benefits will be provided to the American public through this request and why is this program necessary?

Under Title VI of the Civil Rights Act of 1964, all federal agencies are required to ensure that federal funds do not subsidize programs or activities that discriminate on the basis of race, color or national origin. ACR provides leadership and direction with regard to civil rights, diversity and EEO matters. The ACR mission is to implement civil rights, EEO policies, and operational programs to ensure their full and successful development in support of FAA's mission to provide the safest, most efficient aerospace system in the world. ACR's goal is to achieve safety through implementing a strong civil rights program and further enhancing FAA's inclusive culture so that all employees understand they have the opportunity to achieve their full potential and, when conflicts arise, they are resolved early and at the lowest possible level.

ACR is committed to providing a workplace that promotes equal opportunity, is free of harassment, and is an environment where employees can focus on productivity, not conflict. Our vision is to create, within the FAA and its federally-assisted programs, an environment free of civil rights violation and discrimination, where all are treated equitably with dignity and respect. The result of these efforts is a diverse and satisfied workforce that collaboratively helps to ensure the safety of the flying public.

Detailed Justification for – Government and Industry Affairs (AGI)

FY 2022 – Government and Industry Affairs (AGI) – Budget Request ($000)

Program Activity			
Salaries and Expenses	1,655	1,703	1,755
Program Costs	162	162	162
Total	**$1,817**	**$1,865**	**$1,917**
FTE	**10**	**10**	**10**

What is this program and what does this funding level support?

The Office of Government and Industry Affairs (AGI) supports the Administrator and represents the FAA by providing the principal linkage between the Agency and Congress.

AGI works with FAA offices to coordinate, facilitate, and present FAA's legislative message. AGI consistently monitors and gauges the interest and needs of the United States Congress. This relationship also extends to coordinating FAA legislative initiatives and responses with the Department of Transportation (DOT). 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 2022 budget request:

- Communicate to Congress on behalf of the Administrator and Management Board.
- Provide OST's Office of Governmental Affairs with factual, concise, and complete information from significant AGI congressional contacts and activities.
- Foster strong partnerships with key industry stakeholders.

What benefits will be provided to the American public through this request and why is this program necessary?

AGI continuously improves the quality, timeliness, and usefulness of FAA core business functions. AGI fosters productive relationships with key members of Congress and Congressional Oversight Committees. AGI solicits information from program offices within the

Agency to better understand and communicate areas of interest or concerns to the United States Congress.

AGI's mission is to provide high quality, timely communications to Congress. It is essential that public policy be debated on its merits so that the best outcomes can result. The work of AGI 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. AGI's established congressional relations are vital to advancing the aviation priorities of the FAA, the Department of Transportation, and the Administration.

Detailed Justification for – Communications (AOC)

FY 2022 – Communications (AOC) – Budget Request
($000)

Program Activity			
Salaries and Expenses	5,945	6,378	6,581
Program Costs	773	1,273	1,273
Total	**$6,718**	**$7,651**	**$7,854**
FTE	**28**	**30**	**30**

What is this program and what does this funding level support?

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: Media Relations and Corporate Communications.

Media Relations:
Media Relations works 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. Media Relations develops and implements communication strategies and public outreach to alert and inform the traveling public and aviation stakeholders of urgent safety issues.

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 470 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 40,000 FAA employees with accurate and timely information on programs and activities.

FY 2022 Anticipated Accomplishments:

Function/Office	FY 2022 Anticipated Accomplishments
Media Relations	• Increase awareness and understanding of FAA initiatives and other issues through press conferences, media briefings, press releases, social media, and other communication channels. • 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 educate new audiences. • Use a variety of internal communication vehicles to educate employees about Agency strategic goals, programs, and activities. Obtain feedback that helps the FAA meet those goals.

What benefits will be provided to the American public through this request and why is this program necessary?

With more than 119 million page views a year, FAA.gov provides a wealth of resources to the American public. Pilots, mechanics, and other members of the flying public consistently read FAA's news, directives, hazardous materials information, and airworthiness information every second of every day of the year.

The FAA has seen a persistent increase in demand for secure access to critical aviation safety information. Users downloaded more than 9.5 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. Information for air traffic operations, General Aviation safety, NextGen, and unmanned aircraft systems is delivered via text, video, and graphical formats.

With more than 40,000 employees working in offices and in the field, across 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 communication vehicles ensure that employees are able to access information about everything from Human Resource benefits to changes in compensation

programs that may directly affect them. Strong internal communications generate a more engaged, productive, and loyal workforce.

As the demand for safety information continues to grow from all stakeholders (employees, the public, the media, and the aviation community), these groups expect unfettered 24 hours a day/7 days per week access to information the FAA provides, and interaction with that information through the Web, email, and social media. AOC will provide accurate critical information about FAA operations, safety oversight, efficiency initiatives and other programs to all of these groups as quickly as possible.

Detailed Justification for – Office of Chief Counsel (AGC)

FY 2022 – Office of Chief Counsel (AGC) – Budget Request
($000)

Program Activity			
Salaries and Expenses	43,436	46,283	47,684
Program Costs	3,893	2,970	3,004
Total	**$47,329**	**$49,253**	**$50,688**
FTE	**229**	**234**	**234**

What is this program and what does this funding level support?

The Office of the Chief Counsel (AGC) provides mission critical legal services for the FAA. 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.

AGC's principal legal practice areas are:

1) Enforcing aviation safety rules, rulemaking, acquisition and commercial law, aircraft and other tort litigation;

2) Rulemaking activity, environmental legal services, airport legal services which support airport expansion and capacity, commercial space legal services which support launch activities, and acquisition of technologies that support increased capacity and efficiency; international activity and
harmonization of safety rules, ; and

3) Enhancing FAA's high performing workforce, supporting numerous agency- wide

strategic initiatives, and providing legal services in support of agency administrative functions including employment and labor law, ethics counsel, Freedom of Information Act and Privacy Act services and legislative services.

FY 2022 Anticipated Accomplishments:

Funding at the FY 2022 requested level would 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 not only the safe, but also the timely integration of new entrants into the national airspace. In particular, AGC has had to devote a steadily increasing amount of resources to aid in the safe integration of UAS. For example, current UAS rulemaking projects involve the substantial time of nine attorneys. More than 10 percent of the personnel of AGC are engaged in UAS matters and the workload is increasing.
- 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.
- Safety and environmental review of commercial space launch activities.
- Providing management advice and counsel on personnel and labor matters: including whistleblower protection, Executive Orders regarding labor negotiations, and air traffic controller hiring.
- Representing the FAA in litigation before the Merit Systems Protection Board, Equal Employment Opportunity Commission, Federal Labor Relations Authority, and Federal courts.
- 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 including the National Transportation Safety Board (NTSB).
- Coordination across the Executive and Legislative branches on legislative services.

What benefits will be provided to the American public through this request and why is this program necessary?

AGC contributes to the overall success of FAA programs and functions that reside with the

various lines of business and staff offices with programmatic responsibility. AGC's contribution cannot be assessed through a single measure. AGC contributes to many programs to ensure that overall 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 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 AGC's 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 FAA's various program areas.

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

FY 2022 – Policy, International Affairs, and Environment (APL) – Budget Request ($000)

Program Activity			
Salaries and Expenses	53,963	56,436	60,958
Program Costs	15,642	18,048	22,309
Total	**$69,605**	**$74,484**	**$83,267**
FTE	**272**	**280**	**294**

What is this program and what does this funding level support?

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 coordinating FAA's reauthorization efforts, identifying, researching, and projecting emerging issues and trends.

International Affairs is responsible for formulating the FAA's international strategy and associated regional and global priorities, aligning FAA's international activities, programs and initiatives to most effectively accomplish the strategic goals and initiatives of the FAA, DOT, and the United States government, and leading collaborative engagement and cooperation with civil aviation authorities and aviation stakeholders 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.

National Engagement and Regional Administration is responsible for conducting outreach, engagement, and horizontal integration to Congressional officials, federal, state and local governments, airports, military, civic organizations, as well as to customers across the agency. In addition, Regional Administrators oversee regional emergency operations and integration services to ensure that appropriate communication and coordination occurs in critical crisis

response incidents related to U.S. National Airspace System (NAS) continuity.

APL will continue to achieve the goals of the Administration and the Department in connection with various domestic and international initiatives, while maximizing outcomes through the leveraging of partnerships, technology, and expertise.

Anticipated FY 2022 Accomplishments:

Function/Activity	FY 2022 Anticipated Accomplishments
Aviation Policy and Plans	▪ Facilitate the implementation of a long-term FAA reauthorization bill, working across the agency, with the Administration, and with 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 UAS advanced operations, Commercial Space Launch and Re-entry, and supersonic aviation to the Office of the Secretary of Transportation and the Office of Management and Budget. ▪ Develop national and airport level activity forecasts, benefit-cost studies, issue analysis, economic impact studies, and stakeholder outreach, to facilitate NAS planning ▪ Improve FAA's effectiveness by leading streamlined and responsive corporate planning, performance, and risk management processes for the agency. ▪ Conduct analysis and coordinate cross-FAA efforts regarding impacts to the FAA and the aviation industry, including recovery strategy and implementation (such as for COVID-19)
International Affairs	▪ Influenced the International Civil Aviation Organization, member States, and appropriate regional aviation organizations and industry to align global standards and recommended practices with U.S. best practices in aviation safety oversight, operational efficiency and capacity, environmental sustainability, commercial space transportation, and integration of new and innovative technologies. ▪ Achieved a safe and seamless global air transportation system through coordinated outreach and training on U.S. aviation innovative systems, procedures, and concepts. ▪ Managed international agreements and arrangements to support FAA and United States research, collaboration, and technical assistance with States and key international organizations to advance global aviation safety, efficiency, capacity, and environmental stewardship. ▪ Orchestrated FAA response to, and support of, global conflicts

	and crisis/incident management events to mitigate impacts to the safety and security of civil aviation.

Function/Activity	
Environment and Energy	▪ Refine noise exposure and fuel burn targets, policies and guidance, taking into consideration research outcomes and emerging technologies. ▪ Support environmental certification, including the development and/or updating the processes and procedures for noise certification of aircraft, including subsonic aircraft and UAS. ▪ Continue streamlining environmental review processes and revise the FAA National Environmental Policy Act implementation Order 1050.1 and associated desk reference as necessary. ▪ Enable the next generation of supersonic aircraft, unmanned aircraft systems, and urban air mobility.
National Engagement and Regional Administration	▪ Enhance aviation safety by increasing awareness and outreach on the FAA high priority safety initiatives. ▪ Enhance community engagement techniques and proactively address growing noise concerns associated with aircraft and airspace procedures with communities throughout the US. ▪ Support emergency preparedness and continuity of operations. ▪ Provide program management assistance and coordination activities to support the prioritization and implementation of Northeast Corridor initiatives that reduce delays and improve schedule reliability. ▪ Increase support for the Science, Technology, Engineering, and Math Aviation and Space Education program (STEM AVSED).

Program Increases:
The FY 2022 budget request for APL includes additional funding for the following programmatic initiatives.

Discretionary Adjustments			
Expanded FAA International Presence	2,425	4	2
Community Noise Engagement	1,758	7	4
STEM/AVSED	1,800	4	2
APL Total	**$5,983**	**15**	**8**

Expanded FAA International Presence: The FY 2022 funding request of $2.42 million and 4 FTP/2 FTE will allow FAA to establish Senior Representatives in the United Kingdom, Poland, Mexico, and Southeast Asia. FAA has a mission to support a global aviation system for U.S. stakeholders that is equally safe and efficient as flying in U.S. airspace. To accomplish this mission, the FAA relies heavily on a cadre of employees stationed overseas to enhance its ability to engage with foreign authorities to influence their adoption of aviation standards and policies that align to U.S. interests. These permanent overseas positions will provide the necessary seniority, workforce and resource bandwidth, skill sets, and collaboration capabilities to successfully engage the international civil aviation community and effectively influence and drive global aviation standards, policy, direction, and modernization based on U.S. positions.

Community Noise Engagement: The FY 2022 funding request of $1.76 million and 7 FTP/4 FTE will provide additional resources to increase FAA's growing engagement demands with communities expressing concern over aircraft noise. The FAA will be better equipped to address issues and concerns through the development and implementation of a public web-accessible application that addresses community aviation noise issues, to include relevant Frequently Asked Questions and a dashboard for reporting FAA's Community Engagement Strategic Goals. The funding request also supports the FAA's Noise Complaint Initiative portal in nine regions; and provides dedicated FAA Headquarters resources to support noise and community issues nationwide.

STEM AVSED Program: FAA is requesting additional funding to develop a measurable, sustainable and meaningful program that provides outreach and connections with targeted populations. The FY 2022 funding request of $1.8 million and 4 FTP/2 FTE will allow for an increase in staffing in the Aviation Workforce and Education Program Office, support the development and implementation of a data tool to track and collect all STEM AVSED related activity, and provide workshops and materials to targeted underrepresented groups to introduce students to scientific concepts.

(See also "Operations Summary" for a detailed description of the Program Increase requests.)

What benefits will be provided to the American public through this request and why is this program necessary?

APL is the agency lead for Aviation Policy, International Aviation, and Environmental issues. Specifically, 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, and environmental policy.

In addition, the Regional Administrators serve as the corporate representatives for the FAA Administrator in communicating with local, state and Federal agencies, the aviation industry (from manufacturing to air carriers), and community organizations. 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 to strengthen U.S. positions as the gold standard for aviation.

As the global leader in aviation, the FAA must engage internationally to increase global safety standards and enhance aviation safety and efficiency. APL is responsible for improving environmental performance and addressing energy and sustainability needs, and for developing broad based approaches and coordinating Agency responses to limit and reduce future aviation environmental impacts.

APL operates the Cornerstone Regional Operations Center that serves as a 24 hours a day/7 days a week communication hub that provide voice and data dissemination necessary to direct management of the NAS. Regional Administrators coordinate communication responses related to aircraft accidents, emergencies, missing aircrafts, hijacking, security threats, facility and system outages, airport closures, earthquakes and public information requests and complaints

Detailed Justification for – Human Resource Management (AHR)

FY 2022 – Human Resource Management (AHR) – Budget Request
($000)

Program Activity			
Salaries and Expenses	75,783	80,444	82,876
Program Costs	29,029	30,545	31,199
Total	**$104,812**	**$110,989**	**$114,075**
FTE	**476**	**478**	**478**

What is this program and what does this funding level support?

The FAA workforce is the backbone of the agency's success in providing the safest and most efficient aerospace system in the world. The Office of Human Resource Management (AHR) request covers daily work in providing human resource services to the nearly 45,000 FAA employees. AHR provides the strategic management of human capital that ensures the FAA has the skilled workforce needed to meet the changing demands of the industry we serve. In FY 2022, AHR will:

- Continue implementing agency-wide leadership development programs to build a solid pipeline of future leaders and provide existing leaders with the tools needed to provide transformational leadership in support of the FAA mission.
- Refine efforts to improve the engagement, commitment, and satisfaction of FAA's workforce, which is a significant factor in enabling the Department of Transportation to advance the multi- modal transportation system of the future.
- Employ 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 focuses on the FAA's human capital by identifying, recruiting, and training FAA's workforce with the leadership, technical, and functional skills needed to meet the challenges of the future while maintaining the world's safest and most efficient aerospace sector. AHR's objectives align with the FAA and the Office of the Secretary of Transportation's Safety, Infrastructure, Innovation, Accountability strategic goal areas.

The Office of Human Resource Services, AHF establishes, delivers, and improves the agency-wide employment services and programs through payroll and personnel action processing. It also

includes facilitating position management and classification, recruitment, hiring, and enterprise onboarding. AHR serves as a business partner to agency employees, supervisors, managers, and executives on personnel matters involving employment and pay. By doing this, we are able to develop strategic workforce plans across the administration and assist with individual workforce plans for LOBs/SOs and divisions.

Key Activities include:

- Human resources management consultation
- Workforce planning, position management, and classification
- Recruitment, applicant assessment, referral of qualified applicants, and job offers.
- Engage and onboard employees throughout the enterprise
- Personnel action processing and pay administration
- Oversight and processing of personnel actions including the development of systems to support processing
- Developing strategic workforce plans across the enterprise

The Office of Compensation, Benefits, and Worklife, AHB manages the FAA's employee benefit, retirement programs, compensation, performance management, work-life, and workers' compensation programs.

Key Activities include:

- Process benefits forms and applications, to include providing counseling on survivor benefits, disability compensation, and changes to Federal Employees Health Benefits, Federal Employees Group Life Insurance, and the Thrift Savings Plan (TSP). Operates benefits operations from 7am to 5pm CST and a centralized mailbox accessible 24/7
- Administer two distinct performance management systems: Valuing Performance System (VPS) and the Performance Management & Assessment System (PMAS)
- Calculate and administer pay programs (VP, MPIP, SCI, EIP)
- Manage Agency-wide recognition initiative
- Manage the FAA and DOT Worker's Compensation Program to include timely processing of injury claim forms, containment of Agency costs, and training of Agency managers
- Manage and promote the Employee Assistance Program (EAP)/ WorkLife Solutions Program.
- Manage and promote work-life programs including child care centers, health and wellness, child subsidy, nursing mothers, emergency planning, telework, and voluntary leave programs

The Office of Labor and Employee Relations, AHL manages the relationships between FAA and the unions that represent its employees.

Key Activities include:

- Manages Labor relations with the eight unions (with a total of 32 bargaining units)

which represent nearly 35,000 (78%) of the approximate 45,000 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 practice proceedings and arbitrations, at both the national and regional levels of recognition
- Provides labor and employee relations training to management
- Provides consultative labor and employee relations services and guidance, such as conduct and discipline and performance improvement
- Provides labor and employee relations services for other DOT modes via shared services agreements

The Office of Career and Leadership Development, AHD delivers innovative Human Capital Development solutions that power individual and enterprise success; partnering to be the Source-of-Choice for FAA's Human Capital Development.

Key Activities include:
- FAA Leadership & Learning Institute
- FAA Human Capital Development Solutions; Fee for Service
- Executive Development
- Succession Planning Policy and Program Management
- Rotational Development Programs
- Development Programming at the Senior Leader/Manager Level
- Development Programming at the Aspiring Manager/Emerging Leaders Level
- Learning Services Contract Management

The Office of Accountability and Strategic Business Management, AHA focuses on management accountability in response to allegations of harassment; strategic communications, project and business management; processes/procedures enabling proactive, data driven decision-making across AHR.

Key Activities include:
- FAA Accountability Board
- FAA HR Data Analysis and Reporting
- FAA Federal Employee Viewpoint and Employee Engagement
- Awards (monetary, time off and length of service)
- AHR Financial Contracts & Records Management
- AHR Business Management & Planning
- FAA Off boarding
- FAA Human Capital Management Technology

Function/Activity	FY 2022 Anticipated Accomplishments
AHF	• Adoption of a streamlined and technologically advanced employment and personnel action request process, which improves FAA's ability to attract, hire, and retain top talent • Continue maturation of strategic HR services to forecast, recruit, and onboard the optimal number of FAA employees with the critical competencies • Standardizing and automating the Personnel Action Request process • Significant maturation of an agency-wide strategic workforce planning framework • Develop a strategic framework that supports a pipeline for talent acquisition in critical and non-critical occupations
AHB	• Deploy case digitization/claims management tool • Ensure compliance with workers' compensation components of Department of Labor's Protecting Employees, Enabling Reemployment initiative • Telework: Expand agency readiness and use of telework flexibilities and alternative work arrangements • EAP/WorkLife Solutions: To exceed a WorkLife Solutions program utilization rate consistent with FY 2021 metrics • Emergency Planning: Implement Mobile accountability application program for self-reporting during and event/incident • Leave Programs: Establish fully functioning and governed Voluntary Leave Bank in place in FY 2021 and Transition the Voluntary Leave Transfer Program to a secure electronic system synced with payroll and time keeping systems • Nursing Mothers Program: Expanding the Nursing Mothers program to include 17 portable lactation rooms • Child Care Centers: Assist in establishing a consortium with DHS, Board of Directors and other federal agencies to fund a designated number of child care spaces at various FAA child care facilities • Child Care Subsidy: Determine if Subsidy cap should be increased to meet market demands • Migrate VPS performance management program from VPS to PMAS • Gain approval for and implement changes to compensation and performance management programs as recommended from leadership

AHL	• Provide day-to-day operational support and services to FAA managers on labor and employee relations • Implement a labor and employee relations strategy • Manage oversight and compliance of all bargaining with FAA unions
AHD	• Ensure FAA leadership skills continue to evolve as the technologies and strategic priorities of the organization change • Continue implementing enterprise level, innovative approaches to leadership development to build a solid pipeline of future leaders, and provide existing leaders the tools needed to deliver transformational leadership in support of the FAA mission • Enhance the available learning services available to all FAA employees through the eLMS • Addition of comprehensive virtual learning inventory focusing on managerial and leadership development
AHA	• Continue to foster a workplace free of harassment and inappropriate behavior through investigation and adjudicating allegations of employee misconduct • Lead the Agency in executing action plans for increased employee engagement across the FAA • Ensure AHR compliance with IT systems, budget, contracting and financial rules and regulations • Develop executive level strategic partnerships and communications • Provide HR data reports and analysis to support FAA-wide human capital decision-making • Completed migration to Electronic Transition System for automated off boarding

What benefits will be provided to the American public through this request and why is this program necessary?

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 FAA's learning management system. AHR also supports the Employee Assistance Program, 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.

With FAA's core mission of aviation safety, AHR is the lead office with responsibility for

attracting, recruiting, and hiring qualified US citizens to fill safety critical positions. This ensures the traveling public is supported by a system which is both safe and secure. At the requested level AHR will be able to support the FAA and achieve and sustain the required level of employees at the right level of qualification and expertise necessary to maintain the safety of the aviation system.

Staff Offices
($000)

	Dollars (in Thousands)	FTP	OTFTP	FTE
FY 2021 Enacted	**$265,394**	**1,148**	**24**	**1,135**
Adjustments to Base	**$8,105**	-	-	6
Annualization of FY 2021 Pay Raise 1.0%	492	-	-	-
Annualization of FY 2021 FTE	1,071	-	-	6
FY 2022 Pay Raise 2.7%	4,236	-	-	-
FY 2022 FERS Increase	1,599	-	-	-
Working Capital Fund	707	-	-	-
Discretionary Adjustments	**6,611**	**19**	**-**	**10**
Improving Aviation Safety Oversight	303	4	-	2
Expanded FAA International Presence	2,425	4	-	2
Community Noise Enagement	1,758	7	-	4
STEM/ AVSED	1,800	4	-	2
FAA Office of Civil Rights: National External Operations Program	325	-	-	-
FY 2022 Request	**$280,110**	**1,167**	**24**	**1,151**

See Operations Summary for a detailed description of the explanation of funding changes.

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FACILITIES AND EQUIPMENT

(AIRPORT AND AIRWAY TRUST FUND)

For necessary expenses, not otherwise provided for, for acquisition, establishment, technical support services, improvement by contract or purchase, and hire of national airspace systems and experimental facilities and equipment, as authorized under part A of subtitle VII of title 49, United States Code, including initial acquisition of necessary sites by lease or grant; engineering and service testing, including construction of test facilities and acquisition of necessary sites by lease or grant; construction and furnishing of quarters and related accommodations for officers and employees of the Federal Aviation Administration stationed at remote localities where such accommodations are not available; and the purchase, lease, or transfer of aircraft from funds available under this heading, including aircraft for aviation regulation and certification; to be derived from the Airport and Airway Trust Fund, **[**$3,015,000,000**]***$3,410,000,000*, of which **[**$545,000,000**]** *$550,000,000* shall remain available until September 30, **[**2022**]** *2023*, *and* **[**$2,330,400,000**]** *$2,860,000,000* shall remain available until September 30, **[**2023**]** *2024***[**, and $139,600,000 shall remain available until expended**]**: *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 not later than 60 days after submission of the budget request, the Secretary shall transmit to the Congress an investment plan for the Federal Aviation Administration which includes funding for each budget line item for fiscal years **[**2022**]** *2023* through **[**2026**]** *2027*, 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. *(Department of Transportation Appropriations Act, 2021.)*

Program and Financing
(in millions of dollars)

Identification code: 69-8107-0-7-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Obligations by program activity:			
	Direct program:			
0001	Engineering, development, test and evaluation	158	209	215
0002	Procurement and modernization of (ATC) facilities and equipment	1,825	1,974	2,032
0003	Procurement and modernization of non-ATC facilities and equipment	217	191	197
0004	Mission support	256	235	240
0005	Personnel and related expenses	526	563	550
0007	Spectrum Efficient National Surveillance Radar (SENSR)	18	1	. . . . .
0008	2017 Hurricanes/2018 Supplemental	10	20	11
0100	Subtotal, direct program	3,010	3,193	3,247
0799	Total Direct obligations	3,010	3,193	3,247
0801	Facilities and Equipment (Airport and Airways Trust Fund)	60	87	87
0900	Total new obligations, unexpired accounts	3,070	3,280	3,334
	Budgetary resources: Unobligated balance:			
1000	Unobligated balance brought forward, Oct 1	2,101	2,153	1,989
1001	Discretionary unobligated balance brought fwd Oct 1	2,041	. . . . .	. . . . .
1020	Adjustment of unobligated balance brought forward	. . . . .	. . . . .	. . . . .
1021	Recoveries of prior year unpaid obligations	40	. . . . .	. . . . .
1050	Unobligated balance	2,101	2,153	1,989
	Budget authority: Appropriations, discretionary:			
	Appropriations discretionary:			
1101	Appropriation (special or trust fund)	3,045	3,015	3,410
	Spending authority from offsetting collections, discretionary:			
1160	Appropriation, discretionary (total)	3,045	3,015	3,410
1700	Collected	85	101	89
1701	Change in uncollected payment, Federal sources	-3	. . . . .	. . . . .
1750	Spending authority from offsetting collections, disc (total)	82	101	89
	Spending authority from offsetting collections, mandatory			
1900	Budget authority (total)	3,127	3,116	3,499
1930	Total budgetary resources available	5,228	5,269	5,488
	Memorandum (non – add) entries:			
1940	Unobligated balance expiring	-5	. . . . .	. . . . .
	Special and non-revolving trust funds:			

Identification code: 69-8107-0-7-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
1941	Unexpired Unobligated balance, end of year	2,153	1,989	2,154
1950	Other balances withdrawn and returned to unappropriated receipts	21	. . . . .	. . . . .
1951	Unobligated balance expiring	5	. . . . .	. . . . .
1952	Expired Unobligated balance, start of year	84	87	87
1953	Expired Unobligated balance, end of year	82	87	87
1954	Unobligated balance canceling	21	. . . . .	. . . . .
	Change in obligated balances:			
3000	Unpaid obligations, brought forward, Oct 1	2,105	2,208	2,686
3010	Obligations incurred, unexpired accounts	3,070	3,280	3,334
3011	Obligations incurred, expired accounts	. . . . .	. . . . .	. . . . .
3020	Outlays (gross)	-2,907	-2,802	-3,269
3040	Recoveries of prior year unpaid obligations, unexpired	-40	. . . . .	. . . .
3041	Recoveries of prior year unpaid obligations, expired	-24	. . . . .	. . . . .
3050	Unpaid obligations, end of year	2,208	2,686	2,751
	Uncollected payments:			
3060	Uncollected pymts, Fed sources, brought forward, Oct 1	-72	-56	-56
3061	Adjustment to uncollected pymts, Fed sources brought forward , Oct 1	-1	. . . . .	. . . . .
3070	Change in uncollected pymts, Fed sources, unexpired	3	. . . . .	. . . . .
3071	Change in uncollected pymts, Fed sources, expired	14	. . . . .	. . . . .
3090	Uncollected pymts, Fed sources, end of year	-56	-56	-56
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	2,032	2,152	2,630
3200	Obligated balance, end of year	2,152	2,630	2,695
	Budget Authority and outlays, net:			
4000	Budget authority, gross	3,127	3,116	3,499
4010	Outlays from new discretionary authority	919	1,371	1,488
4011	Outlays from discretionary balances	1,968	1,423	1,781
4020	Outlays, gross (total)	2,887	2,794	3,269
	Offsets:			
	Against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-44	-40	-39
4033	Non-Federal sources	-55	-61	-50
4040	Offsets against gross budget authority and outlays (total)	-99	-101	-89
	Additional offsets against gross budget authority only:			
4050	Change in uncollected pymts, Fed sources, unexpired	3	. . . . .	. . . . .
4052	Offsetting collections credited to expired accounts	14	. . . . .	. . . . .
4053	Recoveries of prior year paid obligations, unexpired	. . . . .	. . . . .	. . . . .
4060	Additional offsets against budget authority only (total)	17	. . . . .	. . . . .
4070	Budget authority, net (discretionary)	3,045	3,015	3,410
4080	Outlay, net (discretionary)	2,788	2,693	3,180
4101	Outlays from mandatory balances	20	8	. . . . .

Identification code: 69-8107-0-7-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4170	Outlays, net (mandatory)	20	8	. . . . .
4180	Budget authority, net (total)	3,045	3,015	3,410
4190	Outlay, net (total)	2,808	2,701	3,180
	Memorandum (non-add) entries:			
5090	Unexpired unavailable balance, SOY Offsetting collections	3	3	3
5092	Unexpired unavailable balance, EOY Offsetting collections	3	3	3

Funding in this account provides for the deployment of communications, navigation, surveillance, and related capabilities within the National Airspace System (NAS). This includes funding for several activities of the Next Generation Air Transportation System, a joint effort between the Department of Transportation, the National Aeronautics and Space Administration, and the Departments of Defense, Homeland Security, and Commerce to improve the safety, capacity, security, and environmental performance of the NAS. The funding request supports the Federal Aviation Administration's comprehensive plan for modernizing, maintaining, and improving air traffic control and airway facilities services.

Object Classification
(in millions of dollars)

Identification code: 69-8107-0-7-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Direct obligations:			
	Personnel compensation:			
11.1	Full-time permanent	357	368	372
11.3	Other than full-time permanent	1	1	7
11.5	Other personnel compensation	6	5	6
11.9	Total personnel compensation	364	374	385
12.1	Civilian personnel benefits	123	133	135
13.0	Benefits for former personnel	. . . . .	. . . . .	2
21.0	Travel and transportation of persons	25	28	21
22.0	Transportation of things	3	2	2
23.2	Rental payments to others	27	42	43
23.3	Communications, utilities, and miscellaneous charges	90	48	49
25.1	Advisory and assistance services	1,602	1,816	1,871
25.2	Other services from non-federal sources	209	143	127
25.3	Other goods and services from federal sources	21	45	46
25.4	Operation and maintenance of facilities	135	85	86
25.5	Research and development contracts	4	1	1

Identification code: 69-8107-0-7-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
25.7	Operation and maintenance of equipment	75	66	68
25.8	Subsistence and support of persons	1	1	1
26.0	Supplies and materials	18	39	35
31.0	Equipment	255	212	216
32.0	Land and structures	56	155	155
41.0	Grants, subsidies, contributions	. . . . .	3	4
43.0	Interest and dividends	2	. . . . .	. . . . .
99.0	Subtotal, obligations, Direct obligations	3,010	3,193	3,247
99.0	Subtotal, obligations, Reimbursable obligations	60	87	87
99.9	Total new obligations, unexpired accounts	3,070	3,280	3,334

Employment Summary

Identification code: 69-8107-0-7-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
1001	Direct civilian full-time equivalent employment	2,849	2,851	2,851
2001	Reimbursable civilian full-time equivalent employment	43	50	50

EXHIBIT III-1

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

	(A)	(B)	(C)	(D)	(E)	(F)
	FY 2020 Actual	FY 2020 CARES Act	FY 2021 Enacted	FY 2021 CRRSA	FY 2021 American Rescue Plan	FY 2022 PRESIDENT'S BUDGET
Engineering, Development. Test and Evaluation	218,100		157,600			159,500
Air Traffic Control Facilities and Equipment	1,870,800		1,818,450			2,231,870
Non-Air Traffic Control Facilities and Equipment	203,400		256,250			269,130
Facilities and Equipment Mission Support	237,700		237,700			199,500
Personnel and Related Expenses	515,000		545,000			550,000
TOTAL	$3,045,000	$	$3,015,000	$	$	$3,410,000
FTEs						
Direct Funded	2,849		2,851			2,851
Reimbursable, allocated, other	43		50			50

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 2021 TO FY 2022
Appropriations, Obligations Limitations, and Exempt Obligations
($000)

Item	Change from FY 2021 to FY 2022 ($000)	Change from FY 2021 to FY 2022 (FTE)
FY 2021 ENACTED	**$3,015,000**	**2,851**
ADJUSTMENTS TO BASE		
Annualization of FY 2021 Pay Raise	1,217	
FY 2022 Pay Raise	10,271	
FERS Increase in FY 2022	3,972	
Other FY 2022 Base Adjustments	-10,460	
Subtotal, Adjustments to Base	**$5,000**	**0**
PROGRAM REDUCTIONS		
Engineering, Development, Test and Evaluation		
Air Traffic Control Facilities and Equipment		
Non-Air Traffic Control Facilities and Equipment		
Facilities and Equipment Mission Support	38,200	
Personnel and Related Expenses		
Subtotal, Program Reductions	**$38,200**	**0**
PROGRAM INCREASES		
Engineering, Development, Test and Evaluation	1,900	
Air Traffic Control Facilities and Equipment	413,420	
Non-Air Traffic Control Facilities and Equipment	12,880	
Facilities and Equipment Mission Support		
Personnel and Related Expenses		
Subtotal, Program Increases	**$428,200**	**0**
FY 2022 REQUEST	**$3,410,000**	**2,851**

Facilities and Equipment (F&E) Index

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

Activity 4, Facilities and Equipment Mission Support

4A09	Aeronautical Information Management Program	$8,900,000	244
	Total, Activity 4	**$199,500,000**	
5A01	Personnel and Related Expenses	$550,000,000	247
	Total, All Activities	**$3,410,000,000**	

Executive Summary – Facilities and Equipment (F&E) Budget Summary

What is this program and what does this funding level support?

The FY 2022 President's budget requests $3.41 billion to enable FAA to maintain the capacity and safety of the current National Airspace System (NAS). This represents an increase of $395 million above the FY 2021 enacted budget. This request includes $825.5 million for Next Generation Air Transportation System (NextGen) capital related investments. The remainder of the investment will 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 five activities that group programs according to a common purpose. NextGen and Legacy Programs are found across all five activities and are specifically identified as such further in this overview.

Activity 1 - Engineering, Development, Test and Evaluation:

For Activity 1, the FAA requests $159.5 million to sustain the laboratories and facility infrastructure at the William J Hughes Technical Center and for Unmanned Aircraft System (UAS) innovation work. This represents an increase of $1.9 million above the FY 2021 enacted budget of $157.6 million. The primary reason for the increase is that innovation work for the future remains an FAA priority.

Activity 2 - Procurement and Modernization of Air Traffic Control Facilities and Equipment:

For Activity 2, the FAA requests $2.2 billion to perform modernization of air traffic control facilities, systems, and equipment, and to support infrastructure upgrades, system replacements, and technology refresh at manned and unmanned facilities. This represents an increase of $413.4 million above the FY 2021 enacted budget of $1.8 billion. This increase to Activity 2 is for additional work to address the needs at operational facilities and to advance the state of good repair for this valuable component of FAA infrastructure.

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 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
- Sustaining satellite-based infrastructure such as Automatic Dependent Surveillance-Broadcast and Wide Area Augmentation Systems
- Deploying communications infrastructure to provide surveillance and navigation services
- Replacing or modernizing manned and unmanned air traffic control 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:

For Activity 3, the FAA requests $269.1 million for the modernization of non-air traffic control facilities, business systems, and equipment. This represents an increase of $12.8 million above the FY 2021 enacted budget of $256.3 million. The programs under Activity 3 support safety, regulation, security, information technology security, and regional and service center building infrastructure and support. The primary reason for this increase is the result of additional security funding for FAA facilities.

Activity 4 – Facilities and Equipment Mission:

For Activity 4, the FAA requests $199.5 million is requested to provide system wide integration, transition engineering, and technical contractual support in direct support of system acquisition or installation. This request is a decrease of $38.2 million below the FY 2021 enacted budget of $237.7 million. The driver for this reduction is a onetime financial adjustment to both of the lease budget line items. This funding will provide for the following:

- Transition engineering, integration, and support
- NAS integrated logistics support
- Technical support services for implementation
- Program Support and Aeronautical Center Leases

Activity 5 - Personnel, Compensation, Benefits, and Travel:

For Activity 5, the FAA requests $550.0 million for the direct cost of federal salaries, benefits, travel, and related personnel costs of FAA employees supporting all capital projects under the F&E account. This amount represents an increase of $5.0 million above the FY 2021 enacted budget of $545.0 million.

NAS Facility Infrastructure Sustainment:

FAA has an approximately $5 billion maintenance backlog for facilities that directly support national air space operations. The deferred maintenance backlog is so large that continued direction of funding resources to support these facilities are necessary in order to reduce FAA operational risk. The request includes $669 million toward this backlog.

In addition to the sustainment backlog, there are significant needs to replace air traffic control facilities that no longer meet operational requirements and have sustainability gaps. As FAA addresses these facility requirements, a major goal of the agency is to include energy savings and environmental improvements whenever possible. The request includes $331 million toward facility replacement projects.

In total, the request includes $1.0 billion to advance the state of good repair for FAA infrastructure facilities including replacement projects. This amount represents an increase of $418.7 million compared to the FY 2021 enacted budget of $581.7 million. This infrastructure funding will improve the Facility Condition Index ratings at FAA facilities that provide the backbone for the NAS and NextGen functionality. The deferred maintenance backlog is so large that additional funding increases for these facilities are necessary in order to reduce FAA operational risk.

NAS System Sustainment:

Funding of $640.9 million is requested for Automation, Communication, Navigation/Landing, and Surveillance ATC systems infrastructure. This represents a decrease of $37.0 million compared to the FY 2021 enacted budget of $678.0 million. These systems allow the 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 radios 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 1,200 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.

NextGen

NextGen is a portfolio of 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 – The request includes $97.6 million to continue basic and applied research efforts in support of UAS technologies and other concepts.

Implementation – The request includes $654.3 million to continue the implementation of NextGen programs that have achieved or are near a Final Investment Decision (FID). Work on a number of these programs has been delayed due to limitations imposed by COVID-19 restrictions and other factors. Programs with deferred work include Terminal Flight Data Manager, Data Communications, NextGen Weather Processor, and En Route Automation Modernization Enhancements.

What benefits will be provided to the American public through this request and why is this program necessary?

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. F&E programs contribute to the success of metrics that show a safe and efficient airspace system and include runway incursion reduction, ATC system operational availability, and NAS on-time arrivals.

Detailed Justification for - 1A01 Advanced Technology Development and Prototyping

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Advanced Technology Development and Prototyping	$40,900	$26,600	$29,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Runway Incursion Reduction Program	---	$3,100.0
B. System Capacity Planning and Improvements	---	2,000.0
C. Operations Concept Validation and Infrastructure Evolution	---	5,000.0
D. Major Airspace Redesign	---	3,000.0
E. Strategy and Evaluation	---	1,000.0
F. Dynamic Capital Planning	---	3,200.0
G. Operational Modeling Analysis and Data	---	2,000.0
H. Enterprise, Management, Integration, Planning and Performance	---	4,000.0
I. In-Service Engineering	---	2,500.0
J. Strategic Initiative Analysis and Validation	---	3,200.0

What is this program and what does this funding level support?

FAA's Advanced Technology Development and Prototyping program develops and validates technology and systems that support safe and efficient air traffic services. For FY 2022, a total of $29.0 million is requested to support the evolving air traffic system architecture and improvements in airport safety and capacity.

A. Runway Incursion Reduction Program

The RIRP's objective is to discover and research and innovative 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, Runway Incursion Reduction research emphasis will remain on testing the application of technology for the development of situational awareness tools aimed at pilots, controllers,

and vehicle operators that operate on taxiways and runways. Current initiatives include Runway Safety Assessment studies such as Runway Incursion Prevention Shortfall Analysis to identify candidate small-to-medium sized airports with historically high rates of Runway Incursions. Candidate technologies best suited to an airport based on causal factors encountered at that site (e.g. converging runways, ground vehicle operations, taxiway/runway hotspots, etc.) will be identified.

For FY 2022, $3.1 million is requested for technology prototype development, testing, demonstration and documentation for the reduction of risk associated with the acquisition of new safety technologies in the national airspace system.

B. System Capacity, Planning, and Improvements

The program provides dashboard style reporting tools which track traffic flow performance data and analyzes delays and cancelations for the purpose of improving national airspace performance. These dashboards inform commercial airlines and FAA management to align and harmonize FAA/Airline metrics reporting during operational reviews. In addition, this program has funded operational performance reporting under international Memoranda of Cooperation with Europe and Singapore as well as support to international organizations such as the International Civil Aviation Organization and the Civil Air Navigation Services Organization.

This program sponsors performance metric tasks which develop methods for correlating Airline schedules, Weather events and FAA actions with outcomes such as flight delay, cancellations, diversions or extended routing. Experts from the FAA, academia, and industry collaborate to analyze and develop recommendations for improving capacity and system efficiency, to reduce delays at specific airports. This work includes research, modelling, analysis of capital investment benefits, and identifying future trends using airline schedule projections. These efforts identify the relationship factors between national airspace modernization and airline performance.

For FY 2022, $2.0 million is requested to continue development of traffic planning and flow dashboards, capacity analysis and metric tools that will support traffic management, commercial space, performance during convective weather and support for international Memoranda of Cooperation.

C. Operations Concept Validation and Infrastructure Evolution

As new concepts evolve, this program identifies operational gaps and potential technologies that could address these gaps. It conducts studies and analyses in operational focus areas to include Commercial Space Operations in the NAS, Evolution of Trajectory-Based Operations, and Time-Based Metering Operations with Advanced Rerouting. This program ensures that potential enhancements are operationally sound and captured in the architecture plans for the national airspace.

For FY 2022, $5.0 million is requested to conduct analysis and risk mitigation activities for the identified operational focus areas.

D. Major Airspace Redesign

The purpose of this national initiative is to review, redesign, and restructure airspace. The FAA prioritizes candidate airspace redesign projects to determine which projects provide the most benefits and develops criteria for assessing that project's system-wide impact. 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.

For FY 2022, $3.0 million will continue implementation of airspace redesign efforts that frequently result in changes in the number and shape of operational positions or sectors, including changes to sector, area, or facility boundaries. Required infrastructure changes can include communication modifications such as changes in frequencies, connectivity of a radio site to the air traffic control facility, and improved controller-to-controller connectivity. In addition, these changes can include surveillance infrastructure modifications to ensure proper radar coverage; automation modifications to the En-Route Automation Modernization data processing or flight data processing.

E. Strategy and Evaluation

This program develops and maintains mathematical models of the national airspace system that are used to aid organizations throughout the FAA in new investment analyses, implementation prioritizations, trade-off studies, and capability benefit estimates under various operational conditions (e.g., weather, demand, new entrants, etc.). The FAA and contractors use these simulation capabilities to analyze advanced air traffic management concepts and conduct related national airspace performance analyses. These models also support rapid analysis of airport improvements, air carrier demand changes, and new air traffic technology implemented within the national airspace. For FY 2022, $1.0 million is requested to:

- Deliver software for a system-wide model with enhanced airport representation
- Deliver software for an airport queuing model that evaluates mixed equipage operations at an airport
- Support a modeling capability that investigates the integration of and impact of trajectory uncertainty on the Traffic Flow Management System, Time Based Flow Management, and Traffic Flow Departure Management

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 and major acquisition programs remain on schedule and within cost. The program will focus on the following activities:

- Determining quantitative economic value and internal benefits validation for capital projects
- Milestone tracking, schedule modeling, and performance measurement
- Earned value management, auditing, trend analysis, and monitoring through program life cycle
- Field implementation planning and support for capital portfolio management and post implementation analysis for corporate lessons learned results

For FY 2022, $3.2 million is requested to sustain and enhance an automated tracking and reporting system for facilities and equipment projects. Managers and engineers have up-to-date reliable data on projects through the resource tracking program and productivity continues to improve under standardized project management operating procedures.

G. Operational Modeling Analysis and Data

The Operational Modeling Analysis and Data program provides support to national airspace performance analysis by improving the efficiency and integration of operational data, national airspace performance reporting, and the tools used for both. This program also makes enhancements to individual and consolidated products in an effort to keep up with growing data demands in the FAA. These enhancements support of the Air Traffic Organization operational units, operational and capital investment planning, as well as post operational modeling and analysis.

A study of FAA wide operational databases identified a shortfall in available analytical products and recommended the creation of a database to capture operational events associated with individual flights to improve the timeliness of operational analyses and reduce the cost. This program will develop and publish standardized operational events data on a per-flight basis and by facility (e.g. airport). For FY 2022, $2.0 million is requested to modernize and integrate the NAS Data Warehouse and the Aviation System Performance Metrics systems.

H. Enterprise, Management, Integration, Planning and Evaluation for NAS/NextGen

For FY 2022, $4.0 million will continue the Enterprise Management, Integration, Planning and Evaluation for the national airspace NextGen program. This will provide human capital management, enterprise management, technical support, and outreach functions required to deliver NextGen benefits. Transforming the national airspace into a flexible, scalable, and time-based management system is the fundamental objective of NextGen research, infrastructure development, and operational integration. The

successful, ongoing realization of NextGen benefits is the result of rigorous program and acquisition management partnered with stakeholder collaboration. This program provides technical support for conducting proof of concepts for new technology planned for implementation into the national airspace system. This will lead to the transformation of the national airspace system and promote increased capacity and efficiency in the national airspace.

I. In-Service Engineering

In-service engineering allows for immediate response and tactical distribution of resources to emerging technology solutions. For FY 2022, $2.5 million is requested for ongoing engineering support of all prototyping efforts.

J. Strategic Initiatives Analysis and Validation

For FY 2022, $3.2 million is requested for technological advances and innovation opportunities in the interests of aviation improvements for air traffic, regulation/certification and all lines of business that cannot be anticipated two years prior to budget submission. Examples include demonstrations and modeling concepts, validation of commercial products offered to FAA for certification, as well as exploration of concepts for future aviation operational usage one to four years from now. These opportunities typically arise during the execution budget year after funding has been appropriated.

What benefits will be provided to the American public through this request and why is this program necessary?

The projects 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 national airspace system remains the safest and most efficient air traffic control system in the world.

Detailed Justification for - 1A02 William J. Hughes Technical Center Laboratory Sustainment

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
William J. Hughes Technical Center Facilities	$20,000	$16,900	$16,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
William J. Hughes Technical Center Laboratories	---	$16,900.0

What is this program and what does this funding level support?

This program sustains the William J. Hughes Technical Center (WJHTC) Laboratories. This centralized set of laboratories supports the Acquisition Management System lifecycle of projects from concept and requirements definition through the determination to implement those system in the national airspace system.

These laboratories are the only location where it is possible to realistically simulate the national airspace system 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 facilities 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. These labs also provide a flexible high-fidelity environment to support and validate research that advances future air traffic concepts in an environment that is integrated with other WJHTC capabilities. For FY 2022, $16.9 million is requested to support the following activities:

- **Laboratory Support Contracts:** Includes contract support services to sustain the operation of the laboratories including infrastructure engineering; technical services; laboratory networking; test and simulation services; laboratory maintenance; scheduling support for multi-user laboratories; and laboratory management.

- **Hardware/Software Licenses and Maintenance Agreements:** Over 50 annually renewed 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 Master Plan**: A long-term laboratory Master Plan will improve the overall function and efficiency of the facility. The FY 2022 portion of this plan will complete all phases of the consolidated facility that provides continuity of operations for national airspace operational equipment as well as non-operational, but critical equipment. Construction that adds resiliency to the electrical and mechanical infrastructure of this already robust facility will be completed. Construction will begin on the space for the relocation and consolidation of the Cockpit Simulation Facility and the Airway Facilities Tower Integration Lab.

- **Laboratory Equipment Technology Refresh:** Laboratory Equipment refresh addresses lifecycle replacement of national airspace supporting equipment. This ensures that laboratory equipment is available for use and in proper operating order. Technology Refresh is required of the Laboratory Network Management and Laboratory Network Operations Center systems.

- **Land Leases, Miscellaneous Supplies and Parts:** Items include land leases for three radar sites, laboratory communications, laboratory cabling, general supplies, and diagnostic equipment.

- **Continued Improvements to Laboratory Systems and Infrastructure:** The FAA's centralized set of laboratories and infrastructure must be modified, upgraded, and reorganized as capital programs and their supporting systems are delivered, installed, and eventually removed. The laboratory infrastructure encompasses over 210,000 square feet of laboratory space in the main buildings, along with numerous outlying buildings, and remote sites. Lifecycle replacement of infrastructure includes some of the on-going improvements such as transient voltage surge suppression upgrades; raised floor replacements; electrical distribution panel life-cycle replacements; and computer air conditioning unit replacements.

What benefits will be provided to the American public through this request and why is this program necessary?

The American public benefits by having WJHTC Laboratory Facilities to support research, development, testing, and evaluation of current and future national airspace systems. This support includes the operational support of national airspace systems in the field. When problems are identified at field locations, the appropriate laboratory is utilized to recreate or simulate the problem; identify a solution; test the solution; and if necessary, develop a field modification that will be installed to correct the problem. The capabilities developed in the laboratories will reduce the overall cost of national airspace system development and will enhance the safety and efficiency of air travel.

Detailed Justification for - 1A03 William J. Hughes Technical Center Infrastructure Sustainment

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
William J. Hughes Technical Center Infrastructure Sustainment	$15,000	$10,000	$16,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
William J. Hughes Technical Center Infrastructure Sustainment	1	$16,000.0

What is this program and what does this funding level support?

This program sustains the William J Hughes Technical Center (WJHTC) facilities, site utilities, and infrastructure. This represents approximately 1.6 million square feet of test and evaluation, research and development, and administrative facilities, plus numerous project test sites on 5,000+ acres of land. The WJHTC is at the forefront of the FAA's challenge to modernize the U.S. air transportation system.

For FY 2022, $16.0 million is requested to accomplish the following projects that promote sustainment of the FAA's infrastructure at the WJHTC:

- **Mold Remediation Program at Technical and Administrative Building - Building 300.** Construction and design efforts required to replace Heating, Ventilation and Air Conditioning equipment. The air-handling units in this building are more than 35 years old and have exceeded the industry standard lifecycle of 20 years.

- **Replacement of Emergency Electrical Feeder from Central Utilities Plant to WJHTC Technical and Administrative Complex – Building 303 to Building 300**. Construction efforts required to replace the emergency electrical feeder from the Central Utilities Plant to the Technical and Administrative Complex. The existing electrical feeder has an industry standard lifecycle of 25 years. However, this infrastructure is original to the facility's construction in 1980 and provides the

necessary back up electrical service to all the life safety systems in the Technical and Administrative building at the WJHTC.

- **Electrical Distribution System Repairs at Technical Support Facility and Equipment Repair Facility – Buildings 305.** Construction efforts to replace site electrical distribution elements that are 35 years old and well beyond their industry standard lifecycle of 20 years. Some systems are already failing or are exhibiting symptoms of potential failure.

- **Mechanical Equipment Replacements at Advanced Automation Systems Facility - Building 316.** Construction efforts required for the replacement of Heating, Ventilation and Air Conditioning equipment in Building 316. The air-handling units in this building are approximately 30 years old and have exceeded the industry standard lifecycle of 20 years.

- **Sustainment of the Dining Facility at the WJHTC Technical and Administrative Complex – Building 300.** Construction is required for sustainment of this space configuration, architectural finishes, lighting, sound attenuation elements, flooring finishes and replacement of operational equipment.

- **Sustainment of the Auditorium at the WJHTC Technical and Administrative Complex – Building 300.** Design will focus on updating the auditorium architectural finishes, lighting, sound system and video conferencing elements, flooring finishes and replacement of operational equipment.

- **Program Support** provides project engineering design services, design reviews, and construction management/oversight for various engineering disciplines. This work includes, but is not limited to electrical, mechanical, and architectural engineering type projects in the Capital Investment Plan.

What benefits will be provided to the American public through this request and why is this program necessary?

Infrastructure sustainment at the WJHTC saves taxpayer money by reducing expenses associated with ongoing operation and maintenance activities as well as reducing 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.

Detailed Justification for - 1A04 NextGen - Separation Management Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
NextGen - Separation Management Portfolio	$20,500	$21,200	$23,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ADS-B In Applications – Interval Management Planning	---	$4,000.0
B. Wake Turbulence Re-Categorization	---	2,500.0
C. Separation Automation System Engineering	---	7,000.0
D. Closely Spaced Parallel Runway Operations	---	1,000.0
Concept Development for Integrated National Airspace		
E. Design and Procedures Planning	---	2,000.0
F. Space Integration Capabilities (SIC)	---	3,000.0
G. Unmanned Aircraft Systems (UAS) Upper Airspace	---	4,000.0

What is this program and what does this funding level support?

This portfolio evaluates concepts and capabilities that enhance aircraft separation assurance through use of ground based automation and aircraft enhancements. The improvements identified under this portfolio will enable more arrival and departure aircraft operations.

A. Automatic Dependent Surveillance – Broadcast (ADS-B) In Applications – Interval Management Planning

This project consists of a set of ground and flight deck capabilities that are used by air traffic controllers and flight crews to more precisely manage spacing between aircraft. An air traffic controller can issue an Interval Management clearance that allows flight crews to manage spacing relative to another aircraft through speed adjustments generated by onboard Flight Interval Management avionics.

For FY 2022, $4.0 million is requested to conduct phase 1 system engineering to support

an FY 2023 final investment decision. Phase 1 provides minimum functionality to support a limited set of interval management operations and other ADS-B In capabilities.

B. Wake Turbulence Re-Categorization

This program is focused on increasing the throughput at capacity constrained airports and airspace. Obtaining this increase requires aircraft wake mitigation separation concepts using current weather conditions and specific performance characteristics of aircraft. This data allows reductions in separation between aircraft while maintaining an acceptable level of safety in the national airspace.

For FY 2022, $2.5 million is requested to finalize concepts for advanced wake separation management in the terminal area and develop benefit and safety assessments of those concepts. The funding will also support the development of wake product design requirements for future technical transfer documentation.

C. Separation Automation System Engineering

This program matures emerging separation management automation capabilities and develops automation enhancements for En Route, Terminal, and Oceanic domains to support planned operational improvements. Separation management automation includes all air traffic control computerized capabilities that assist air traffic controllers in maintaining safe aircraft separation while maximizing the number of aircraft in the airspace. Controllers will be able to provide separation assurance based on the current flight location and improved predictions of where and when the flight is expected to be at a future point in time. These efforts will result in better aircraft sequencing and fewer tactical maneuvers around airports.

For FY 2022, $7.0 million is requested to complete artifacts and activities in support of Investment Analysis Readiness Decisions for En Route Automation Modernization Enhancements 3 and Advanced Technologies and Oceanic Procedures Enhancements. Candidate automation capabilities will support controllers with advanced tools for more efficient routes that result in less fuel burn and reduced gas emissions. These tools will better identify aircraft conflicts and consider wake turbulence, which will increase airspace capacity, service, and safety.

D. Closely Spaced Parallel Runway Operations

This program involves simultaneous approaches and departures of aircraft at airports with parallel runways that are closely spaced, or less than 4,300 feet apart. These operations are utilized at several large metropolitan airports to accommodate increased aircraft volume. The program will develop and finalize concepts for airports with closely spaced parallel runways that face operational constriction when under limited visual conditions. It will focus on performing safety studies on integrated arrival and departure concepts; reductions in minimum radar separations on final approach; and research to reduce separation requirements for dependent departures concept. The program will also

conduct site analyses for the various concepts to determine applicable airports and parallel runways in the national airspace system.

For FY 2022, $1.0 million is requested to support concept validation of Minimum Radar Separation reductions on final approach, continue support of existing program concepts, as well as to identify further concepts for closely spaced parallel operations.

E. Integrated National Airspace Design and Procedures

This program is currently preparing for the future national airspace wide implementation of Performance Based Navigation procedures with the original focus on Established on Required Navigation Performance Instrument Approach Procedures. As the Established on Required Navigation Performance Instrument Approach Procedures application continues to mature and extend, the research will look at the next Performance Based Navigation initiative known as Multiple Airport Route Separation. Both of these efforts are aimed at enabling additional Performance Based Navigation operational capabilities to conduct concept validation at one or more developmental sites and prepare cost benefit analysis, implementation guidance and concept validation materials and reports.

For FY 2022, $2.0 million is requested to conduct concept validation at one or more developmental sites and prepare cost benefit analysis, implementation guidance and concept validation materials and reports.

F. Space Integration Capabilities

This program will ensure the availability of airspace for space launch and reentry operations while minimizing the effect of these operations on other national airspace system stakeholders. Given the growing number of stakeholders involved with launch and reentry operations, the current use of non-integrated systems to manage operation's safe access to airspace does not exist. This program will define and mature a set of capabilities to facilitate the integration of launch and reentry operations into the national airspace system. Requirements will be prioritized and bundled into a set of phased acquisitions for Air Traffic Services with the required upgrades. The program will leverage work already completed to support decisions for modified policies, procedures, acquisitions, or other activities to support Air Traffic Services.

For FY 2022, $3.0 million is requested to develop products in support of Final Investment Decision and Source Selection Documentation.

G. UAS Class E Upper Airspace

This program will investigate future operations above 60,000 feet, where demand for this airspace is projected to increase. While current Class E regulations are predicated on traditional airspace usage, the advent of new technologies and increasing commercial interests present opportunities for the diversification of operations within this airspace. This program will analyze communications and surveillance requirements needed to integrate these types of operations (i.e. geostationary, extreme velocity, and long

duration). Activities will include engineering and assessments of communications and surveillance solutions and conducting modeling and simulation on separation procedures for traditional airspace and Upper Class E Airspace above 60,000 feet. For FY 2022, $4.0 million is requested to continue investigation of surveillance and communication requirements in Class E Upper Airspace as well as to maintain industry partner engagement, as user needs are continuously refined.

What benefits will be provided to the American public through this request and why is this program necessary?

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 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 national airspace system.

Capabilities in this portfolio will support an increase in capacity by increasing airport throughput because of closer spacing of flights accepted from Terminal Radar Approach Control airspace and managed on final approach. 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. 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 - 1A05 NextGen – Traffic Flow Management (TFM) Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
NextGen – Traffic Flow Management (TFM) Portfolio	$19,800	$8,000	$13,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Surface Tactical Flow	---	$3,000.0
B. Strategic Flow Management Application	---	3,000.0
C. Advanced Methods	---	5,000.0
D. Initial Trajectory Based Operation Implementation	---	2,000.0

What is this program and what does this funding level support?

This portfolio involves national airspace operators and FAA traffic managers, along with advanced automation, in managing daily flight and flow decision making. The project evaluates airspace and airport capability issues, such as special activity airspace and weather to improve the overall efficiency of the national airspace system. TFM provides greater flexibility to the flight planners, and makes the best use of available airspace and airport capacity.

A. Surface Tactical Flow

This program is researching and developing airport surface capabilities to optimize the experience for the flying public, Air Traffic Control and the industry by improving the collaboration and decision-making among the national airspace system users. The program will provide the tools necessary to achieve a virtually collaborative surface environment by participating in collaborative decision-making initiatives where the input of flight operators, airport authorities and air traffic controller's viewpoints are used to provide a shared surface situational awareness and improve predictability.

For FY 2022, $3.0 million is requested for activities that include:

- Complete and deliver a report on cloud-based technologies and services required to exchange data from Electronic Flight Bag applications in a timely and secure manner. Electronic Flight Bag is an electronic information management device that helps flight crews perform flight management tasks more easily and efficiently with less paper.

- Conduct field prototyping and evaluation of Terminal data exchange capabilities. Terminal Data Exchange is the ability to quickly and accurately exchange information digitally within the facility and with other facilities, flight operators, and other national airspace system users.

Develop products in support of Acquisition Management System, Concept and Requirement Definition phase for Terminal Flight Data Manager Enhancements. These products will quantify the shortfall in sufficient detail to estimate solution costs and benefits and translate service needs into preliminary requirements and a solution Concept of Operations. The most realistic alternative solutions to the service need can then be identified and evaluated.

B. Strategic Flow Management Application

This program will leverage automation to improve Traffic Flow Management operations by addressing system-wide demand and capability imbalances. There is a need to access and share data for advancing future traffic flow operations addressed through the research in Traffic Flow Management Information Flows, and the concepts identified in the Performance Based Flow Management concept of operations. The Performance Based Flow Management environment features shared decision-making responsibilities among relevant stakeholders enabled by improved coordination, communication, and information sharing. Industries across the board are investing in data driven solutions leveraging learning automation and cloud computing. The aviation/aerospace industry is no exception. Performance Based Flow Management will move away from legacy, monolithic automation systems to a new cloud and micro services-based, flexible, and scalable architecture that leverages new learning automation technologies. FY 2022, $3.0 million is requested for activities that include:

- Engineering activities for Traffic Flow Management Capability Modeling to include platform development and proof of concept activities. As future traffic flow management concepts are identified, the FAA needs a modeling platform to be able to thoroughly evaluate them and continue their development.

- Concept engineering activities for Performance Based Flow Management Model Development and Tabletop Exercises of Performance Based Flow Management. These activities will help us better understand the role learning automation can play in evolving Traffic Flow Management.

- Concept engineering activities for flow information standard to support traffic flow management planning and execution functions.

C. Advanced Methods

Advanced Methods will explore technologies (e.g. speech recognition, machine learning, and artificial intelligence), infrastructure enhancements, and procedural changes to meet current and future traffic management needs. This program will support improvements to increase airport capacity, sector throughput, and reduce sector delays by providing national Airspace system users and air traffic management with a common understanding of national airspace constraints. The program will develop and test prototype improvements and provide operational concepts and requirements for potential implementation in automation programs and operational organizations. These leading-edge technologies could advance the use of data storage solutions to provide better-organized and accessible data. Additionally, improved coordination data will allow the FAA to drive operational analysis of traffic management. This program will also support improvements needed to adapt the FAA's certification tools, processes, best practices and policies.

For FY 2022, $5.0 million is requested for activities that include:

- Developing a prototype capability for the advanced automation learning/data mining capability that utilizes historical and real-time data.

- Complete Analysis Report on FAA automation systems and stored data for suitability with artificial intelligence technology.

- Identify areas where machine learning/deep learning/artificial intelligence algorithms are critical to user performance.

- Identify specific methods that will improve the acceptance and certification (as appropriate) of the methods that will be used for operational and safety improvements.

D. Initial Trajectory-Based Operations

Initial Trajectory Based Operations is an Air Traffic Management method for strategically planning, managing, and optimizing flights throughout the national airspace by using time-based management, information exchange between air and ground systems, and the aircraft's ability to fly precise paths in time and space. This program includes the Northeast Corridor initiative that will reduce flight congestion from Washington D.C to Boston Massachusetts. For FY 2022, $2.0 million is requested for activities that include:

- Program management of implementation strategy, location specific evolution plans, sustainment strategy, stakeholder management analyses, communication plans, and reporting products

- Risk Management planning and execution

- Data and metrics gathering to support quantification of operational changes

What benefits will be provided to the American public through this request and why is this program necessary?

The TFM portfolio researches and implements capabilities that are expected to improve both the efficiency of individual flights and optimization of 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. These support systems include flexibility to avoid airspace constraints, better predict capacity demands and ensure efficient utilization of national airspace capacity.

The TFM portfolio supports the average daily airport capacity metric by providing more efficient use of system capacity through maximizing airspace and airport throughput using time-based management. It also provides improved operational predictability through more accurate and efficient end-to-end strategic planning and scheduling. Enhanced flight efficiency is achieved by delivering more efficient flows into and out of major metropolitan areas through integrated operations. Increased operational flexibility is provided through increased user collaboration regarding preferred trajectories and priorities to support business objectives.

Detailed Justification for - 1A06 NextGen – On Demand National Airspace System Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
NextGen – On Demand National Airspace System Portfolio	$8,500	$10,500	$9,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Flight Objects	---	$3,000.0
B. Common Status and Structural Data	---	2,000.0
C. Dynamic Airspace	---	1,000.0
D. Flight Deck Collaborative Decision Making	---	3,000.0

What is this program and what does this funding level support?

The On Demand National Airspace System Information portfolio conducts pre-implementation work to reduce risk in supporting the efficient and secure exchange of information within the FAA as well as between the FAA and other national airspace system users. This portfolio provides flight planners, air navigation service providers staff, and flight crews with reliable information on changes in conditions throughout the national airspace system. This portfolio examines concepts and matures capabilities through validation activities, demonstrations conducted with stakeholders, and human systems engineering.

A. Flight Object

The project will define the mechanisms for capturing and sharing the most up to date information on any flight. Additionally, the project will develop a single common reference for all system information about a flight and will seek to eliminate exchange of flight information that is redundant or inconsistently defined. This project is engaged in the alignment of the standards for flight information definitions with the emerging International Civil Aviation Organization efforts such as Flight and Flow-Information for a Collaborative Environment.

The Flight Information Exchange Model standard will be the basis for Flight Object information exchange and will support the modernization of flight planning across various users in air traffic management. The Flight Information Exchange Model core includes additional sets of data elements to support the global Flight and Flow-Information for a Collaborative Environment concept.

For FY 2022, $3.0 million is requested to update Flight Object concept and operational requirements documentation, impact assessment report, and a concepts engineering study to address the challenges of implementing the global Flight and Flow-Information.

B. Common Status and Structure Data

The project 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, as well as related integration activities, enable improved flight planning and pilot briefing services. They also allow increased on-demand national airspace system operational performance information, as well as better airspace management using timely schedule information and a common awareness of Special Activity Airspace status across the national airspace system.

For FY 2022, $2.0 million is requested to fund the development of requirements for machine-to-machine information exchange using an internationally recognized standardized format for aeronautical information, known as the Aeronautical Information Exchange Model. This project will work toward enhancing the Aeronautical Information Exchange Model and identifying future improvements in the Notice to Airmen environment using advanced techniques, such as machine learning and artificial intelligence. This project will also work to complete a Concept of Operations and Preliminary Program Requirements for Aeronautical Information Management Modernization Enhancement 2.

C. Dynamic Airspace

The project will create a future vision where flexible routing of national airspace infrastructure data to Air Traffic Control facilities enables the temporary transfer of airspace control from one or more facilities to other facilities in the event of an outage. This will improve national airspace resiliency and flexibility. The work will capitalize on planned enhancements to national airspace system infrastructure and Air Traffic Management automation focused on cloud-based systems and Internet Protocol routable networks. Capabilities to monitor, coordinate, execute, and restore the routing of data will also be identified along with temporary transfer of airspace control between facilities.

For FY 2022, $1.0 million is requested to complete final versions of the functional requirements for automation systems, functional requirements for communication systems, and final technology transfers of requirements to applicable programs.

D. Flight Deck Collaborative Decision Making

The project addresses the disparities in the implementation of flight deck automation advancements to support flight crew and air traffic management decision-making in a collaborative environment. This project will determine the initial national airspace system and System Wide Information Management services for use with the flight deck. It will support the flight crew decision making by providing Electronic Flight Bag applications and the corresponding air traffic management enhancements that will enable future capabilities such as Flight Planning, mobile Instrument Flight Rule clearances, and trajectory negotiations. An electronic flight bag is an electronic information management device that helps flight crews perform flight management tasks more easily and efficiently with less paper. The program will develop, standardize, certify, approve and implement flight deck applications that enable enhanced participation by the flight crew in the collaborative decision-making process.

For FY 2022, $3.0 million is requested to conduct functional analysis for Flight Deck collaborative decision-making applications to support the new Flight Deck capabilities. This work will include evaluation of emerging technologies to develop the concept and requirements document, develop prototype and systems architecture, and develop technical feasibility document based on the new Flight Deck collaborative decision-making functionalities.

What benefits will be provided to the American public through this request and why is this program necessary?

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.

This portfolio is an enabler for a digital information environment that supports machine learning and Artificial Intelligence for decision-making. The standardization of flight information enables more efficient flight planning and leads to improvement in traffic management and decision-making. Enhancing automation capabilities and improved collaboration with the flight deck results in increased predictability of aircraft allowing a reduction in delays and improved capacity in national airspace system. Having a common, shared situational awareness and increased accessibility to accurate, actionable national airspace information results in safer conditions nationwide. Accelerated recovery following system outages accompanied by systemic reduction in delays allows for continuous, efficient use of available airspace capacity.

Detailed Justification for - 1A07 NextGen – NAS Infrastructure Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
NextGen – NAS Infrastructure Portfolio	$11,500	$15,000	$10,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Weather Forecast Improvements	---	$1,500.0
B. New Air Traffic Management Requirements	---	6,000.0
C. Information Management	---	3,000.0

What is this program and what does this funding level support?

The National Airspace System 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 validation activities, human system engineering, and demonstrations. Work in this portfolio addresses aviation weather-related issues by supporting the improvement of the following:

- Air Traffic Management Requirement improvements to decision-making processes during adverse weather conditions
- Weather forecasting in the transformed national airspace system
- Conduct Information Management analysis to develop solutions that can apply across the national airspace system

A. Weather Forecast Improvements

The project seeks to improve weather predictions and determine how to improve the use of that information. Currently, there is minimal automation available to assist with identifying, analyzing, and translating raw weather data into national airspace system constraints. This project 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 national airspace system. Weather Forecast Improvements will improve aviation weather forecasting models with the goal of determining and reducing weather's effects on air traffic. The program also develops the necessary policies and guidance for the provision of aviation weather services under U.S. commitments to the International Civil Aviation Organization. For FY 2022, $1.5 million is requested to fund activities that include:

- Coordination and integration of weather information needed to help optimize decision support tools and decision support processes

- Concept requirements definition and investment analysis work for NextGen Weather Processor and Common Support Services – Weather Future Enhancements

- FAA weather commitments to the International Civil Aviation Organization including updated reports depicting U.S. position on draft amendments to the organization

B. New Air Traffic Management Requirements

The program identifies new opportunities to improve the efficiency and effectiveness of air traffic management. It supports the NextGen goal of expanding capacity by developing decision support tools that improve the strategic management of operations in the national airspace system. New Air Traffic Management Requirements will continue activities in support of Weather Transition, Advanced Air/Ground Procedures, Command and Control in a Cloud Environment, Next Generation Input Devices, and Internet Protocol Based Command and Control Data Links. For FY 2022, $6.0 million will support requirements that include:

- Identify emerging weather requirements needs and gaps in support of ceiling and visibility weather information

- Develop prototype command and control instance in the cloud for a selected system

- Initiate analysis of command and control performance and security requirements and begin risk management analysis to support potential use of internet based, safety critical data exchange

- Determine which technologies show most promise for fulfilling FAA objectives to conduct a more in-depth verification and validation analysis for use with specified national airspace operations

C. Information Management

Is performing engineering analysis on the information infrastructure to address future requirements for System Wide Information Management. Information Management will merge the information sharing needs with additional requirements from upcoming

NextGen initiatives and capabilities. The research initiated within this project will identify gaps, business needs, alternatives, and tradeoffs that exist in the transition from the current System Wide Information Management program and define the functional requirements for future enhancements to System Wide Information Management to support information sharing with national airspace systems and users.

Research will also assess the factors related to information sharing such as bandwidth restrictions, security, performance requirements, and an increasing number of various types of users. The work performed within Information Management will be useful in resolving questions pertaining to the efficient management of information within the FAA and users.

For FY 2022, $3.0 million is requested to identify candidate solutions that can be assessed through the Enterprise Services Infrastructure framework, perform analysis for additional requirements and additional enhancements to the information sharing infrastructure, and develop the products to support in the Investment Analysis Readiness Decision for System Wide Information Management Enhancement 2.

What benefits will be provided to the American public through this request and why is this program necessary?

The work under the NAS Infrastructure portfolio supports the NextGen goals of improved capacity, efficiency, and safety though it's crosscutting development programs. Through improved weather forecast timeliness and accuracy, Weather Forecast Improvements will optimize the usage of available airspace.

New Air Traffic Management Requirements' span multiple areas including communications, information management, and weather. The benefits delivered by these efforts support operational improvements that will increase the number of arrivals and departures at major airports.

Information Management will improve the use of enterprise wide data and information management for data analysis purposes while also minimizing costs by providing an enterprise solution for the collection, storage and analysis of operational data for post-operational use. This program will also provide the American public greater access to desired data housed within the FAA.

Detailed Justification for - 1A08 NextGen Support Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
NextGen Support Portfolio	$11,000	$8,400	$7,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
NextGen Laboratories and Operational Assessments	Various	$7,000.0

What is this program and what does this funding level support?

The NextGen Support Portfolio provides the National Airspace System laboratory environments required to evaluate, mature, and validate the broad framework of concepts, technologies, operational functions, and systems prior to and in the early phases of implementation into the operational national airspace environment. For FY 2022, $7.0 million is requested for the annual operation, maintenance and upgrade of laboratories and to support impact assessments of national airspace requirements and capabilities as they become available in an operational environment.

The NextGen Integration and Evaluation Capability Laboratory is an integration and evaluation facility located at the William J. Hughes Technical Center in Atlantic City, New Jersey. This laboratory provides an environment that allows for concept development and validation, integration, and operations analysis capabilities through Human-in-the-Loop simulation testing and data analysis. Human-in-the-Loop simulations have the intended users (air traffic controllers/technicians/etc.) of a concept actively participate in the simulation to help identify any issues/concerns. This work supports studies that measure and validate concept feasibility, human performance, usability, changes in workload, and safety.

The Florida Test Bed laboratory is located at the Daytona Beach International Airport and provides a platform where early stage concepts are integrated, demonstrated, and evaluated. The Florida Test Bed core infrastructure is configured to enable remote connections with other FAA and industry partner sites to allow for multi-site

demonstration capabilities. The Test Bed provides the ability for industry to bring and integrate new concepts and technologies.

The Enterprise Operational Analysis Performance task provides the support and performance models to assess new capabilities and initiatives, predict, monitor and track the impact of their implementation and identify future benefits. This work informs the NextGen Advisory Committee decision-making and ensures the NextGen Segment Implementation Plan is updated to include the incremental improvements necessary to develop, integrate, and implement new capabilities in the national airspace system.

What benefits will be provided to the American public through this request and why is this program necessary?

The American public benefits by having flexible laboratory environments and tools to evaluate future concepts and technologies that are necessary to move the national airspace system into the 21st century. These advanced tools will benefit the American public through the enhancement of safety and efficiency for air travel.

Detailed Justification for - 1A09 NextGen – Unmanned Aircraft Systems (UAS)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
NextGen – Unmanned Aircraft Systems (UAS)	$51,900	$22,000	$24,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. UAS Concept Validation and Requirements Development	---	$10,000.0
B. UAS Flight Information Management	---	10,000.0
C. Urban Air Mobility	---	4,000.0

What is this program and what does this funding level support?

These projects will allow integration of UAS operations into the national airspace system without impact to manned aircraft operations or creating disruptions or delays. The program will identify industry's innovation work that can be leveraged in public-private partnerships. These projects support expanded operational opportunities while ensuring that national airspace operations will continue to remain as safe as they are today.

A. UAS Concept Validation and Requirements Development

This project conducts the overall analysis and planning for the development and integration of UAS enabling technologies within the national airspace infrastructure. The project will examine, develop, and validate concepts and requirements, leading to investments in support of expanding UAS access to the national airspace system. This work provides the foundation for the development of new air traffic policies, procedures, automation functionality, and training requirements to enable safe integration of UAS operations into the national airspace system.

For FY 2022, $10.0 million is requested to:

- Advanced Air Mobility Beyond Visual Line of Sight National Airspace System Evaluation will develop a Shortfall Analysis and an Operational Requirements Analysis.

- Assess information needs and information sharing services, flight plan information for strategic and tactical de-confliction, needed to provide real-time safety assurance for automation systems and human actors for Advanced Air Mobility Beyond Visual Line of Sight National Airspace System Evaluation operations.

- Airborne Collision Avoidance System – Small UAS standards within Radio Technical Commission for Aeronautics SC-147

B. UAS Flight Information Management

The UAS Flight Information Management project supports multiple UAS operations in the national airspace to keep the airspace safe from aviation-related known and potential hazards and provide adequate notification to users. In order to operate safely, the FAA must be aware of when and where UAS operations are occurring. FAA oversight of UAS operations provides a means of traceability that will:

- Inform other national airspace users of UAS activity in their operating vicinity

- Ensure that operators are complying and conforming to regulatory standards

- Identify and hold accountable those who are responsible during investigations

Focusing on Integrated UAS Traffic Management and Urban Operations enables the FAA to develop infrastructure to support various UAS Traffic Management functionalities across the FAA that is specifically designed to handle increases in capacity resulting from increasing UAS traffic. For FY 2022, $10.0 million will support work that includes:

- Develop Initial Concept of Operations for Integrated UAS Traffic Management and Air Traffic Management Operations

- Complete Concept Analysis Report, Validation Report, and update of UAS Traffic Management Data Exchange Requirements for Integrated Operations

- Complete Final System/Subsystem Specifications, Information Systems Security Assessment, Human Factors Assessment, and Reference Implementation for UAS Traffic Management Urban Operations

- Complete UAS Traffic Management Plan Evaluation Final Report in coordination with the Florida Testbed Team and Initial System/Subsystem Specifications, incorporating specific capabilities which include Remote Identification and Tracking

- Complete initial update of the Flight Information Management System prototype for Integrated UAS Traffic Management Operations

- Develop operational capabilities technology transfer package UAS Traffic Management Data Exchange Analysis, Data Exchange Architecture, and Data Exchange Evaluation

- Onboarding UAS Service Suppliers to support the established rule that requires Remote Identification of UAS

C. Urban Air Mobility:

While the increase in urbanization over the recent past has led to increasing transportation congestion and environmental stress, it also offers an opportunity to explore solutions to transportation related problems in the national airspace. The aviation industry is exploring the feasibility of manned and unmanned aerial cargo and air passenger vehicles such as air taxis and air ambulances under the Urban Air Mobility concept.

Urban Air Mobility requires innovative traffic management techniques and tools where traditional air traffic management and separation services provided by the FAA may not be adequate. This project will explore the safe integration of Urban Air Mobility operations into the national airspace, which may need to operate within both UAS Traffic Management and Air Traffic Management environments. For FY 2022, $4.0 million is requested for the following:

- Urban Air Mobility separation management with vehicle technology consideration and analysis on Urban Air Mobility airspace designs, rules, and procedures. Develop final Concept of Operations, operational safety analysis, and industry collaboration and data collection plan

- Develop Urban Air Mobility functional analysis, data exchange requirements, system architecture, and operational evaluation plan.

- Complete Flight Demonstration of the Airborne Collision Avoidance System for rotorcraft Operational Capability system specified in the System Requirements Specification.

What benefits will be provided to the American public through this request and why is this program necessary?

The UAS projects play a critical role in enabling UAS operations in the national airspace without affecting manned aircraft operations, without creating disruptions or delays, and ensuring national airspace operations will continue to be safe. A major part of providing for UAS operations is the direct engagement with industry to build a public-private partnership exploiting industry's research and innovative technologies. Automating operations in this environment reduces the need for government review and approval of "exception handling" of UAS flights. Leveraging the partnership to provide

improvements to national airspace capabilities and operations through this integrated framework provides a cost-effective approach to addressing needs and solutions.

Detailed Justification for - 1A10 NextGen – Enterprise, Concept Development, Human Factors, and Demonstrations Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Enterprise, Concept Development, Human Factors, and Demonstrations Portfolio	$19,000	$19,000	$10,600

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	---	1,000.0
C. Stakeholder Demonstrations	---	7,100.0
D. Innovation Opportunities	---	1,000.0

What is this program and what does this funding level support?

Enterprise Concept Development, Human Factors, and Stakeholder Demonstration Portfolio conducts enterprise level activities, including the development of concepts across the national airspace system, human factors analysis of a NextGen operational environment, and demonstrations of proposed system improvements to ensure operational feasibility and viability.

These early development efforts lead to improvements that provide air traffic controllers with new and/or improved tools and procedures to manage air traffic. As an example, the Urban Air Mobility program held a series FAA, National Atmospheric and Space Administration, Industry collaborative forums to validate key assumptions regarding incorporating Unmanned Aircraft System operations into the national airspace system. The outcome of these activities will inform demonstrations that showcase the practical application of proposed system improvements and validate their feasibility.

A. Enterprise Concept Development

The Enterprise Concept Development program is used to identify and assess early concepts and conduct validation activities (i.e., modeling and real-time simulations) that

will transform the national airspace system. Areas of interest include, but are not limited to, trajectory-based coordination, the use of artificial intelligence in the national airspace system and the potential of unmanned aircraft systems for urban transportation. When appropriate, concept activities will be considered from a global perspective including International Civil Aviation Organization requirements for global aircraft tracking and network communication.

For FY 2022, $1.5 million is requested to support concept development and validation activities, research, concept engineering, and concept analysis.

B. Enterprise Human Factor Development

The Enterprise Human Factor Development program provides human performance guidance and recommendations to support the maturation, development and validation of new concepts. Embedding human factors considerations into concept development activities allows for the identification of potential human performance issues and mitigation strategies for those issues. This increases the usability, acceptability, and safety of new concepts and systems as they integrate into the national airspace system.

For FY 2022, $1.0 million is requested to identify human factors performance considerations for modernization of the national airspace system and future requirements.

C. Stakeholder Demonstrations

The Stakeholder Demonstration program provides practical application and analysis of proposed system improvements to verify concept feasibility and assess the cost-benefit trade space. Through collaboration with stakeholders, operators, and end-users, these demonstrations reduce implementation risk by providing early prototyping of requirements before capabilities are fully incorporated. Demonstrations collect and provide data to support business case and investment decisions tied to the decision points in the national airspace system architecture. These demonstrations promote industry involvement and attain community acceptance. Rigorous demonstrations ensure the integration and interoperability of systems and reveal the need for rulemaking, policy changes, and training.

For FY 2022, $7.1 million is requested to support multiple demonstrations related to modernizing the national airspace system including, but not limited to, the following:

Trajectory Based Operations Demonstration: This project will assess the need for additional capabilities required to evolve from today's national airspace, with miles of separation, to the trajectory based operations model that will allow aircraft to fly more precise flight paths to a specific point in airspace at a precise time. FAA will produce a final report and a transition package that will document the information requirements to achieve global harmonization and become part of the requirements for flight information system modernization.

Urban Air Mobility: This project will execute a demonstration of these emerging flight operations and their interaction with Unmanned Traffic Management and Air Traffic Management. Validate the Urban Air Mobility concept of operation through simulations, completion of gap analysis, developing the necessary system prototypes, and executing the necessary demonstrations in partnership with industry.

Innovative Airports: The project will develop a concept of operation for the use of low cost technologies to monitor aircraft movement on the airport surface, assess the performance of the network connectivity, develop the applicable prototypes, and demonstrate the use of the technologies in an operational environment.

D. Innovation Opportunities

This program conducts initial feasibility assessments on a select set of innovations proposed to the FAA by industry for inclusion into the national airspace system. These proposed innovations are selected based on their purported maturity and readiness for implementation (i.e., sufficient research has been completed and minimal development is required). This project will initiate several short duration assessments to determine the benefit to the national airspace system and the maturity level of the proposed innovation. If it is concluded that a proposed innovation has benefit to the national airspace system but has not reached a sufficient maturity level, then it will be suggested for inclusion in the Research, Engineering and Development (RE&D) budget. The proposed innovations that which meet both requirements will be considered for inclusion into near term planned investments.

For FY 2022, $1.0 million is requested to complete a series of short duration feasibility assessments of industry proposed innovations.

What benefits will be provided to the American public through this request and why is this program necessary?

The Enterprise Portfolio promotes safety, efficiency and a reduction in air traffic delays. The program will continue to validate operational concepts to identify technical and operational requirements paying particular attention to human factors considerations and conduct stakeholder demonstrations to collaborate with users, operators, and other partners on emerging technologies and national airspace system wide concepts to prepare the national airspace system for air traffic operations in 2035 and beyond.

Detailed Justification for - 2A01 En Route Automation Modernization (ERAM) System Enhancements and Technology Refresh

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
ERAM System Enhancements and Technology Refresh	$105,950	$66,900	$104,450

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ERAM Sustainment 3	---	$64,000.0
B. ERAM Enhancement 2	---	40,000.0
C. Independent Operational Assessment	---	450.0

What is this program and what does this funding level support?

The ERAM System is the Automation System used in 20 Air Route Traffic Control Centers. The ERAM System Displays all Aircraft positions in the En Route Sectors across the country. This is the main tool used by air traffic controllers in the En Route environment for separation of aircraft.

A. ERAM Sustainment 3

This project is the third step in the planned technology refresh update to the ERAM equipment sustainment program. The Sustainment 3 program development started in FY 2020 and achieved Final Investment Decision on December 18, 2019. This sustainment program will address the remaining ERAM infrastructure hardware, network equipment and operating system at operational, training and support environments that were not replaced in the previous technology refresh efforts. The ERAM Sustainment 3 program execution timeline is FY 2020 to FY 2026.

For FY 2022, $64.0 million is requested for system engineering, solution development, equipment procurement, test, evaluation, and site implementation. Specifically, undertaking the following activities related to key elements of program implementation:

- Hardware transition related software development/modification with test and verification and ERAM Release integration with training and logistics
- Procurement of the replacement hardware to key sites and the first deployment phase, including the following equipment:

    - Enterprise Storage System, Processors and Tape Backup units replacement

    - IBM P5/6 Series processors (including Flight Data Processor, Surveillance Data Processor Servers and Air Traffic Workstations)

This work is a critical component to complete the sustainment of the ERAM infrastructure systems. This program also includes security adaptation to align security and network communication features with current FAA telecommunications infrastructure standards.

B. ERAM Enhancements 2

This project includes improvements in separation management, trajectory prediction, and human interface capabilities to improve the delivery of air traffic services today and to continue the evolution of trajectory-based operations. The Final Investment Decision was completed in December 2016.

ERAM Enhancements 2 is focusing on the capabilities listed below. The FAA regards these improvements as high priorities:

- Automating the handoff procedure between domestic airspace and international partner Canada will reduce controller workload

- Properly processing updates to International Civil Aviation Organization equipage will impact 160,000 flights per year that are currently improperly processed, leading to improvements in safety while improving the ability to perform Optimized Profile Descents due to the correct equipage at the Terminal Radar Approach Control boundary

- Conflict Probe Enhancements that provide increased conflict detection and resolution capabilities to support separation management

- Aircraft Trajectory Modeling Enhancements that will lead to improved conflict probe accuracy and reduced occurrence of false and missed alerts

- Technical Operations User issues: improvements for monitoring the status of external systems and provide detailed information for ERAM system troubleshooting

For FY 2022, $40.0 million is requested for system engineering, solution development, test, evaluation, and site implementation. The following development contractor activities are planned:

- Complete software implementation for the automated handoff to Canada capability
- Complete requirement and design for Aircraft Trajectory Modeling Enhancements and International Civil Aviation Organization equipage enhancements
- Complete software implementation of Conflict Probe modeling enhancements
- Complement site implementation for Technical Operations User issues

C. Independent Operational Assessment

For FY 2022 $450,000 is requested for an assessment to identify any safety hazards and/or operational concerns with ERAM Enhancements 2 system capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

The program focus is on maintaining the high availability of the ERAM capability. The ERAM Sustainment projects are necessary for the replacement of equipment that is approaching the end-of-life and hardware that is being discontinued by the manufacturer. ERAM Enhancements will provide software enhancements for the En Route controller team and will improve the efficiency and effectiveness of En Route sector operations. This will sustain the safety critical Air Traffic operations as well as lower system life cycle cost.

Detailed Justification for - 2A02 Next Generation Weather Radar (NEXRAD)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Next Generation Weather Radar (NEXRAD)	$3,000	$3,600	$3,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Next Generation Weather Radar (NEXRAD) Sustainment 1	---	$400.0
B. Next Generation Weather Radar (NEXRAD) Sustainment 2	---	3,500.0

What is this program and what does this funding level support?

NEXRAD is a long-range weather radar that detects, analyzes, and transmits weather information for use by the Air Traffic Control System Command Center, En Route, Terminal, and Flight Service Facilities. NEXRAD detects, processes, and distributes for display, hazardous and routine weather information that are processed by FAA's Weather and Radar Processor, Integrated Terminal Weather System, and the Corridor Integrated Weather System systems. NEXRAD is a joint program among Departments of Transportation, Defense, and Commerce, with National Weather Service as the lead. Agencies share developmental costs and implementation costs in proportion to the number of systems fielded by each agency. The FAA owns and operates 12 NEXRADs, located in Alaska (seven), Hawaii (four), and Puerto Rico (one).

NEXRAD was originally installed between 1990 and 1996 with an economic service life of 20 years, there are currently 159 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 and a major sustainment effort is required to extend the service life. For FY 2022, $3.9 million is requested to support National Weather Service's Next Generation Weather Radar sustainment efforts. The FAA funding share for NEXRAD Program Improvement and Technology Refresh is an annual requirement as established in the Memorandum of Agreement among three agencies.

What benefits will be provided to the American public through this request and why is this program necessary?

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.

Detailed Justification for - 2A03 Air Route Traffic Control Center (ARTCC) and Combined Control Facility (CCF) Building Improvements

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
ARTCC/CCF Building Improvements	$96,900	$101,200	$134,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ARTCC and CCF Facility Sustainment	23	$107,000.0
B. Enterprise Facilities Sustainment	1	25,300.0
C. In-Service Engineering	---	2,300.0

What is this program and what does this funding level support?

The ARTCC and CCF Building Sustainment Program supports En Route air traffic operations and service-level availability by providing life-cycle management of the physical plant infrastructure at the 21 ARTCCs and two CCF facilities. It is one of the programs within the Air Traffic Control Facilities Sustainment Portfolio.

Many of these structures were built in the 1960s and have been expanded several times since then. The average age of the ARTCC and CCF facilities is 60 years old. Currently, there is a $376.1 million facility backlog of needed repairs or upgrades, which includes all building systems such as heating, ventilation, and air conditioning (HVAC) components; all piping, plumbing, control systems; and both the exterior and interior of the building. This backlog increases the risk of outages and may result in increased maintenance costs. This program sustains these buildings to meet air traffic service requirements and to reduce the backlog.

Major construction projects will replace obsolete plant equipment and improve work areas. These projects include replacement of chillers, cooling towers and associated mechanical and electrical system elements necessary for cooling national airspace system electronics and computer equipment. Fire detection systems that have exceeded life

expectancy and not supported by the manufacturer will be replaced. The new systems are more efficient and will reduce energy consumption at the facilities.

For FY 2022, $107.0 million is requested for ongoing ARTCC sustainment projects. The requested funding amount is required to continue efforts to ensure that critical national airspace system 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.

FY 2022 major improvement projects include:

- **Environmental Wing Project** - This project will remove the major facility equipment, chillers, boilers, pumps, and critical spaces air handling units from untenable locations such as basements and attics. The new environmental wing structure will co-locate a large proportion of the mechanical equipment in a location, which provides significantly improved access for both preventive and corrective maintenance. Increased reliability and improved Operation Risk Management are the key benefits to this project. The project will also selectively allow the replacement of other essential facility equipment that is part of the backlog such as air handling units, electrical panels, lighting controls, roofs, and raised floor systems.

FY 2022 Projects

- Construct Environmental Wing – Albuquerque, NM ARTCC and Guam CCF, and Indianapolis ARTCC.

- Design Environmental Wing – Washington, DC and Los Angeles, CA ARTCC's.

Specific mission critical and local sustainment projects will also be accomplished at each ARTCC/CCF facility to replace obsolete equipment and infrastructure in order to support the air traffic control mission, and to ensure the facility is maintained in an acceptable condition.

For FY 2022, $25.3 million is requested for the sustainment of FAA Enterprise Facilities. These facilities include the FAA Air Traffic Control System Command Center, two National Enterprise Management Centers, and the Northeast Operational Support Facility. Major projects in FY 2022 include the project at the Command Center, which will establish its own critical power feed, and upgrading the heating, ventilation, and air conditioning (HVAC) at the Command Center. The work this year will also include the design phase of the future expansion of the control room within the Command Center. Additionally, sustainment projects associated with the Enterprise Facilities will include the funding of needed repairs or upgrades for all building systems, such as HVAC components; all piping, plumbing, control systems; electrical, conveying, and general infrastructure; and both the exterior and interior of buildings.

In addition, $2.3 million is requested for in-service engineering activities that provide an immediate response to emerging technology solutions.

What benefits will be provided to the American public through this request and why is this program necessary?

This program sustains 21 ARTCC and two CCF facilities, as well as 10 Enterprise Facilities that are critical and vital to facilitate the FAA's mission to serve the flying public. The mission of the En Route Facilities Sustainment Program is to support En Route Air Traffic operations and service level availability through facility life-cycle program management of the 21 ARTCC's, the two CCFs at San Juan and Guam, and the 10 Enterprise Facilities such as FAA Command Center and National Enterprise Management Centers Buildings. Much of the infrastructure and 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.

Detailed Justification for - 2A04 Air/Ground Communications Infrastructure

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Air/Ground Communications Infrastructure	$7,850	$7,850	$7,815

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Communications Facilities Sustainment	10	$6,115.0
B. Radio Control Equipment - Sustainment	---	1,000.0
C. In-Service Engineering	---	700.0

What is this program and what does this funding level support?

The Air-to-Ground Communications Infrastructure Sustainment programs enhance operational efficiency and effectiveness by replacing aging radio equipment, providing new, relocated or upgraded remote communications facilities, and providing equipment and support to detect and resolve radio frequency interference with FAA communications.

A. Communications Facilities Sustainment

For FY 2022, $6.1 million requested is to initiate the expansion/replacement/upgrade of 10 CFS sites, procure replacement radios, equipment racks, antennas, towers, and prepare sites for installations. These sites include Hampton, Georgia; Cle Elum, Washington; St. Charles, Missouri; Watford City, North Dakota; San Juan, Puerto Rico; Galbraith Lake, Alaska; Waterford, Michigan; Cleveland, Ohio; Klawock, Alaska; and Washington, Indiana.

The Communications Facilities Sustainment project provides new, relocated or upgraded Remote Communication Facilities to enhance the Air to Ground communications between air traffic control and the aircraft when there are gaps in coverage or new routes are adopted.

B. Radio Control Equipment – Sustainment

For FY 2022, $1.0 million requested is for a Radio Control Equipment obsolescence study. The funding will be used to install existing Radio Control Equipment units supporting 40 channels and to support the construction and verification of the Radio Control Equipment test bed. The funding will also be used to procure 100 control type power supplies and 100 redesigned modules to replace obsolete parts while providing longer-term support for the operational Control Site Radio Control Equipment systems. This project replaces obsolete radio signaling and control equipment, which controllers use to select a remote radio channel.

C. In Service Engineering

In-service engineering allows for immediate response and tactical distribution of resources to emerging technology solutions. For FY 2022, $700,000 is requested for ongoing engineering support of communication systems.

What benefits will be provided to the American public through this request and why is this program necessary?

Air/Ground Communications Infrastructure will significantly improve safety by replacing aging and increasingly unreliable equipment and 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 costs for the FAA and taxpayers.

Detailed Justification for - 2A05 Air Traffic Control En Route Radar Facilities Improvements

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Air Traffic Control En Route Radar Facilites Improvements	$5,300	$7,500	$15,913*

*Note: Dollar value is rounded.

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Long Range Radar Infrastructure Sustainment	49	$15,212.5
B. In-Service Engineering	---	700.0

What is this program and what does this funding level support?

The Air Traffic Control En Route Radar Facilities Improvements Program is responsible for 157 Long Range Radar surveillance facilities that provide aircraft position information to FAA En Route control centers for air traffic control, and to the Department of Defense and the Department of Homeland Security for security monitoring of the national airspace system.

About 80 percent of the long-range radar 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. Average Facility Condition Index of all 157 long range radar facilities is currently at 82 percent, which is below the minimum 90 percent required for such facilities. This surveillance equipment must remain operational for the foreseeable future.

For FY 2022, $15.2 million is requested to sustain approximately 49 facilities that are in poor condition and have greatest impact to the national airspace system. The scope of the long-range radar infrastructure sustainment program includes upgrades and/or replacement of buildings and towers: mechanical, electrical, security, fire detection, and lightning protection systems; facility access roads; and related infrastructure. This work will extend the service life of the facilities, and reduce the chance of outages that often cause air traffic delays.

Additionally, for FY 2022, $700,000 is requested for ongoing engineering support of long range radar. In-service engineering allows for immediate response and tactical distribution of resources to emerging technology solutions.

What benefits will be provided to the American public through this request and why is this program necessary?

The infrastructure improvements will improve the reliability of, better protect, and reduce the operating costs of these critical long range radar sites. The goal of this infrastructure sustainment program is to reach 90 percent Facility Condition Index by 2030.

Detailed Justification for - 2A06 Oceanic Automation System

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Oceanic Automation System	$15,900	$9,150	$10,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Oceanic Improvements	---	$2,000.0
B. Advanced Technologies/Oceanic Procedures Enhancements 1	---	8,000.0
C. Independent Operational Assessment	---	400.0

What is this program and what does this funding level support?

From 2005 to 2007, the Advance Technologies/Oceanic Procedures program replaced the original oceanic air traffic control system, updated procedures, and modernized the Oakland, New York, and Anchorage Air Route Traffic Control Centers, which house the oceanic automation systems. Advance Technologies/Oceanic Procedures integrates flight and surveillance data processing and detects conflicts between aircraft for safe oceanic air traffic control operations.

A. Oceanic Improvements

Support a category of requirements that address system changes driven by new operational standards and other International Civil Aviation Organization mandates. These changes are small in nature, must be addressed quickly, and the scope of these enhancements does not require significant capital investments. For FY 2022, $2.0 million is requested for analysis and solution implementation activities that improve the delivery of oceanic domain services.

B. Advanced Technologies/Oceanic Procedures Enhancement 1

Addresses the operational shortfalls of the current oceanic system as the FAA moves forward with new initiatives and other national airspace system upgrades. The Automatic Dependent Surveillance - Contract Reduced Oceanic Separation modification will

provide controllers the automated tools to safely apply and monitor reduced oceanic separation minima. The change will reduce the current standard from 30 Nautical Mile Lateral and 30 Nautical Mile Longitudinal to 23 Nautical Mile Lateral and 20 Nautical Mile Longitudinal separation standards.

For FY 2022, $8.0 million is requested for the Advanced Technologies/Oceanic Procedures Enhancement 1 program. This request will complete development of modifications and begin testing for the Enhanced Controller Coordination and Enhanced Conflict Probe in Surveillance Airspace to be deployed in FY 2023.

The funding will also support software design and the start of software development to move the existing weather data to the System Wide Information Management interface. Once established on the System Wide Information Management interface, new services for retrieving the published weather data will streamline and automate manual processes of inputting weather data into the system. This change is planned to be delivered in 2024 and deployed at all sites by 2025.

C. Independent Operational Assessment

For FY 2022, $400,000 is requested for an assessment to identify any safety hazards and/or operational concerns with Enhancement 1 capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

The new enhancements will provide airlines and general aviation with reduced operating costs and system delays by delivering improved coordination and user request capabilities that support optimum flight profiles, increasing the likelihood of on-time arrivals.

Detailed Justification for - 2A07 Next Generation Very High Frequency (VHF)/ Ultra High Frequency (UHF) Air/Ground Communications System (NEXCOM)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Next Generation Very High Frequency Air/Ground Communications System	$70,000	$60,000	$51,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Next Generation VHF/UHF A/G Communications Phase 2	---	$40,000.0
B. Next Generation VHF/UHF A/G Communications Phase 3	---	11,000.0

What is this program and what does this funding level support?

For FY 2022, $40.0 million is requested for NEXCOM Phase 2 to replace and modernize the aging and obsolete national airspace system air-to-ground analog radios that allow direct voice communication with pilots with new Very High Frequency and Ultra High Frequency radios at terminal and flight services facilities.

For FY 2022, $11.0 million is requested to support in the analysis of NEXCOM Phase 3. The existing Very High Frequency analog controller-to-pilot communications system lacks the capacity and flexibility to accommodate future growth in air traffic and air/ground communication frequency assignments. The system is beyond its estimated lifecycle and is increasingly expensive to maintain. Air/ground communication is the most fundamental and safety important element of the air traffic control system supporting all phases of flight for En Route, Terminal, and Flight Service operational environments.

The NEXCOM program plans to use funding to deploy 2,500 new Terminal Air Traffic Control Radios (receivers and transmitters) at 115 terminal and flight services facilities, purchase Very High Frequency and Ultra High Frequency radios, procure 125 Emergency Transceivers, and fund related implementation and support activities. Ultimately, 35,000 Very High Frequency and Ultra High Frequency radios will be

deployed in the national airspace system under the NEXCOM Phase 2 program through 2026.

NEXCOM will meet the new and growing demands for air transportation services and provide the operational flexibility and Voice over Internet Protocol capability. NEXCOM allows for efficient utilization of Very High Frequency spectrum required for voice communications and enables the recovered spectrum to be available for data communications as needed.

What benefits will be provided to the American public through this request and why is this program necessary?

NEXCOM will improve reliability and reduce growing maintenance costs replacing existing communications equipment with modern Air to Ground Communications equipment. An added performance benefit of NEXCOM is the ability to increase capacity by expanding the number of communications channels within the spectrum assigned to the FAA. The Mean Time between Failure performance metric, which is closely related to availability, will be increased from 11,000 hours to 50,000 hours at the completion of NEXCOM Phase 2. This will both increase the safety of the national airspace system benefitting commercial airlines, general aviation and the flying public as well as reducing costs to taxpayers.

Detailed Justification for - 2A08 System-Wide Information Management (SWIM)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
System-Wide Information Management (SWIM)	$81,825	$31,050	$33,973

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. SWIM Segment 2B	---	$2,473.0
B. SWIM – Segment 2C	---	18,500.0
C. Enhanced SWIM Cloud Services	---	9,000.0
D. National Cloud Integration Service	---	4,000.0

What is this program and what does this funding level support?

The SWIM program is an information management and data sharing system for the Next Generation Air Transportation System (NextGen). SWIM provides policies and standards to support data management, secure data integrity, and control data access and use.

A. SWIM Segment 2B

SWIM Segment 2B implements and continues to improve the FAA's ability to manage the efficient flow of information through the National Airspace System and includes additional capabilities to strengthen the overall security of information systems. Those capabilities are:

- **Enterprise Service Monitoring:** Collects and provides centralized situational awareness data from multiple sources; allows single point data access that helps expedite fault isolation and service restoration, enabling near real-time end-to-end monitoring and reporting of enterprise SWIM services.

- **Identity and Access Management:** Establishes an authorization capability, which allows SWIM and other national air space programs to centralize management of access privileges to national air space data on different platforms. This authorization capability reduces cyber security vulnerabilities by ensuring enforcement of proper security policies when creating, managing, and revoking access privileges. As of September 2020, all national air space programs are required to use Identity and Access Management.

- **National Airspace Common Reference:** Integrates, aggregates, correlates and filters a variety of airspace data to form spatial and temporal relationships.

- **SWIM Terminal Data Distribution System:** Converts legacy surface movement data into easily accessible information, which is published via national airspace system Enterprise Messaging Service.

For FY 2022, $2.5 million is requested to complete deployment and cover the 2nd-level engineering support for Phase 2B capabilities until they complete transition to the Operations account.

B. SWIM Segment 2C

SWIM Segment 2C provides a technology refresh of aging national airspace system Enterprise Messaging Service infrastructure. This messaging service centralizes data messaging between internal and external systems and users. It also refreshes SWIM capabilities and equipment reaching end of service, end of life, and the end of security patching. These capabilities include:

- **Enterprise Service Monitoring:** Collects and provides centralized situational awareness data from multiple sources; allows single point data access that helps expedite fault isolation and service restoration, enabling near real-time end-to-end monitoring and reporting of enterprise SWIM services.

- **Identity and Access Management:** Establishes an authorization capability, which allows SWIM and other national air space programs to centralize management of access privileges to national air space data on different platforms. This authorization capability reduces cyber security vulnerabilities by ensuring enforcement of proper security policies when creating, managing, and revoking access privileges. As of September 2020, all national air space programs are required to use Identity and Access Management.

- **SWIM Flight Data Publication Service:** Provides en-route flight data to national airspace system consumers; allows consumers to receive real-time data for analytics, business processes, research, and other activities.

- **SWIM Cloud Distribution Service with SWIM Industry FAA Team portal technology insertion:** Provides scalable platform and data distribution services for external consumers thus relieving the strain on the national air space Enterprise Security Gateway.

For FY 2022 $18.5 million is requested to continue technology refresh of national airspace system Enterprise Messaging Service infrastructure, to install Identity and Access Management and Enterprise Service Monitoring hardware technical refresh, and to complete SWIM Industry FAA Team Portal version 3 Initial Operating Capability in February 2022.

C. Enhanced SWIM Cloud Services

Enhanced SWIM Cloud Services is a scalable cloud solution that enables bi-directional communications; performs cloud engineering; provides research and development environment; enhances security including application level certificate-based authentication, encryption and digital signatures to support Federal Information Security Management Act requirements. Enhanced SWIM Cloud Services will provide a highly scalable solution enabling the FAA to cost-effectively support future anticipated growth of offered services and evolving data exchange scenarios with mission partners.

For FY 2022 $9.0 million is requested to continue building a scalable cloud solution for aviation partners and internal producers and consumers that will enable bi-directional communications, platform cloud engineering, and security controls to protect sensitive data.

D. National Cloud Integration Service

This project will establish services, processes and capabilities to address FAA programs' emerging need to enable cloud services and enterprise infrastructure adoption. This will significantly reduce the technical risks and complexity for programs. For FY 2022, $4.0 million is requested to continue the development of a cloud opportunity roadmap for national airspace system programs. This roadmap will be used to identify future non-safety critical systems and applications that are viable candidates to transfer to a cloud environment.

The National Cloud Integration Service project will also define a standardized process for providing engineering support to national airspace system programs seeking to transition to a cloud environment and readily identify the most useful services that will optimize their cloud benefits. Additionally, the Sandbox Environment will continue to be maintained and enhanced. This will allow programs the ability to prototype an architecture that will support the future cloud operations architecture. Additionally, National Cloud Integration Service will actively work to standardize the security authorization process for national airspace system systems utilizing cloud infrastructure. These efforts are critical in supporting the agency's exploration into cloud services.

What benefits will be provided to the American public through this request and why is this program necessary?

SWIM reduces both the number and types of unique communication interfaces, reduces redundancy of information and better facilitates information sharing, improves predictability and operational decision-making, and reduces cost of service. The improved coordination that SWIM provides allows for the transition from tactical conflict management of air traffic to strategic trajectory-based operations. SWIM provides the foundation for greatly enhanced information exchange and sharing with other agencies. SWIM provides policies and standards to support data management, secure data integrity, and control data access and use.

Detailed Justification for - 2A09 Automatic Dependent Surveillance – Broadcast (ADS-B) NAS Wide Implementation

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
ADS-B NAS Wide Implementation	$159,400	$180,000	$157,633

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ADS-B Sustain Leased Services	---	$139,633.0
B. ADS-B NAS Wide Implementation – Enhancement 1	---	18,000.0

What is this program and what does the funding level support?

ADS-B is an advanced surveillance technology that provides highly accurate information by using an aircraft's broadcasted position instead of position information from traditional radar. This technology reduces delays and enhances safety. Aircraft position (longitude, latitude, altitude, and time) is determined using the Global Navigation Satellite System. 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 is used to display aircraft position on En route and terminal automation systems used by air traffic controllers.

The Gulf of Mexico implementation of air traffic control services is providing ADS-B surveillance data for aircraft operating in a large area without access to traditional radar coverage. Energy platforms in the Gulf of Mexico are utilized by the program to host surveillance, communications, and weather facilities. These platforms have a temporary lifespan that are impacted by a number of economic and technical criteria. The shutdown of a platform requires the removal of existing facilities and the installation of replacement facilities on platforms that address any operational shortfall. Program funding supports the removal, refurbishment, and relocation of the ADS-B, Very High Frequency communications, and/or weather facilities.

A. ADS-B Sustain Leased Services

For FY 2022, $139.6 million is requested to provide for the continued implementation and operation of the following baseline applications:

- ADS-B Separation Services
- Pilot Advisory Services
- Traffic Information Services – Broadcast
    - Flight Information Services – Broadcast
    - Automated Dependent Surveillance – Rebroadcast
- Weather and National Airspace System Situation Awareness

The funding will also allow continued operation of Wide Area Multilateration surveillance services capability. Wide Area Multilateration provides aircraft location information to the automation systems at Denver Air Route Traffic Control Center, Southern California Terminal Radar Approach Control, and Charlotte Terminal Radar Approach Control. Additionally, the funding will allow for continued engineering and design work for the implementation of a spectrum congestion solution to ensure the viability of the 1,090 MHz spectrum to support surveillance services throughout the national airspace system.

The requested funding will also support the continuation of FAA air traffic control services with Gulf of Mexico helicopter operators and energy platform owners, as agreed upon in the Memorandum of Agreement. This funding will be used to:

- Remove and refurbish facilities and equipment from active energy platforms when Memorandum of Agreement partner platform owners make the decision to shut them down
- Identify and evaluate an appropriate site to restore any lost services
- Install new or refurbished systems on strategically located energy platforms
- Install equipment in new facilities on other strategically located Memorandum of Agreement partner energy platforms.

This funding will also continue ADS-B Baseline Services, utilizing subscription fees for ADS-B infrastructure owned and operated by the prime contractor. The anticipated FY 2022 activities for ADS-B Sustain Leased Services include:

- Provide and maintain ADS-B baseline services and applications.

- Pay subscription fees:

    - Provide service to more than 300 service volumes within specified requirements. A service volume is a cylinder of airspace and is used in planning areas of air operations.

    - Provide Wide Area Multilateration surveillance services supporting air traffic operations for selected airspace.

The requested funding will also support operational enhancements to the portfolio. Specifically, the funding will be used to enhance existing capabilities and services to improve service resiliency and ensure continued delivery of high quality surveillance and ADS-B Rule enforcement.

B. ADS-B Enhancements

For FY 2022, $18.0 million is requested to support the operational enhancement of this portfolio. The funding will be used to provide additional ADS-B benefits by implementing activities that may include:

- Security enhancements for National Institute of Standards and Technology compliance.

- Expanding ADS-B service coverage in selected areas.

- More comprehensive vehicle ADS-B equipage at large airports.

- Utilization of additional ADS-B parameters to monitor altitude compliance, enhancing safety and efficiency of the national airspace system.

- Displaying ADS-B In capability indicators on ground automation systems.

What benefits will be provided to the American public through this request and why is this program necessary?

Benefits provided by ADS-B to the American public include more efficient use of airspace capacity, fewer flight delays, and more optimal routing for aircraft. Other efficiency benefits include reduced weather deviations and fewer cancellations during inclement weather conditions resulting from increased access to some Alaskan regions and Gulf of Mexico oil platforms. These efficiencies translate to savings in both aircraft direct operating costs and passenger value of time.

ADS-B meets a large performance gap in the capability of pilots and air traffic control to receive situation awareness information, thus providing for safety in ways legacy systems cannot by delivering the following services through cockpit avionics:

- Enhanced see-and-avoid capabilities, which will assist pilots in preventing mid-air collisions.

- Air Traffic Control services in non-radar airspace.

- Weather information, helping to reduce incidences related to Instrument Flight Rule operations.

Detailed Justification for - 2A10 Windshear Detection Service (WDS)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Windshear Detection Service (WDS)	$1,000	$2,500	$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Windshear Detection Services (WSDS) Sustainment 2	83	$3,000.0

What is this program and what does the funding level support?

This program provides automated wind shear and microburst alerts used by Air Traffic Controllers to warn pilots of immediate hazards to approach, landing, and departure at eighty-three airports. WSDS Sustainment 2 provides a nationwide technical refresh to keep legacy wind shear detection systems working after they exceed their planned, 20-year service lives. Without WSDS Sustainment 2, avoidable safety hazards to the National Airspace System would arise as WSDS providers fail, unable to be repaired or return to service. The program will address all obsolescence and supportability problems of the Low-Level Windshear Alert System and Weather Systems Processor.

- These systems detect microbursts and wind shear activity near runways and along approach/departure corridors

- Sustainment of these systems will allow Air Traffic Controllers to continue providing warnings to aircraft of hazardous wind shear and microburst conditions as they happen

For FY 2022, $3.0 million is requested to start the design, development and prototyping of the solution sets for sustainment tasks to address service life issues.

What benefits will be provided to the American public through this request and why is this program necessary?

The WSDS Sustainment 2 project assures automated wind shear and microburst alerts will be provided to Air Traffic Controllers, and by extension to pilots responsible to the flying public for safe arrival and departure at airports during thunderstorms, when wind shear and microburst hazards threaten. WSDS provider systems help aviation safety by giving accurate and timely warnings of hazardous conditions near runways and approach corridors. Since the legacy systems entered service twenty years ago, no major wind shear-related accidents have happened at protected airports due in part to their timely warnings, especially when hazards cannot be seen due to darkness and obstructions to vision aloft. WSDS Sustainment 2 will resolve all system obsolescence and maintainability shortfalls present after two decades in-service.

Detailed Justification for - 2A11 Air Traffic Management Implementation Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Air Traffic Management Implementation Portfolio	$50,000	$17,200	$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Traffic Flow Management System Enhancement 4	---	$1,000.0
B. Traffic Flow Improvements	---	2,000.0
C. Traffic Flow Management System Sustainment 3	---	5,000.0
D. In-Service Engineering	---	2,000.0

What is this program and what does the funding level support?

Throughout each day, Traffic Managers use Traffic Flow Management System (TFMS) to maintain near real-time situational awareness and predict areas that may experience congestion due to capacity reductions or unusual demand increase.

TFMS becomes especially important when external factors, such as adverse weather, reduces national airspace system capacity. This requires proactive planning, coordination and adjustments to mitigate impacts, for missed connections, canceled flights, increased fuel consumption, etc. resulting from the weather. The Air Traffic Control System Command Center uses TFMS to model and implement national airspace system wide Traffic Management Initiatives to make the most efficient use of available capacity to avoid gridlock and minimize delays.

A. TFMS Enhancement 4

This project is the current TFMS enhancement package, providing improved Traffic Flow Management capabilities. For FY 2022, $1.0 million is requested to complete the development of TFMS Release 15. This release includes updates to the TFMS Re-Route Impact Assessment, a "what-if" modeling tool that provides Traffic Management Specialists the ability to model, assess, and share the impact of a proposed reroute, prior

to initiation of the reroute. Re-Route Impact Assessment provides the tools for the specialists to verify that the reroute alleviates the targeted congestion area while not adversely causing congestion in other areas of the national airspace system. Re-Route Impact Assessment is a necessary precursor to the Improved Demand Predictions capability, which will improve TFMS predictions of demand for national airspace system resources to help reduce unnecessary delays. Re-Route Impact Assessment will also help improve TFMS stability.

B. Traffic Flow Improvements

This project was implemented to respond to stakeholder-identified inefficiencies in current Traffic Flow Management systems. The scope of these national airspace system improvements is limited to operational changes that do not require significant capital investments nor involve significant systems complexity, interdependencies, or national airspace system operational changes. This project will support operational and engineering analyses, solution development, and solution implementation activities designed to improve the delivery of Traffic Flow Management services.

For FY 2022, $2.0 million is requested to complete the following improvements:

- Modifications to the Departing Sequencing Program
- Migrating the Route Management Tool to the FAA Cloud
- Installation of Time Based Flow Management Support String equipment and software in four Terminal Radar Approach Control Facilities and at the William J Hughes Technical Center

C. TFMS Sustainment 3

This effort will perform a technology refresh of the Traffic Flow Management System Processing Center hardware that is at its end of service life. This will bridge the gap between TFMS and a new concept of operations being proposed in Flow Management Data and Services. Additionally, this work will modernize some of the remaining legacy user interface software applications supporting the TFMS that have become a cause for system outages.

Flow Management Data and Services will be a replacement system for TFMS, designed with a new architecture to maximize efficiency and flexibility, while making the best use of the existing Traffic Flow Management capabilities. This system will leverage a modern architecture design and provide new functionality deployed faster by separating the Data from the Services and Applications. Flow Management Data and Services will utilize Development and Delivery/Deployment via automation to greatly reduce cycle time as well as enable rapid development.

Development and Delivery/Deployment via automation aims at establishing a culture and environment where building, testing, and releasing software, can happen rapidly, frequently, and more reliably. Flow Management Data and Services will seek to utilize this to emphasize the collaboration and communication of software developers and other information-technology professionals while automating the process of software delivery and infrastructure changes.

For FY 2022, $5.0 million is requested to conduct the following:

- Create a "Bridge" activity to maintain the Traffic Flow Management Processing Center hardware until Flow Management Data and Services can be put into operation
- Continue investment and engineering analyses to define the solutions required to solve current software obsolescence issues
- Prepare an investment analysis case for replacing Traffic Flow Management System Processing Center hardware
- Prepare an investment analysis case to procure a new replacement system for TFMS

D. In Service Engineering

In-service engineering allows for immediate response and tactical distribution of resources to emerging technology solutions. For FY 2022, $2.0 million is requested for ongoing engineering support of air traffic management systems.

What benefits will be provided to the American public through this request and why is this program necessary?

The requested funding will reduce erroneous alerts presented to En Route Supervisors and improve accuracy of demand predictions, which yields better traffic management decisions. The program will improve the overall availability and reliability of the TFMS tools by integrating data for departure management and making data readily available to traffic management unit users. In addition, sustainment of the system will allow TFMS to maintain the overall operational availability within the national airspace system, enabling the Traffic Flow Management system and capabilities that reside on it to continue providing benefits that include:

- Greater system reliability, dependability and availability, enabling TFMS to achieve and sustain its full benefits of avoiding national airspace system delay as well as retain TFMS users trust

- Decrease maintenance and repair activities, thereby reducing time to repair which will reduce the impact of outages as well as avoid increased TFMS operational and support costs

Detailed Justification for - 2A12 Time Based Flow Management (TBFM) Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Time Based Flow Management (TBFM) Portfolio	$20,000	$20,000	$13,300

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Time Based Flow Management Enhancement 1	---	$3,900.0
B. Time Based Flow Management Sustainment 1	---	9,000.0
C. Independent Operational Assessment	---	400.0

What is this program and what does this funding level support?

The TBFM portfolio includes Sustainment and Enhancement initiatives that support the national airspace system. These capabilities enhance system efficiency by leveraging the TBFM decision-support tool, a system that has already been deployed to Continental United States Air Route Traffic Control Centers, select Terminal Radar Approach Control facilities and select Air Traffic Control Towers.

For FY 2022, $13.3 million is requested for the TBFM Portfolio to continue the integration, installation and deployment of TBFM tools. Improvements in TBFM's core Time-Based Metering capability and an expansion of TBFM tools to additional locations will enhance efficiency and optimize demand and capacity.

A. TBFM Enhancement 1

The core capabilities of the TBFM Enhancement 1 effort are Terminal Sequencing and Spacing and expansion of Integrated Departure/Arrival Capability. Terminal Sequencing and Spacing will provide efficient sequencing and runway assignment by making the time-based flight plan visible to the terminal controllers. Currently, visibility to the plan within the automation tool is lost as the flight is transferred from En route to terminal controllers. This visibility will allow efficiencies to be realized for the remaining 80 miles of airspace typically seen between the terminal boundary and runway. Integrated Departure/Arrival Capability streamlines and automates the monitoring and scheduling

process for aircraft departures. It identifies departure demands and available slots, assigns the slots to aircraft and de-conflicts departures. The Integrated Departure/Arrival Capability enables electronic negotiation of Call For Release process between tower and ARTCC instead of the manual phone call. This increases efficiency for departure operations.

For FY 2022, $3.9 million is requested for activities that include:

- Achieve operational suitability call for Terminal Sequencing and Spacing based on testing at William J. Hughes Technical Center
- Complete initial Terminal Sequencing and Spacing adaptation for the first TSAS site
- Improve time based metering capabilities at Philadelphia International Airport
- Provide enhancements (adaptation, software, and procedural) as identified per Independent Operational Assessment and initial Terminal Sequencing and Spacing operational use

B. TBFM Sustainment 1

Will replace existing hardware, increase the reliability of the current system and reduce operations costs. For FY 2022, $9.0 million is requested to:

- Complete Engineering Analysis for new hardware selection
- Complete hardware testing and key site testing activities for new hardware suite
- Complete hardware procurement
- Initiate hardware installation

D. Independent Operational Assessment:

For FY 2022, $400,000 is requested for an assessment to identify any safety hazards and operational concerns with TBFM capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

TBFM Sustainment will reduce maintenance costs of the existing hardware and continue sustainment of the TBFM system. It will ensure Operational Availability of 99.5 percent at the TBFM sites.

Detailed Justification for - 2A13 Next Generation Weather Processor (NWP)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Next Generation Weather Processor (NWP)	$24,300	$24,300	$48,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. NextGen Weather Processor (NWP)	---	$33,000.0
B. Common Support Services Weather	---	14,400.0
C. Independent Operational Assessment	---	800.0

What is this program and what does this funding level support?

Air Traffic Management 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 air traffic management decision support tools and 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. 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 than currently available.

A. Next Generation Weather Processor (NWP)

Will establish a common weather processing platform that will functionally replace legacy FAA weather processor systems and host new capabilities. NWP uses data from the FAA and National Oceanic and Atmospheric Administration radar and sensors, and forecast models. NWP includes sophisticated algorithms to create aviation-specific current and predicted weather information. NWP creates enhanced weather products that will be available via the Common Support Services-Weather system. It will perform the weather translation necessary to enable the use of weather information by automated decision support tools. For FY 2022, $33.0 million is requested to provide the following:

- Continue NWP Solution Development and Implementation activities

- Execute Project Management oversight by the government and its support organizations

- Complete NWP Aviation Weather Display (AWD) software development

B. Common Support Services-Weather

Will enable universal access and the standardization of weather information for dissemination to users by System Wide Information Management. Common Support Services-Weather will filter weather information by location and time. Consumers of the information published by Common Support Services-Weather will include air traffic controllers, traffic managers, commercial aviation, general aviation, and the flying public. This system 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. Common Support Services-Weather will also be scalable to facilitate the addition of new users and new systems.

This System will make improved weather products provided by NWP, the National Oceanic and Atmospheric Administration's NextGen Information Technology Web Services, and other weather sources, available to FAA and national airspace system users for input into collaborative decision-making. Common Support Services-Weather 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. For FY 2022, $14.4 million is requested to:

- Continue Common Support Services-Weather Solution Development and Implementation activities

- Execute Project Management oversight by the government and its support organizations

- Complete Common Support Services-Weather Release 1 integration testing

C Independent Operational Assessment:

Additionally, for FY 2022, $800,000 is requested for an assessment to identify any safety hazards and operational concerns with NWP and Common Support Services-Weather capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

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. Additionally, the production of advanced aviation specific weather information improves safety for the American public.

Detailed Justification for - 2A14 Airborne Collision Avoidance System X (ACASX)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Airborne Collision Avoidance System X (ACASX)	$6,900	$5,100	$500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Airborne Collision Avoidance System X	---	$500.0

What is this program and what does this funding level support?

ACAS X will replace the existing Traffic Alert and Collision Avoidance Systems that are required in airspace for all commercial aircraft with 30 or more seats and on all cargo aircraft greater than 33,000 pounds. The system is designed to prevent mid-air collisions. The current system has limitations and some shortfalls. ACAS X will reduce the number of "nuisance alerts" experienced by the current system while simultaneously providing a reduced probability of near mid-air collision.

For FY 2022, $500,000 is requested to support the continued deployment of ACAS X. Subject matter experts for the ACAS X program will support vendor outreach by means of engineering testing and evaluation support to vendors and initial operators as well as user outreach to pilots and air traffic control.

What benefits will be provided to the American public through this request and why is this program necessary?

Benefits include an increase in trust for ACAS X, reduction in workload for pilots and Air Traffic Controllers, faster and less expensive implementation of updates to ACAS X in the field, and improved safety when conducting operations under Instrument Meteorological Conditions.

Detailed Justification for - 2A15 Data Communications in Support of NextGen Air Transportation System

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Data Communications in Support of NG Air Transportation System	$136,248	$110,000	$110,250

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Data Communications – Segment 1 Phase 2 Initial Services	---	$5,600.0
B. Data Communications – Air Ground Internet Protocol Gateway	---	4,000.0
C. Segment 1 Phase 2 Full Services	---	27,700.0
D. Segment 1 Phase 1/2 DCIS Network Services	---	72,600.0
E. Independent Operational Assessment	---	350.0

What is this program and what does this funding level support?

The Data Communications (Data Comm) program will provide data communications between Air Traffic Control 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 National Airspace System benefits and lays the foundation for a data-driven National Airspace System.

Data Comm is needed to bridge the gap between current voice-only air traffic control and the data-intensive NextGen operations. 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 air traffic control message generation and exchange (hardware and software) and the communications data link between ground and airborne users. Current analog voice communications contribute to operational errors due to miscommunications, stolen clearances, and delayed messages due to frequency congestion. In FY 2004 and FY 2005, approximately 20 percent of En Route operational errors were voice communication related and, 30 percent of the high severity En Route operational errors

were deemed communications related. Data Comm significantly reduces communications related operational errors and improves the safety of air travel.

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 show airline operations are benefiting from reduced gate delay and taxi times and improved on-time performance. The busiest airport clearance delivery positions at the busiest airports are seeing the most dramatic benefit.

Data Comm services improves operations in the following manner:

- Improves flight efficiency due to improved controller and flight crew efficiency by providing automated information exchange
- Improves re-routing capabilities
- Provides more efficient routes for aircraft
- Decreases congestion on voice channels and provides an alternate communications capability
- Improves national airspace system capacity and reduces delays associated with congestion and weather
- Improves communication accuracy and safety with digital communication (i.e., reduced read/hear back errors, reduced loss of communications events)
- Reduces environmental impact due to less fuel burn and fewer emissions
- Reduces direct operating cost savings from increased throughput realized through reduced delays and improved communications

For FY 2022, $110.3 million is requested for the Data Comm program. This funding supports the deployment of Segment 1 Phase 2 Full Services, funding for the Data Comm Network Services, and investment analysis activities for the Air Ground Internet Protocol Gateway. In addition, the request will fund software upgrades for the avionics that enable Data Comm communications possible on the flight deck.

A. Segment 1 Phase 2 (S1P2) Initial En Route Services

For FY 2022, Data Comm is requesting $5.6 million for S1P2 Initial En Route Services. This funding will be used to complete the implementation, site testing, and training activities at the remaining Continental United States (CONUS) Air Route Traffic Control Centers (ARTCC). The funding will go towards En Route Automation modernization

(ERAM) prime vendor support of site testing, training, and fixing any software issues found during testing and implementation. Funding is also needed for program management, program control, operations and contract management support as well as second-level engineering support.

B. Air Ground Internet Protocol Gateway

For FY 2022, Data Comm is requesting $4.0 million for the Air Ground Internet Protocol Gateway. This funding will provide a ground system to support Internet Protocol Suite communications. This additional hardware and software will allow the Data Comm system to support Internet Protocol communications beyond the Future Air Navigation System. Future Air Navigation System consists of a legacy message set that enables communication between pilots and Air Traffic Control. This will also include the infrastructure to support advanced capabilities and additional research and development in the Data Comm Segment 2 timeframe. This will support the implementation of more advanced NextGen services such as 4 Dimensional Trajectories, Advanced Interval Management, Tailored Arrivals, Digital Taxi, and Dynamic Required Navigation Performance.

C. Segment 1 Phase 2 Full Service

For FY 2022, Data Comm is requesting $27.7 million for Segment 1 Phase 2 Full En Route Services. Activities will include the completion of software development integration test of Data Comm Full Services capabilities and the beginning of deployment. In addition, this funding will allow the vendor to provide specialty-engineering support related to system safety, security, human factors, and reliability engineering. The vendor will complete the test and evaluation process for Full Services and the program office will begin its implementation program. The program office will work with the vendors as well as Second Level Engineering to design scenarios, test processes and evaluation criteria, and deployment plans.

D. Segment 1 Phase 1 and Segment 1 Phase 2 DCIS Network Services

For FY 2022, $72.6 million is requested for network services. This funding will provide the Very High Frequency Data Link Mode 2 air ground network service that provides connectivity between the controllers and the cockpit. The Data Comm Network Services also include operations and maintenance, monitoring and control, network engineering and security, and certification suite activities. This Data Comm Network Service supports both Tower and En Route operations.

E. Independent Operational Assessment

For FY 2022, $350,000 is requested for an assessment to identify any safety hazards and/or operational concerns with Data Comm system capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

Data Comm will reduce operational errors associated with communications, enhancing the safety and efficiency of the National Airspace System. Data Comm will also reduce environmental impact due to less fuel burn and fewer emissions. The program will improve National Airspace System capacity and reduce delays resulting in estimated passenger value of time savings of $11.3 billion for Tower and Initial En Route Services over the program life cycle. The addition of Full Services capabilities will add another $734 million of passenger value of time savings over the program life cycle.

Detailed Justification for - 2A16 Offshore Automation (OA)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Offshore Automation (OA)	$1,000	$0	$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Offshore Automation	---	$10,000.0

What is this program and what does this funding level support?

The OA program objective is to standardize automation platforms that support control of En route and terminal airspace at the four non-continental United States facilities referred to as the offshore facilities: Anchorage Air Route Traffic Control Center, Honolulu Control Facility, Guam Center Radar Approach Control, and San Juan Center Radar Approach Control.

These facilities do not currently have an En Route Automation Modernization (ERAM) or a Standard Terminal Automation Replacement System (STARS) system to perform automation information for the air traffic controllers. The program plans to address the sustainability concern associated with the Offshore Flight Data Processing System at Honolulu that is reaching an end of life status. This problem is the result of hardware limitations with the mainframe computer as well as retention of legacy expertise.

The program will provide nationally supported standardized automation platforms that will bring the four facilities and their systems into better strategic alignment with the Continental United States National Air Space. The program will develop solutions to improve automation redundancy and resiliency, address future lifecycle challenges associated with these facilities and systems, and increase workforce flexibility by providing standardization to the offshore facilities.

For FY 2022, $10.0 million is requested to begin systems engineering and software development efforts. Final Investment Decision is scheduled for the first quarter of FY 2022.

What benefits will be provided to the American public through this request and why is this program necessary?

Offshore Automation will standardize the En route and the terminal systems utilized by air traffic control at Anchorage Air Route Traffic Control Center, Honolulu Control Facility, Guam Center Radar Approach Control, and San Juan Center Radar Approach Control facilities. The program will address sustainability risk; provide greater workforce efficiency and flexibility; and allow access to NextGen technologies.

Detailed Justification for - 2A17 Reduced Oceanic Separation

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Reduced Oceanic Separation	$32,300	$15,450	$7,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Advanced Surveillance Enhanced Procedural Separation (ASEPS)	---	$7,000.0

What is this program and what does this funding level support?

This program analyzes and evaluates enhancements in surveillance technology that can support reduced separation between aircraft and provide safety and efficiency benefits in oceanic Flight Information Regions.

For FY 2022, $7.0 million is requested to support efforts to better understand the suitability and potential benefits of applying Space-Based Automatic Dependent Surveillance - Broadcast services in the oceanic environment. These funds will support the development of a baseline capability that incorporates Space-Based Automatic Dependent Surveillance -Broadcast data into Advanced Technologies and Oceanic Procedures. It will also support an evaluation of the data's performance in three areas of the ocean: Shemya Island, Alaska; Bermuda; and a dozen small Pacific islands. This evaluation will help to identify desired enhancements for Space-Based Automatic Dependent Surveillance-Broadcast enabled oceanic operations. In FY 2022, the ASEPS team will also conclude an operational assessment of Space-Based Automatic Dependent Surveillance-Broadcast in the Caribbean as part of the initial offshore operations analysis.

FY 2022 work will include:

- Complete evaluation of Space-Based Automatic Dependent Surveillance - Broadcast performance in the Caribbean, and make recommendations for future use of Space-Based Automatic Dependent Surveillance – Broadcast services.

- Incorporate Space-Based Automatic Dependent Surveillance -Broadcast surveillance data into Advanced Technologies and Oceanic Procedures for use by air traffic controllers.

- Develop plans and begin preparations for air traffic controllers to monitor aircraft travelling in airspace around Shemya, Alaska; Bermuda; and a cluster of small islands in the South Pacific.

- Continue the analysis of contingency capabilities and industry engagement activities for future concepts to evaluate and mature the development of Space-Based Automatic Dependent Surveillance -Broadcast.

What benefits will be provided to the American public through this request and why is this program necessary?

These efforts will advance the FAA's understanding of the suitability and potential safety and efficiency benefits of using Space Based Automatic surveillance in oceanic environments. They will also support the Agency's development of a new operational concept for oceanic operations that includes enhanced, Very High Frequency-like communications and use of weather products paired with enhanced surveillance to make air travel safer and more efficient.

Detailed Justification for - 2A18 En Route Service Improvements

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
En Route Service Improvements	$2,000	$2,000	$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
En Route Service Improvements	---	$2,000.0

What is this program and what does this funding level support?

This program supports a category of requirements that address necessary and unplanned changes in the En route domain. These sudden needs are the result of operational changes in the field, unanticipated changes from external organizations like the International Civil Aviation Organization, third party data providers, neighboring Air Navigation Service Providers or potential cost-savings initiatives. The scope of these changes are limited to operational changes that do not require significant capital investments or involve significant systems complexity or system interdependencies. For FY 2022, $2.0 million is requested for operational analysis, engineering analysis, solution development, and solution implementation activities to improve the delivery of En route domain services.

This funding will be used to improve the presentation, access, and use of En Route Automation Modernization (ERAM) and other systems data by air traffic controllers and managers, resulting in more efficient, safer, and cost-effective delivery of En route services. These small but critical improvements are identified by current operations, and support FAA and/or International Civil Aviation Organization changes.

What benefits will be provided to the American public through this request and why is this program necessary?

This program will provide increased Air Traffic Management efficiency, improved target levels of safety, and enhanced productivity through the implementation of high priority

En route functional improvements. 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.

Detailed Justification for - 2A19 Commercial Space Integration

($000)

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Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Commercial Space Integration	$23,000	$11,000	$6,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Space Data Integrator - Prototype Sustainment	---	$1,000.0
B. Space Integration Capabilities Enhancement	---	5,500.0

What is this program and what does this funding level support?

The Commercial Space Integration into the National Airspace System program will automate the FAA's ability to monitor and respond to launch and reentry operations in the airspace. Many of the planned commercial space 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 national airspace system without significant disruptions to both space and air operators.

A. Space Data Integrator Prototype Sustainment:

For FY 2022 $1.0 million is requested to continue sustainment of the Space Data Integrator Prototype in the Commercial Space Integration lab. This prototype enables Proof-of-Concept work that supports integration of launch and reentry data. The Space Data Integrator Proof-of-Concept demonstrates the benefits of an integration system but is limited in capability.

B. Space Integration Capabilities Enhancement:

For FY 2022, $5.5 million is requested for investment analysis in preparation for Final Investment Decision in June 2022, as well as program implementation once the decision is made. This program will ensure the availability of airspace for space launch and reentry operations while minimizing the effect of these operations on other national

airspace stakeholders. The program will develop and subsequently implement Air Traffic Automation changes, to enable the integration of launch and reentry operations into the national airspace system.

What benefits will be provided to the American public through this request and why is this program necessary?

This program is necessary to support the increasing commercial space traffic within the national airspace system while maintaining the safety and overall efficiency of national airspace. This program will automate resource intensive processes and reduce the potential for human error during launch and reentry operations. This program will also maximize availability of airspace to support space operations, while minimizing the impact on other stakeholders such as major airlines, general aviation and the general flying public.

Detailed Justification for - 2B01 Terminal Doppler Weather Radar (TDWR-Provide

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Terminal Doppler Weather Radar (TDWR)	$2,200	$0	$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Terminal Doppler Weather Radar Sustainment 2	---	$500.0
B Terminal Doppler Weather Radar Sustainment 3	---	500.0

What is this program and what does this funding level support?

The TDWR is a Doppler weather radar system used by Air Traffic Controllers to increase the safety of the National Airspace System and provide vital information and warnings regarding hazardous wind shear conditions to air traffic controllers managing arriving and departing flights in the terminal area. The current system is facing serious obsolescence issues and has been in service since 1994. This program will extend the service life of the system and replace TDWR components not addressed in previous efforts that have deteriorated due to aging or have otherwise become obsolete or unsupportable. This sustainment program will enable these systems to continue to provide safety and traffic management services throughout the national airspace system.

For FY 2022, $500,000 is requested to perform implementation of technology refresh modification kits for TDWR Sustainment 2. In addition, $500,000 is requested for preparation activities for a Final Investment Decision for TDWR Sustainment 3 planned for the first quarter of FY 2023.

What benefits will be provided to the American public through this request and why is this program necessary?

FAA has an agreement with the National Weather Service to provide TDWR data. Operational benefits of the system include the real-time detection of microbursts, gust

fronts, wind shifts, and precipitation, as well as prediction of wind changes that allow improved airfield efficiency when making runway changes. Weather-related delays have been reduced since TDWR implementation, allowing savings in aviation fuel consumption. The program will lower TDWR operations costs and eliminate outages.

Detailed Justification for - 2B02 Standard Terminal Automation Replacement System (STARS)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Standard Terminal Automation Replacement System (STARS)	$41,300	$74,900	$63,697

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. STARS Sustainment 3	---	$58,697.0
B. STARS Sustainment 4	---	5,000.0

What is this program and what does this funding level support?

STARS is used by Air Traffic Controllers to ensure the safe separation of both military and civilian aircraft within the nation's terminal airspace. It is a real-time digital processing and display system that replaced legacy air traffic control automation equipment at:

- 148 FAA and 91 Department of Defense Terminal Radar Approach Control facilities totaling 239
- 430 FAA and 173 DoD Air Traffic Control Tower facilities totaling 603
- More than 100 systems installed and maintained at the STARS support sites that include Operational Support Facilities and the FAA Academy.

A. STARS – Sustainment 3

Will enable the FAA to replace key elements of STARS that have reached their end of life and/or are no longer compatible with current commercial offerings. This investment will deploy products required to mitigate end of life technology issues and will ensure continued STARS reliability, maintainability, and availability. For FY 2022, $58.7 million is requested for the following work:

- Deploy the new Operating System at 50 sites

- Deploy Digital Video to all Terminal Control Workstations and Tower Display Workstations at all G4 sites. The STARS Full G4 configuration is dual-threaded and quadruple redundant, including a Full-Service Level and Emergency Full-Service Level thread, each with two channels for redundancy

- Deploy X4000 Replacement Processors and Digital Recording Device

- Transition Time Division Multiplex based communication to Internet Protocol based communication at remote towers

- Program Office Support for program management, training, deployment, systems engineering and logistics

B. STARS – Sustainment 4

This investment will provide engineering, development and deployment activities that will enable the FAA to replace key components of STARS that have reached their end of life and are no longer compatible with current commercial offerings. Continued sustainment investments for STARS are necessary to maintain system performance levels, respond to future security threats, and continued support for Terminal Radar Approach Control operations by replacing obsolete components with modern technology.

For FY 2022, $5.0 million is requested to fund planning work for the next phase of sustainment activities for STARS. The program will evaluate and implement:

- Operating System Updates

- Front-Room Modernization

- Back Room Core Rack Redesign

- STARS Processor and Digital Recording Device Updates and Bulk Buy

What benefits will be provided to the American public through this request and why is this program necessary?

STARS infrastructure can be expanded and extended to meet increased traffic demands and accommodate the introduction of new automation functions necessary for improved safety, efficiency, and capacity. STARS is the principal tool used by air traffic controllers in and around airport terminal facilities for controlling aircraft.

Detailed Justification for - 2B03 Terminal Automation Program

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Terminal Automation Program	$6,500	$3,900	$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Flight Data Input/Output Sustainment	---	$2,000.0
B. Terminal Improvements	---	2,000.0

What is this program and what does this funding level support?

A. Flight Data Input/Output Sustainment

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. This information assists controllers in tracking aircraft, providing departure clearances, and anticipating the arrival of aircrafts in the sector under their control. The Flight Data Input/Output Sustainment program replaces end-of-life and obsolete equipment with fully compatible commercial off the shelf and modified commercial of the shelf equipment. In addition to replacing components, this project will support a common Internet Protocol infrastructure that supports future automation systems architecture, and the Terminal Flight Data Manager System (TFDM).

For FY 2022, $2.0 million is requested to continue the procurement of hardware and software, provide program management support, procurement and installation of replacement Flight Data Input/Output components at FAA and Department of Defense air traffic control facilities, and all related logistics.

B. Terminal Automation Modernization Improvements
Support a category of requirements that address necessary and unplanned changes to various systems in the Terminal domain. These sudden needs are the result of operational changes in the field, unanticipated changes from external organizations like

the International Civil Aviation Organization, third part data providers, neighboring Air Navigation Service Providers or potential cost-savings initiatives. The scope of these improvements is limited to changes that do not require significant capital investments or involve significant systems complexity. For FY 2022, $2.0 million is requested to improve the presentation, access, and use of terminal automation systems data by air traffic controllers and managers, resulting in more efficient, safer, and cost-effective delivery of terminal services.

What benefits will be provided to the American public through this request and why is this program necessary?

These projects reduce the operating and maintenance costs associated with maintaining aging hardware and software, extend the service life of the systems and provide the latest technology and security features.

Detailed Justification for - 2B04 Terminal Air Traffic Control Facilities – Replace

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Terminal Air Traffic Control Facilities – Replace	$24,327	$55,000	$331,165

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Terminal Air Traffic Control Facilities – Replace	---	$331,165.0

What is this program and what does this funding level

This program is included in the Air Traffic Control Facilities Replacement Portfolio. Funding the programs will improve and maintain the facility condition index rating at FAA facilities that provide the backbone for the National Airspace System.

The FAA provides air traffic control services from more than 500 Air Traffic Control Towers and Terminal Radar Approach Control facilities. Under this program, the FAA evaluates which buildings need to be replaced, sustained, or modernized to ensure an acceptable level of building conditions and to meet current and future operational requirements. The average age of Air Traffic Control Towers in the FAA portfolio is 33 years, and the average age of a Terminal Radar Approach Control facility is 26 years. There are facilities that are 65 years old. In some cases, Air Traffic Control Towers and Terminal Radar Approach Control facilities built 20 years ago do not meet today's Occupational Safety and Health Administration, operational, and building requirements. As a direct result of insufficient and often unpredictable funding, we now manage a $665.0 million backlog of Terminal Facilities projects.

FAA has a number of Terminal Air Traffic Control facilities that have problems that impede Air Traffic Control operations. Those issues include line of site issues that prevent Air Traffic Control from being able to view all runways and taxiways on the airport grounds, overcrowding of the facility, and structural issues related to the increases in seismic activity in those areas. 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.

Segment 1 funding in the amount of $11.2 million is requested for FY 2022 to support advance requirements definition. Activities supported under Segment 1 include the evaluation of unique operational and maintenance requirements that impact the Air Traffic Control Tower and Terminal Radar Approach Control facilities, the development of business cases, mock-ups of the Airport Facilities Terminal Integration Laboratory to assist with the evaluation of the attributes of proposed airport sites, actual site selection, and other advance engineering considerations.

Segment 2 funding in the amount of $13.0 million is requested for FY 2022 to support the design phase of an Air Traffic Control Tower and Terminal Radar Approach Control replacement project at the requested facilities to include $4.0 million at Des Moines, Iowa $4.0 million at El Paso, Texas, $2.5 million at San Jose, California, and $2.5 million at HillsboroOergon.

Segment 3 funding in the amount of $292.0 million is requested in FY 2022 to support construction costs associated with the new the Air Traffic Control Tower and Terminal Radar Approach Control facility at requested facilities to include $55.0 million at Greer, South Carolina, $55.0 million at Grand Forks, North Dakota, $77.0 million at Nashville, Tennessee, and $105.0 million at Anchorage, Alaska .

Segment 4 funding in the amount of $10.0 million is requested for FY 2022 for one facility to procure equipment and utilities installation at Charleston, South Carolina Terminal Radar Approach Control.

Segment 5 funding in the amount of $5.0 million is requested for FY 2022 for one facility. This segment funds the disposition, demolition and decommissioning of the facility that has been replaced. The facility included in this request is Teterboro, New Jersey Air Traffic Control Tower.

What benefits will be provided to the American public through this request and why is this program necessary?

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 Air Traffic Control Tower and Terminal Radar Approach Control
- Providing adequate space and infrastructure for new modern equipment and systems

- 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 - 2B05 Air Traffic Control Tower (ATCT)/Terminal Radar Approach Control (TRACON) Facilities – Improve

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
ATCT/TRACON Facilities – Improve	$96,200	$84,600	$92,980

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. ATCT/TRACON Sustainment	---	$71,980.3
B. Facilities Realignment Implementation	---	20,000.0
C. In-Service Engineering	---	1,000.0

What is this program and what does this funding level support?

ATCT/TRACON Terminal Facilities Improve is one of the programs included in the FAA's Air Traffic Control Facilities Sustainment Portfolio. More than fifty percent of the Terminal Facilities in the NAS infrastructure are more than 40 years of age and need improvement projects to bring Facility Condition Index scores into the "Good" range. As a direct result of insufficient often unpredictable funding, we now manage a $665.0 million backlog of Terminal Facilities projects. For FY 2022, $93.0 million is requested for the following:

A. ATCT/TRACON Sustainment

For FY 2022, $72.0 million is requested to initiate modifications, improvements, sustainment and repairs to ATCT/TRACON facilities. Funding will also support system engineering activities, configuration management, facility planning, facility condition assessments and program support services.

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. It will also improve the operational efficiency and environment of equipment within

ATCT/TRACON facilities. The upgrades and improvements to terminal facilities support the national airspace system, modernization strategy to achieve efficient aerospace systems and operations. Facility improvements must incorporate new requirements for relocated or replaced equipment with minimal impact to existing operations.

The program funds an average of 50 sustainment projects each year. Sustainment is defined as activities to continue the national airspace system/terminal service mission critical capability by modifying, repairing, replacing, and reconfiguring. Routine and ongoing maintenance activities are not funded from this program. The sustainment projects include many sites throughout the national airspace system and consist of efforts such as mechanical, electrical, elevators and plumbing.

B. Facility Realignment Implementation

For FY 2022, $20.0 million 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. This project will fund the implementation of realignment recommendations submitted by the FAA Administrator to Congress. The Facility Realignment Implementation efforts include planning, implementation, and disposition activities related to the approved projects in Terminal and En route facilities. Currently approved projects include the following facilities:

- Terre Haute, Indiana (HUF)
- Indianapolis, Indiana (IND)
- Reading, Pennsylvania (RDG)
- Harrisburg, Pennsylvania (MDT)
- Binghamton, New York (BGM)
- Elmira, New York (ELM)
- Wilkes Barre, Pennsylvania (AVP)
- Waterloo, Iowa (ALO)
- Des Moines, Iowa (DSM)
- Bakersfield, California (BFL)
- Fresno, California (FAT)
- Peoria, Illinois (PIA)
- Springfield, Illinois (SPI)
- St. Louis, Missouri (T75)
- Pasco, Washington (PSC
- Spokane, Washington (GEG).

C. In-Service Engineering

Also requested is $1.0 million for in-service engineering to promote the improvements and allow for immediate response and tactical distribution in response to emerging solutions.

What benefits will be provided to the American public through this request and why is this program necessary?

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 those facilities and reduce the risk of air traffic control outages by providing safe, secure, resilient, and efficient buildings that meet modern codes. These improvements reduce the ongoing cost of operational maintenance at these facilities.

Facility alignments are expected to deliver cost savings, cost avoidance, and staffing and operational efficiencies upon implementation and may continue to accrue overtime.

Detailed Justification for - 2B06 National Airspace System Facilities Occupational Safety and Health Administration (OSHA) and Environmental Standards Compliance

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
National Airspace System Facilities OSHA and Environmental Standards Compliance	$40,400	$28,900	$24,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
National Airspace System Facilities OSHA and Environmental Standards Compliance	---	$24,000.0

What is this program and what does this funding level support?

The Air Traffic Organization National Airspace System Facilities OSHA and Environmental Standards Compliance Program provides occupational safety and environmental risk management technical expertise. This work supports compliance with applicable safety and environmental protection standards and mitigate identifiable hazards in the Air Traffic operational workplace.

Air Traffic Organizations acquisitions, installations, modifications, and operations must comply with a wide variety of safety and environmental protection standards. These governing areas range from fire and life safety, electrical safety, and fall protection for our facilities through the storage and disposition of hazardous wastes and materials.

The Environmental and Occupational Safety and Health (EOSH) Services provide safety and environmental protection and risk management support management expertise through the life cycle of Air Traffic operations. EOSH professionals consult in the planning phases of retrofitted and new construction efforts to mitigate risks and even completely engineer out hazards at 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 include educational opportunities focused on safety and environmental risks, application of risk awareness and mitigation techniques through modification of existing Air Traffic assets. The EOSH program performs data analyses to identify, track, and mitigate emerging or recurrent risk concerns.

EOSH program risk management efforts include:

- Protect employees and the environment
- Prevent damage and loss of FAA resources
- Promote a culture of safety and environmental responsibility

For FY 2022, $24.0 million is requested to provide technical compliance expertise to address Federal, State, and local environmental and safety regulations and binding commitments. Primary focus areas include:

- Employee Health/Industrial Hygiene
- Fire and Life Safety
- Fall Protection
- Environmental Compliance
- Occupational Safety
- Service Area Technical Implementation
- Electrical Safety Hazard Analysis
- Asbestos
- Confined Space
- Job Hazard Analysis
- Requirements and Compliance Assurance

Non-compliance with Federal, State, and local environmental, safety, health, legal, and other requirements imposes significant liabilities on the FAA. These can be in the form of personnel injury or loss, interruptions to national airspace system operations, violations of bargaining unit agreements, post-incident response actions (such as costly cleanups), and a decrease in employee morale. Failing to manage safety and

environmental risks also incurs short term and long term financial impacts for the agency. Employee injuries directly affect not only the injured worker, with lost time and productivity. They 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 and why is this program necessary?

The program goal 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. These efforts reduce occupational safety and environmental risks, resulting in a safer, healthier workforce, reduced employee injuries and associated costs, a strong agency compliance posture, and reduced impacts to FAA operations. These efforts also put the FAA in compliance with several Federal and State compliance regulations.

Detailed Justification for - 2B07 Integrated Display System (IDS)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Integrated Display System (IDS)	$24,000	$30,000	$30,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Enterprise Information Display System (E-IDS) Phase 1	---	$30,000.0

What is this program and what does this funding level support?

In the national airspace system, Information Display Systems (IDS) are used operationally in facilities that include; En Route Air Route Traffic Control Centers, Terminal Radar Approach Control facilities, Center Radar Approach Control facilities, and Airport Traffic Control Towers. These systems provide air traffic controllers across the entire country with auxiliary information that complements the information provided on their primary displays (i.e., radar displays). External entities (e.g., Department of Defense, airlines, airport authorities) also use or interface with these IDS.

Information displayed on IDS consists of dynamic information like weather observations from airport surface weather sensors, airport runway status, visibility information, and static information such as airport diagrams, approach charts, and facility directives. The FAA plans to address obsolescence and end-of-life issues of older IDS systems as well as separate maintenance, sustainment, and logistics pipelines. Additionally, the work under this program will allow the IDS systems to interface and integrate with NAS Enterprise Services and System Wide Information Management enabled information services and make these systems compliant with existing and future national airspace security policies.

E-IDS will replace five legacy IDS currently in use at just over 450 facilities. The IDS being replaced are:

- Information Display System Model 4, Automated Surface Observing System Controller Equipment-IDS, and NAS Information Display System are all used in the Terminal Environment

- En Route Information Display System are used at Air Route Traffic Control Centers

- Air Traffic Control Specialist Auxiliary Information Display used in the Anchorage, Alaska Air Route Traffic Control Center

This program will replace legacy IDS with an enterprise system consisting of a common hardware and software platform. The approach provides a standardized configuration that simplifies the logistics pipeline, reduces training needs, and provides national configuration management. The new E-IDS will allow users to work efficiently by providing timely display and correlation of relevant operational information simultaneously on an integrated geospatial display.

E-IDS will provide each user access to information coupled with accurate data filtering, easy-to-use sorting and searching capabilities, and quick reference information. Information managed and displayed will include Notices to Airmen, Special Activity Airspace schedule information, weather products, Pilot Reports, and facility-specific information entered by users

For FY 2022, $30.0 million is requested to support the prime contract development of preliminary software specifications and system architecture design; and draft development test and operational test plans. The funding will also include contractors for program management support such as program control, budget, earned value management, and risk management.

What benefits will be provided to the American public through this request and why is this program necessary?

E-IDS will provide multiple safety benefits to the American public. E-IDS will provide increased productivity, user efficiency, and national airspace system safety by displaying, entering, and distributing Notices to Airmen, and access to Special Activity Airspace schedule and status. This system will also enhance safety in the national airspace system with Pilot Reports collection and distribution across the system enterprise and to other national airspace system users. Improving national airspace system resiliency by supporting faster recovery during adverse events and providing required operational position information to any other properly configured position in the national airspace system will support Air Traffic Management service providers in maintaining continuity of operations.

By replacing multiple legacy IDS systems that are approaching obsolescence, E-IDS as a single system will also reduce sustainment costs and increase program oversight efficiencies compared to the cost of maintaining current multiple legacy IDS systems.

Detailed Justification for - 2B08 Terminal Flight Data Manager (TFDM)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Terminal Flight Data Manager (TFDM)	$135,450	$79,050	$85,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Terminal Flight Data Manager (TFDM)	---	$84,900.0
B. Independent Operational Assessment	---	500.0

What is this program and what does this funding level support?

The Terminal Flight Data Manager (TFDM) program will provide the equipment and software for the collection, distribution, and update of electronic flight data information in the terminal area, and will improve access to information for the safe and efficient control of air traffic. TFDM decision support tools will improve system efficiency by developing runway-specific departure schedules, predicting capacity-demand imbalances and allowing for the implementation of metering programs that reduce congestion on the airport surface. TFDM will automate manual flight data processes to enable enhanced data sharing between the Tower, En Route, Approach Control, Traffic Flow Management and Flight/Airline Operations Centers.

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 air traffic control facilities, and those overseeing traffic flow management systems. This will also facilitate data exchange with key stakeholders such as the airlines' flight operations centers and airport operators to share real-time updates on expected departure times, gate changes and runway assignment requests. 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 air traffic control 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. TFDM will provide the basis for efficient management of traffic flows on the surface at U.S. airports. It will transition airport surface operations from a "first come, first served" model (all planes lining up on the taxiway with engines running waiting to take off). TFDM will create a strategic model that allocates taxi clearances to minimize taxi time (planes are given a specific time slot for departure and they start engines and leave the gate at that precise time to taxi and take off). This will reduce fuel burn and greenhouse gas emissions.

The Final Investment Decision was approved and the prime contract was awarded in June 2016. The program's implementation plan is based on a two software build approach (Build 1 and Build 2) and deployment to 89 airports from FY 2020 to FY 2029. The Build 1 software provides the electronic flight data capabilities, while the Build 2 software provides the decision support capabilities to enable TFDM surface scheduling and metering. TFDM is currently in the Development and Testing phase and starting the implementation activities. The program has completed the following key milestones:

Build 1 Key Milestones:
- System Requirements Review
- Critical Design Review
- Development Test Complete
- Operational Test Start

Build 2 Key Milestones
- System Requirements Review
- Critical Design Review

A. TFDM

This program will integrate into the national air space system 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. In FY 2018, TFDM began providing incremental funding for these other systems and will conclude with the Traffic Flow Management System in FY 2022.

For FY 2022, $84.9 million is requested for the Implementation of TFDM Build 1 and the continued System Development of TFDM Build 2. The Prime Contract costs for FY 2022 will cover the anticipated key milestones outlined below. They will also provide Program Management and Technical Support resources to support the TFDM Program Office and the Systems Operations office (a TFDM stakeholder) in the planning, oversight and management of the Prime Contractor. The remaining FY 2022 funding will provide the TFDM Program Office with the test resources required to oversee and witness the Formal System Test activities and conduct the Operational Test. Additionally, the funding will provide resources needed to support further preparation for the implementation of the TFDM system into the national airspace system.

The FAA is continuing to evaluate the impact of the Pandemic on program schedules.

Anticipated key milestones for FY 2022 are summarized below:

- Complete site surveys at six sites
- Complete hardware installations at four sites
- Complete Build 1 Operational Test (Acquisition Program Baseline milestone)
- Achieve Build 1 Key-Site Initial Operational Capability (Acquisition Program Baseline milestone)
- Conduct Build 1 Independent Operational Assessment (Acquisition Program Baseline milestone)
- Achieve Build 2 Development Test (Acquisition Program Baseline milestone)
- Achieve Initial Operating Capability at three sites

B. Independent Operational Assessment

For FY 2022, $500,000 is requested for an assessment to identify any safety hazards and/or operational concerns with Build 1 activities.

What benefits will be provided to the American public through this request and why is this program necessary?

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 national airspace system. 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 resulting from this program are expected to improve both the efficiency of individual flights while optimizing runway throughput. This system will make air travel safer for the flying public, help reduce passenger delays leading to a better traveling experience, and contribute to less pollution.

Detailed Justification for - 2B09 NextGen – Performance Based Navigation (PBN) Support Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Performance Based Navigation (PBN) Support Portfolio	$5,000	$8,000	$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Distance Measuring Equipment Support for PBN	14	$8,000.0

What is this program and what does this funding level support?

Performance Based Navigation (PBN) uses Area Navigation and Required Navigation Performance to improve access and flexibility in the national airspace system with the goal of providing the most direct and efficient aircraft routes possible. This begins with leaving the departure runway to arriving at the destination 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. In support of PBN, the objective of NextGen Distance Measuring Equipment Program is to provide a resilient network to continue PBN operations during a Global Navigation Satellite System disruption. The program will add Distance Measuring Equipment systems to the existing network to eliminate single points of failure and fill coverage gaps to enable Area Navigation for equipped aircraft.

For FY 2022, $8.0 million is requested for program management, system engineering, logistics support, procurement of four Distance Measuring Equipment systems, and complete the installation of 10 systems to support Area Navigation coverage.

What benefits will be provided to the American Public through this request and why is this program necessary?

These resources benefit the American public by allowing pilots flying aircraft equipped with Area Navigation avionics to continue PBN operations in the event of a Global Navigation Satellite System outage. This will maintain flight efficiency, reduce delays and reduce carbon emissions and noise, thereby providing an environmental benefit. DME/DME Area Navigation service will be available to the 30 percent of commercial aircraft that are not equipped with Inertial Reference Unit (a capability which enables the aircraft to navigate through coverage gaps up to 33 nautical miles), significantly reducing the impact on pilot/controller workload during GNSS disruptions, thereby improving safety. The NextGen Distance Measuring Equipment Program will discontinue existing Distance Measuring Equipment facilities that are not needed for Area Navigation, thereby reducing maintenance costs for equipment, facilities, and instrument flight procedures.

Detailed Justification for - 2B10 Unmanned Aircraft System (UAS) Implementation

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Unmanned Aircraft System (UAS) Implementation	$28,400	$26,600	$31,300

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Small Unmanned Aircraft Systems (UAS) Implementation	---	$28,400.0
B. FAA Drone Zone	---	2,900.0

What is this program and what does this funding level support?

The FAA introduced new and updated regulations to manage the influx of Small UAS into the national airspace system. As a result, of these new regulations, rapid implementation was necessary to manage public interactions and expedite internal FAA business processes. These projects will create the framework needed to allow UAS to operate safely without impact to manned aircraft operations or creating disruptions and delays.

A. Small Unmanned Aircraft Systems (UAS) Implementation

This program is used to operationalize and implement new UAS Traffic Management programs and capabilities. Two UAS traffic management capabilities that will be in the implementation phase in FY 2022 are Low Altitude Authorization and Notification Capability and Remote Identification.

Low Altitude Authorization and Notification Capability (LAANC): is an enterprise capability to automate the FAA's ability to grant authorizations allowing small UAS operators to fly in controlled airspace. Each enhancement is the result of data gathered by stakeholders both in and outside of the FAA and by ongoing usage and integration within the air traffic management community. Low Altitude Authorization and Notification Capability enhancements will mature as concepts, then as requirements and

operating rules, and then will be implemented to realize the operational enhancement. The program office anticipates an incremental developmental approach that introduces capabilities over a yearly cycle through prototyping and national rollouts. For FY 2022, $28.4 million is requested to:

- Complete requirements, software development and implementation of UAS Service Suppliers Performance Rules enhancements to Low Altitude Authorization and Notification Capability. This includes:
    - Capability enhancements related to revised UAS Facility Maps structure update
    - Development of functionalities supporting Part 107 Policy updates (Night Operation Functions, Operations Over People, etc).
- Complete training and policy enhancements for use by air traffic managers on new capabilities
- Complete implementation of Low Altitude Authorization and Notification Capability at select Department of Defense sites
- Implement Enterprise Service solution for UAS Data Correlation for Low Altitude Authorization and Notification Capability and Drone Zone.

UAS Services: Supporting complement of enterprise and secondary services developed in support of LAANC and future UAS data exchanges, including support to FAA implementation of Remote Identification.

- Incorporate enhancements for user interface to access correlated UAS data
- Integrate and enhance common authentication and common logging and monitoring services
- Define and operationalize additional services supporting FAA implementation of Remote Identification

B. FAA Drone Zone

This is a cloud-based Information Technology platform that hosts multiple applications and supporting infrastructure. Applications include a small UAS Registration System, Part 107 Airspace Authorizations/Waivers, Part 107 Operational Waivers and UAS Accident Reporting. Additionally, the FAA Drone Zone platform supports the backend Information Technology systems that run Low Altitude Authorization and Notification Capability. Funding will be used in all stages of Agile software development, database management, enterprise architecture, release management, functional/user acceptance testing, security testing, development support and project management support. For FY 2022, $2.9 million is requested to:

- Develop products and continue enhancements beyond the initial operating capability to improve the public user experience and increase efficiency of internal business processes that are required for the operation of small UAS capability in the national airspace system.

- Part 107 Waiver Enhancement development work will be the final phase of the Waiver Application process called the product enhancements. The product enhancements will meet updated waiver policies and complete the system beyond the initial operating capability.

- Part 91 Certificate of Authorization Application Processing System allows the Public, Civil or Department of Defense (DoD) to request a Certificate of Authorization for a specific or blank flight operation. The product usability enhancements will be the final phase of the project and complete the product in a production environment for submitting Public, DoD and Civil Part 91 requests from the FAA Drone Zone.

What benefits will be provided to the American public through this request and why is this program necessary?

The UAS programs play a critical role in enabling UAS operations in the national airspace system without impacting manned aircraft operations and creating disruptions or delays, and ensuring operations will be as safe as or safer than they are today. Government cost of allowing UAS operations will decrease from the reduction of "exception handling" of UAS flights. Improvements to national airspace system capabilities and operations will be made cost effective due to the integrated framework approach to addressing needs and solutions.

Detailed Justification for - 2B11 Airport Ground Surveillance Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Airport Ground Surveillance Portfolio	$19,000	$27,350	$28,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Airport Surface Detection Equipment – Sustainment	---	$20,000.0
B. Runway Status Lights Sustainment	---	5,000.0
C. Navigation Aids Monitoring Equipment	---	3,000.0
D. Independent Operational Assessment	---	400.0

What is this program and what does this funding level support?

This program maintains surface safety by ensuring continuing functionality of all surface surveillance capabilities that have led to increased runway safety, improved efficiency in air traffic, and increased airport throughput.

A. Airport Surface Detection Equipment Sustainment

This Sustainment program will address maintainability and obsolescence issues associated with the Airport Surface Detection Equipment-Model X and Airport Surface Surveillance Capability systems. The existing Airport Surface Detection Equipment-Model X systems at 35 airports and Airport Surface Surveillance Capability systems at nine airports are surface surveillance systems that use radar, multilateration (a surveillance technique based on measurement of the times of arrival of aircraft and vehicle transponder signals at multiple receivers), and Automatic Dependent Surveillance-Broadcast to track aircraft and vehicles. These systems help air traffic controllers prevent surface collisions and reduce runway incursions by improving situational awareness.

The Airport Surface Detection Equipment Sustainment activity will address the following:

- Aging non-cooperative Surface Movement Radars

- Airport Surface Detection Equipment-Model X and Airport Surface Surveillance Capability obsolescence, depleting inventory levels, and necessary technological updates with processors, remote units, and ancillary equipment

The program received its Investment Analysis Review Decision in the third quarter of FY 2020. The timeline for sustainment activities is a 10-year window from FY 2020 to FY 2029. For FY 2022, $20.0 million is requested to continue sustainment activity.

B. Runway Status Lights Sustainment

This sustainment activity will address maintainability, obsolescence, and information technology security issues associated with the Runway Status Lights system. Replacing obsolete Commercial Off-the-Shelf hardware with newer generation hardware and updating the software to current technology will ensure the continued sustainable, reliable and cost-effective operation of the system throughout its life cycle. The Runway Status Lights system integrates airport lighting equipment with 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 the runway. The system has automated light control logic that commands in-pavement lights to illuminate red when there is traffic on or approaching the runway.

The Runway Status Light Sustainment activity will address the following:

- Aging Field Lighting System, including the Individual Light Controller and Master Light Controller

- Obsolescence, depleting inventory levels, Information System Security deficiencies and necessary technological updates

The program received its Investment Analysis Review Decision in the third quarter of FY 2020. The timeline for sustainment activities is a 10-year window from FY 2020 to FY 2029. For FY 2022, $5.0 million is requested to continue first article testing and implementation.

C. Navigation Aids Monitoring Equipment

The Navigation Aids Monitoring Equipment project will replace or upgrade legacy air traffic control and monitoring systems operating in the national airspace system. Two legacy systems are used at 32 airports in the national airspace; the Interlock Control and Monitoring System and the FA-30000. These systems, typically located in the tower and equipment room, are used by air traffic control specialists and airway transportation system specialists for controlling and monitoring a predefined set of Navigation Aids. These systems include Instrument Landing Systems, Airport Lighting Systems, Runway Visual Range equipment, Runway End Identifier Lights, Precision Approach Path

Indicator light arrays, and other Navigation Aids located at an airport. This project received a Final Investment Decision in December 2020.

For FY 2022, $3.0 million is requested to continue execution of the Navigation Aids Monitoring Equipment project baseline that will be established at Final Investment Decision.

D. Independent Operational Assessment

In addition, $400,000 is requested for an assessment to identify any safety hazards and/or operational concerns Navigation Aids monitoring equipment system capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

This program aligns with the FAA Strategic Initiatives and Goals of enhancing runway safety while maximizing operational efficiency and ensuring airport capacity. The reduction of runway incursions has been identified as one of the FAA's most important aviation safety initiatives.

Detailed Justification for - 2B12 Terminal and En Route Surveillance Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Terminal and En Route Surveillance Portfolio	$62,500	$78,600	$55,373

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Air Traffic Control Beacon Interrogator Model 6 Sustainment	---	$7,000.0
B. Air Traffic Control Beacon Interrogator Model 5 Sustainment	---	900.0
C. Airport Surveillance Radar Model 9 Sustainment 3	---	8,100.0
D. Airport Surveillance Radar Model 9 Sustainment 4	---	5,500.0
E. Airport Surveillance Radar Model 8 Sustainment 1	---	4,323.0
F. Airport Surveillance Radar Model 11 Sustainment 3	---	11,500.0
G. Mode Select Sustainment 3	---	15,900.0
H. In-Service Engineering	---	2,150.0

What is this program and what does this funding level support?

The current stock of FAA Primary Surveillance Radars and Secondary Surveillance Radars are aging. This inventory includes systems such as the Air Traffic Control Beacon Interrogator-5 and the Airport Surveillance Radar-8, which were both originally fielded in the 1970s, and the Airport Surveillance Radar Model 9, which was originally fielded in the mid-1980s. While many of these systems will eventually be replaced, they must be maintained until replacement systems are fully fielded, preventing gaps in radar coverage. Many of these radar systems will remain in place and require sustainment past 2035.

The Terminal and En Route Surveillance Technology Refresh Portfolio is being developed to consolidate, prioritize, and manage sustainment activities for the ground-based radar surveillance systems until they are replaced or divested from the national

airspace system. The sustainment portfolio Investment Analysis Readiness Decision is planned for September 2021 and will be managed through 2029.

A. Air Traffic Control Beacon Interrogator Model 6 Sustainment 1

The Air Traffic Control Beacon Interrogator Model 6 is a Monopulse Secondary Surveillance Radar with selective interrogation capability that significantly improves the accuracy of aircraft position and altitude data provided to air traffic control automation systems. The original Air Traffic Control Beacon Interrogator Model 6 project commissioned the first system in FY 2002 and the last system in FY 2013. The project plans to procure form, fit, and function and/or redesign replacements, as required for 132 operational and seven support systems to ensure sustainment until divested or replaced. For FY 2022, $7.0 million is required for contractor support, program management, second level engineering analysis, and procurement of floppy disk drives, global positioning system time source/plot extractors and the position adjustable range reference orientation transponder site monitoring hardware.

B. Air Traffic Control Beacon Interrogator Model 5 Sustainment 1

The Air Traffic Control Beacon Interrogator Model 5 is a Cooperative Secondary Surveillance Radar System that provides aircraft data for air traffic controllers in En route and terminal airspace. These systems are currently installed at 54 airports and five Department of Defense (DoD) facilities where they are co-located with Airport Surveillance Radar Model 8s and Model 9s. Additionally, there are four support systems at the Mike Monroney Aeronautical Center and the William J. Hughes Technical Center. The Air Traffic Control Beacon Interrogator Model 5 was originally commissioned in 1973. This technology refresh project will replace and/or upgrade the entire system or obsolete Air Traffic Control Beacon Interrogator Model 5 equipment, including original, manufacturer peculiar and commercial off-the-shelf hardware and software. This will ensure the continued reliable and cost-effective operation of the Air Traffic Control Beacon Interrogator Model 5 until divested or replaced. For FY 2022, $900,000 is requested for contractor support, program management and second level engineering support.

C. Airport Surveillance Radar Model 9 Sustainment 3

The Airport Surveillance Radar Model 9 system was procured in the mid-1980s, fielded between 1989 and 1994, and has significantly exceeded the expected 20-year lifecycle. This Sustainment project continues the phased strategy to extend the service life of the Airport Surveillance Radar Model 9 systems, implementing modifications to sustain primary radar surveillance in terminal airspace. The Airport Surveillance Radar Model 9 uses hardware and software architectures that are becoming obsolete. Without modifications, the radar system will experience decreasing reliability, lowering availability, and increasing supportability risks due to the limited commercial availability of some critical components. Airport Surveillance Radar Model 9 Sustainment 3 achieved a successful Final Investment Decision in March 2018, to keep the systems

operational. For FY 2022, $8.1 million is requested for test and installation of data communication equipment, program management, and second level engineering support.

D. Airport Surveillance Radar Model 9 Sustainment 4

The Airport Surveillance Radar Model 9 Sustainment 4 project will continue to address and conduct an in-depth analysis of alternatives to determine the optimal sustainment strategy for these radar systems to ensure the availability of critical terminal surveillance services until divested or replaced. For FY 2022, $5.0 million is requested to support portfolio investment analysis activities and artifact development in support of the portfolio Final Investment Decision in the first quarter of FY 2023. Additionally, $500,000 in initial funding is being requesting to begin the Investment Analysis process for non-cooperative radar replacement.

E. Airport Surveillance Radar Model 8 Sustainment 1

The Airport Surveillance Radar Model 8 technology refresh project is needed to sustain these primary surveillance radar systems until divested or replaced. The Airport Surveillance Radar Model 8 systems were fielded between 1975 and 1980 to provide primary surveillance radar data to air traffic controllers at low and medium-activity airports. Forty-six of these radar systems currently remain in use in the national airspace system. The receiver portion of the system is being modernized by the Common Terminal Digitizer to enable the analog data to interface to the new Standard Terminal Automation Systems. The Sustainment 1 will replace or redesign obsolete hardware and software. For FY 2022, $4.3 million is requested to support investment analysis activities required for Airport Surveillance Radar Model 8 sustainment projects, and to complete implementation and integration of remaining Common Terminal Digitizer equipment.

F. Airport Surveillance Radar Model 11 Sustainment 3

The Airport Surveillance Radar Model 11 Sustainment project investments are managed in five-year segments to ensure availability of critical weather and terminal surveillance services until radar is divested or a replacement system is deployed. The Airport Surveillance Radar Model 11 was procured via Interagency Agreement with the Department of Defense United States Air Force. The FAA procured 69 systems and fielded the last system in 2013. This Sustainment 3 project will address parts obsolescence maintenance issues, and current national airspace system requirements to ensure continued reliable and cost-effective operation of the radar systems until divested or replaced. The program plans to procure form, fit and function and/or redesign replacements, as required. For FY 2022, $11.5 million is requested for design and development, test and program management support.

G. Mode Select Beacon Replacement System Phase 1A

The legacy Mode Select System is a Cooperative Surveillance Radar that supports Air Traffic Control in Terminal and En Route airspaces. The Mode Select also interrogates and receives aircraft identification and altitude information from equipped aircraft. There are currently 137 operational and 11 support systems in the national airspace system. The legacy system is more than 25 years old and suffers from a shortage of replacement parts and/or repair capabilities. The Mode Select Beacon Replacement System Project will replace unsustainable portions of the legacy Mode Select system with a design that incorporates modern surveillance interfaces, defends and mitigates cyber security threats, and provides modifications needed to ensure supportability and sustainment. Phase 1 of this Project will address critical obsolescence and end of service life issues for terminal Cooperative Surveillance Radar systems that will remain in the national airspace system for the foreseeable future. Phase 1 is divided into two parts. Phase 1A will include design, development and test, and limited production with a total number of nine systems. Phase 1B will complete the production and deployment of the remainder of the 41 systems to fulfill national airspace system surveillance requirements. The project will replace the legacy Mode Select system, with a procurement of a Mode Select Beacon System; the existing antenna, encoder, and rotary joint will be retained.

For FY 2022, $15.9 million is requested for system/software architecture, design and development, first article systems, on-site development test, program management support, System Security Services, configuration management, implementation activities, site survey, training development for FAA field maintenance, and FAA air traffic control personnel and information.

H. In-Service Engineering

In addition, $2.2 million is requested to allow immediate response and tactical distribution of in-service engineering resources to emerging technology solutions across the entire surveillance portfolio.

What benefits will be provided to the American public through this request and why is this program necessary?

Outages of primary and secondary surveillance systems contribute significantly to aircraft arrival and departure delays at major airports throughout the United States. The sustainment work under this portfolio will increase equipment and service availability and reduce delays that cost airlines and the flying public money and time. Expected outcomes from the work will be to:

- Extend the service life of the surveillance systems
- Decrease system maintenance

- Reduce outages
- Increase equipment and service availability
- Decrease operating costs

Detailed Justification for - 2B13 Terminal and En Route Voice Switch Recorder Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Terminal and En Route Voice Switch Recorder Portfolio	$40,750	$37,750	$57,496

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Voice Switching and Control System Sustainment 4	---	$5,400.0
B. Terminal Voice Switch Sustainment 2	---	12,026.0
C. NAS Voice Recorder	---	14,800.0
D. Voice Communication Systems – Phase 1	---	25,000.0
E. In Service Engineering	---	270.0

What is this program and what does this funding level support?

Voice Switches and Recorders are integral parts of the FAA's air traffic control system. The reliability of communications from controller to controller and controllers to pilots is vital to a safe air traffic control system.

A. Voice Switch and Control System Sustainment 4

Ensures the operational availability and system reliability of the Voice Switch and Control System as well as Training and Back-up System equipment. The equipment provides voice communication services to the air traffic controllers in the Air Route Traffic Control Centers throughout the national airspace system. Voice Switch and Control System allows the En route air traffic controllers to communicate with other controllers, pilots, ground personnel and other locations while separating, managing and directing air traffic. This Sustainment project replaces and upgrades obsolete components that are no longer supportable. For FY 2022, $5.4 million is requested for sustainment activities including contract program management and engineering analysis, which identifies the Voice Switch and Control System or Training and Back-up System components with the greatest risk of affecting operational availability.

B. Terminal Voice Switch Sustainment 2

Involves sustaining the aging, obsolete voice switches in Air Traffic Control Tower and Terminal Radar Approach Control facilities. Terminal voice switches provide voice communication services to air traffic controllers in the airport towers and Terminal Radar Approach Control facilities. This allows the terminal air traffic controllers to communicate with other controllers, pilots, ground personnel and other locations while separating, managing and directing air traffic.

The Terminal Voice Switch – Legacy Voice Switch Sustainment project covers various types of terminal voice switches, including Small Tower Voice Switch, Enhanced Terminal Voice Switch, Rapid Deployment Voice Switch, Voice Switch By-Pass, and Interim Voice Switch Replacement systems. This project will focus on the components of the existing voice switches that pose the greatest risk to affecting the operational availability to the FAA's voice communications.

For FY 2022, $12.0 million is requested for terminal voice switch sustainment activities, which may include end of life hardware procurements for parts no longer manufactured, power supply replacements and/or refurbishment of other high risk components to extend the service life of the existing equipment. Funding may also be used to refurbish or replace voice switch peripheral equipment, if necessary, and refurbish and/or cannibalize associated legacy systems for spare parts to mitigate supportability risk of Terminal legacy voice switches.

C. National Air Space Voice Recorder

Will replace the legacy Digital Audio Legal Recorders and provide enhanced digital voice recording functionality to meet new requirements. 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 Internet Protocol telephones using secure intranet services, and connection to FAA Telecommunications Infrastructure Enterprise Network Time Protocol.

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 began to reach their end of service life starting in 2017. Full implementation of this program will result in the replacement of the legacy voice recorders, Digital Audio Legal Recorders, which do not meet current Safety Requirements. Additionally, it will decrease the risk of Diminishing Manufacturing Sources and Material Shortages issues in order to maintain Operational Availability.

For FY 2022, $14.8 million is requested for the procurement of approximately forty systems, vendor program management, systems engineering, vendor installation and training. FY 2022 funds will also cover site preparation requirements for approximately 80 locations throughout the national airspace system.

D. Voice Communication Systems – Phase 1

Will provide interface equipment to resolve Radio Control Equipment obsolescence issues as well as add the capability to convert analog signals transmitted from the existing voice switch equipment into the approved international Voice over Internet Protocol standard. Phase 1 will include procurements for Air-to-Ground Protocol Converters and Ground-to-Ground Protocol Converters. The Air-to-Ground Protocol Converters will replace the end-of-life Radio Control Equipment and can operate in Voice over Internet Protocol or in legacy analog mode. The Air-to-Ground Protocol Converters and Ground-to-Ground Protocol Converters will also simplify the future replacement of the legacy voice switches in Phase 2 by allowing the use of protocol converters to communicate with FAA analog interfaces.

For FY 2022, $25.0 million is requested to finalize products in support of final investment decisions and source selection documentation for both the Air-to-Ground Protocol Converters and Ground-to-Ground Protocol Converters acquisitions. In addition, funding will be used to draft products in support of future investment decisions planned for during Phase 2. Voice Communication Systems Phase 2 will focus on the procurement of Internet Protocol-based voice switches.

E. In Service Engineering

In addition, $270,000 is requested to allow immediate response and tactical distribution of resources to emerging technology solutions across this portfolio.

What benefits will be provided to the American public through this request and why is this program necessary?

Direct voice communication between the air traffic controllers and pilots is critical to safe operations throughout the national airspace system. The projects in this budget line item ensure existing and future voice communication systems continue to provide safe and reliable voice communication services. The sustainment projects focus on reducing obsolescence and maintaining availability, until such time that there is a new Internet Protocol-based voice system available for deployment to the national airspace system. The replacement program will enable the FAA to transition to Internet Protocol-based voice communication services; thus, allowing the FAA to gain the inherent benefits of Internet Protocol-based voice services, such as asset sharing and load sharing. Overall, these projects promote operational availability, which helps reduce flight delays.

Voice recorders are used by the FAA for recording voice conversations between air traffic controllers, pilots, and ground-based personnel. Recorded conversations are used in the investigation of accidents, incidents, and in the routine evaluation of air traffic operations. The National Airspace Voice Recorder program reduces costs associated with current voice recorder models that have obsolescence and supportability concerns.

Detailed Justification for - 2B14 Enterprise Information Platform

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Enterprise Information Platform	$10,000	$10,000	$17,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Common Support Services – Flight Data	---	$8,000.0
B. Enterprise Information Management Platform	---	9,600.0

What is this program and what does this funding level support?

The Enterprise Information Platform will utilize a centralized data construct to promote efficient data exchange. The Enterprise Information Management Platform mission will result in a "big data" repository for national airspace system and non-national airspace system information. "Big data" consists of larger, more complex data sets, particularly from new data sources. These data sets are so voluminous that traditional data processing software can't manage them. Utilizing the Enterprise Information Management platform to store and access these massive volumes of data, allows its stakeholders to address business problems that could not previously be tackled.

A. Common Support Services – Flight Data

Is a new investment leveraging the FAA's previous investments in System-Wide Information Management to advance flight information management across the air traffic management system and stakeholders (e.g. flight planning service providers, airlines, and other airspace users). This project will develop the following capabilities to meet the FAA's growing need for coordinated strategic flight planning and distribution of standardized flight information:

- **Flight Planning and Filing** – A standards-based flight planning and filing environment to be used by flight operators and the FAA to negotiate preliminary and

filed flight plans. Constraint sharing/feedback will enable the flight operator to receive and address constraints early in the planning phase.

- **Flight Data Sharing**– Provides a single common reference or legacy and Flight and Flow Information for a Collaborative Environment capable users facilitating operational flight data sharing/exchanges across the national airspace system ecosystem in accordance with centralized and managed business rules.

In order to have a more cost-effective investment, Common Support Services–Flight Data capabilities will be packaged into incremental deployments. The first deployment, Package A, will create the infrastructure for flight filing services. It will enable enhanced flight plans using globally-unique flight identifiers and initial constraint feedback to airspace users. The next deployment, Package B, will enhance flight planning services and provide additional flight data management capabilities for consumers, allow submission of preliminary flight plans and integration with Traffic Flow Management System, and provide enhancements to flight information for additional airspace users and the FAA.

For FY 2022, $8.0 million is requested to support the phased implementation of Flight Planning and Filing and Flight Data Sharing capabilities and development of additional enhancements to enable richer flight information exchange amongst stakeholders. In addition, Common Support Services – Flight Data will finalize all products and achieve an Initial Investment Decision (IID) for Package A of project capabilities, scheduled for first quarter of FY 2022 with a Final Investment Decision to follow in the first quarter FY 2023.

Additionally, the project team will mature engineering requirements for the next set of CSS-FD capabilities, Package B, and begin documentation for Initial Investment Decision of Package B planned for the first quarter FY 2023

B. Enterprise Information Management

This is a cloud-based big data platform, which unifies and secures agency-wide data. This capability provides FAA systems and users with the ability to rapidly find and exploit relevant data from across the FAA, to support faster and more comprehensive analysis, synthesis, and decision-making. This will overcome current data access and processing challenges and existing limitations of the legacy infrastructure. The build out of the Enterprise Information Management Platform will enable the integration of existing and future systems and will bring in additional data sources to maximize the operational impact of these systems.

For FY 2022, $9.6 million is requested for the development of staging and production environments, as well as continued systems development life cycle work that includes system design, implementation and deployment. Planned activities include:

- Provide an Enterprise Information Management Platform hosted development environment to support the pre-production design integration needs of the Operational Analysis and Reporting System, Operational Network Replacement, or other national airspace system acquisition programs.

- Complete the integration of 10 additional data sources: i.e., Air Traffic systems such as space based Automated Dependent Surveillance Broadcast (ADS-B) data and an additional information line of business domain, i.e., logistics, human resources, finance, etc.

- Integrate 12 additional data processing capabilities, that transform the data to add value or enhance usability.

- Provide 10 additional common service tools and two advanced analytic capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

Implementation of Enterprise Information Platform will provide FAA stakeholders with timely and secure access to common Agency data. Enterprise Information Platform will explore cloud-based solutions to reduce the need to build and maintain redundant data management capabilities that support individual programs and systems. Benefits include the alignment of existing and future data requirements into an efficient and effective information-sharing environment, and the ability to use enterprise-wide data to enable complex analytical correlations.

Detailed Justification for - 2B15 NextGen – Remote Towers

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Remote Towers	$0	$0	$4,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Remote Towers	---	$4,900.0

What is this program and what does this funding level support?

Many airports cannot afford and/or justify the establishment and maintenance of a traditional Air Traffic Control Tower to provide air traffic services because of initial implementation and lifecycle costs of a physical, brick and mortar facility. While some airports can subsidize personnel costs via the FAA Contract Tower program, a significant amount of airports cannot afford the cost of construction and recurring maintenance. As mandated by congress, remote tower demonstrations were previously conducted at low and medium density airports in Class D and Class E airspace to evaluate proposed technologies, identify system criteria and develop a process to approve the use of these technologies to provide air traffic services remotely. Additional demonstrations will be conducted to develop standards for systems approved for use at higher density traffic airports in Class B or Class C airspace and initiate research to evaluate the optimal location of remote tower technologies at specific airports.

For FY 2022, $4.9 million is requested to support the following activities:

- Conduct validation of a single site certified remote tower technology at an additional pilot airport
- Conduct stability testing and evaluation of remote tower technologies at initial pilot airports
- Perform system evaluations to support the expansion of Remote Tower Systems Advisory Circular to include operations at Class D and Class E airports

- Update operational requirements for remote tower technologies

What benefits will be provided to the American public through this request and why is this program necessary?

The Remote Tower demonstration activities will allow technologically advanced methods and systems that can be used to monitor aircraft at non-brick and mortar towered airports. This will ultimately improve safety at these airports and prevent operational costs associated with the upkeep and maintenance of physical structures.

Detailed Justification for - 2C01 Aviation Surface Observation System (ASOS)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Aviation Surface Observation System (ASOS)	$4,000	$5,000	$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aviation Surface Weather Observation Network Sustainment	2	---	$8,000.0

What is this program and what does this funding level support?

The Aviation Surface Observation System, also known as the Aviation Surface Weather Observation Network, is a portfolio program that consists of multiple subsystems in the national airspace system that detect and report surface weather conditions required to conduct aircraft operations. Air Traffic Control, Part 91 (general aviation), 121 (scheduled major and regional air carriers), and 135 (charter and on-demand commercial air taxi) Operators, and National Weather Service rely on the data provided by this network. The following national airspace systems depend on the data provided by the Aviation Surface Weather Observation Network:

- Automatic Terminal Information Service
- Surveillance Broadcast Services - Flight Information Service Broadcast
- Standard Terminal Automation Replacement System
- National Airspace System Information Display System
- Weather System Processor
- NextGen Weather Processor
- Common Support Services – Weather

- Integrated Terminal Weather System
- Weather and Radar Processor
- Corridor Integrated Weather System

The program will address obsolescence of hardware components no longer manufactured or supported by vendor coupled with insufficient inventory of sub-systems and parts. For FY 2022, $8.0 million is requested to begin implementation of the Aviation Surface Weather Observation Network Sustainment 2 Project. The project will award contracts to acquire replacement sensors and hardware components required to sustain operational capabilities provided by this network.

What benefits will be provided to the American public through this request and why is this program necessary?

ASOS systems provide official airport weather information that is required to conduct aircraft operations. The program also increases the accuracy and timeliness of forecast and warning products that are provided by the National Weather Service for protection of life and property and enhancement of the national economy.

Detailed Justification for - 2C02 Future Flight Services Program (FFSP)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Future Flight Services Program (FFSP)	$18,000	$17,800	$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Future Flight Services	---	$1,200.0
B. Future Flight Services Air/Ground Media Gateway	---	1,800.0

What is this program and what does this funding level support?

Currently, a combination of entities and platforms provide Flight Services to the General Aviation community. These services include but are not limited to: pre-flight and in-flight flight planning, advisory services, weather briefings, pilot weather report processing, and Search and Rescue coordination. These services are provided within the Continental United States, Puerto Rico, and Hawaii. Flight Services also provides Visual Flight Rules coordination, orientation support to lost aircraft, help maintain continuous weather broadcasts on selected Navigational Aids, and issues Notices to Airman. General Aviation pilots access flight service information directly through web portals, thus reducing the need for pilots to talk to a flight service specialist.

A. Future Flight Services

The Future Flight Services contract was awarded to the incumbent, Leidos, in November FY 2020. The FFSP enhancement work will promote the self-assisted service delivery and reduce costly human-assisted delivery of flight services as much as possible. This project will leverage current 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 and aeronautical information from the Aeronautical Common Service and leverage FAA enterprise infrastructure including System Wide Information

Management and other planned infrastructure enhancements to the greatest extent possible. The primary objective of FFSP is to realign the Flight Services mission by modernizing services and delivery methodologies at a lower cost.

For FY 2022, $1.2 million is requested for FAA Telecommunication Infrastructure non-recurring costs.

B. Future Flight Services/Air-to-Ground Media Gateway

Will allow Flight Services to deliver inflight services in standardized Voice over Intranet Protocol mode using secure intranet services for the Flight Service Provider's voice switch. This will facilitate a Flight Service contract competition by reducing the need for voice switch customizations. Air-to-Ground Media Gateway will function similar to Radio Control Equipment emulation, but will provide a standard Voice over Internet Protocol interface in addition to providing audio to the Remote Monitoring Control Facility interface and being interoperable with national airspace system voice switches and recorders.

For FY 2022, $1.8 million is requested to complete the implementation of Air-to-Ground Media Gateway systems at six Air Route Traffic Control Centers, and for lifecycle support.

What benefits will be provided to the American public through this request and why is this program necessary?

The American Public, as well as the General Aviation community, will benefit from technology enhancements and cost savings gained by elimination and reduction of services which are redundant, obsolete and/or do not align with Flight Service Core Services.

Detailed Justification for - 2C03 Alaska Flight Service Facility Modernization (AFSFM)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Alaska Flight Service Facility Modernization (AFSFM)	$2,650	$2,650	$2,700

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	---	700.0

What is this program and what does this funding level support?

The AFSFM program is a multi-year facility modernization and sustainment program that addresses FAA Flight Service Stations in Alaska. Thirty-three percent of the Alaska Flight Service facilities were constructed in the 1970's and require extensive renovations to meet current building codes, fire life safety, electrical standards and generally do not meet the American's with Disabilities Act accessibility requirements. These requirements are defined and imposed by the Uniform Federal Accessibility Standards and the Architectural Barriers Act Accessibility Standard. These conditions endanger FAA personnel health and safety and increase the risk of service outages.

Specifically, 17 Flight Service Station facilities will be updated to meet environmental, safety and accessibility requirements and the electrical and safety systems will be upgraded to ensure they meet current standards. 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.

For FY 2022, $2.0 million is requested to complete phase 1 of mechanical, electrical and major architectural upgrades at Barrow Flight Service Station, replace boilers and conduct a facility condition assessment at Northway Flight Service Station.

Also requested is In-service engineering that allows for immediate response and tactical distribution of resources to emerging technology solutions. For FY 2022, $700,000 is requested for ongoing engineering support of Flight Service Facilities.

What benefits will be provided to the American public through this request and why is this program necessary?

This program efficiently uses funds to correct deficiencies in older Flight Service Station 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 provides cost savings to the American public.

Detailed Justification for - 2C04 Juneau Airport Wind System (JAWS) Technology Refresh

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Juneau Airport Wind System (JAWS) Technology Refresh	$1,000	$1,000	$4,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Juneau Airport Wind System (JAWS) Sustainment	---	$4,000.0

What is this program and what does this funding level support?

JAWS measures and transmits wind information to the Juneau Automated Flight Service Station, Alaska Airlines, and the National Weather Service for weather forecasting. Other Alaskan aviation users access JAWS data via the Internet. This data provides terrain induced wind and turbulence data that addresses safety of flight and decreases the probability of experiencing unnecessary weather related delays in and out of the Juneau International Airport, Alaska. Although JAWS data is advisory, it is essential for pilots to be aware of wind conditions that affect approach and departure paths because of the restrictive geographical features on both sides of the corridor in and out of the Juneau Airport.

Periodic replacement of commercial off-the-shelf system components is necessary because of the weather condition on the mountains where the wind sensors are located. Updating these sensors assures continued supportability of the system through an indefinite service life. This program will include the replacement of computers and controllers, radios, firmware and software, anemometers, profilers, and may include National Center for Atmospheric Research consulting support.

For FY 2022, $4.0 million is requested to acquire and install replacement Wind Profiler subsystems. Timely replacement of the wind profilers is critical to ensure sustainment of the JAWS turbulence alerting capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

During the JAWS Post Implementation Review, the system has achieved the baseline expectation for increased capacity with actual Required Navigational Procedures. The system has achieved 91 percent detection of all alert messages. JAWS has improved the commercial flight operations with a 52 percent improvement in flights diverted and 9.51 minutes of improvement in average arrival delays while improving arrivals on time. JAWS provides the safe operation of aircraft going in and out of Juneau Airport, and has received positive feedback from Alaska Airlines.

Detailed Justification for - 2C05 Weather Camera Program

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Weather Camera Program	$1,800	$2,000	$2,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Weather Camera - Hawaii	---	$2,000.0

What is this program and what does the funding level support?

The Weather Camera program manages the operational Weather Cameras installed at airports and strategic En route locations in to provide pilots, dispatchers, and flight service station specialists with real-time video weather information. The program office ensures that weather camera services are operational and readily accessible to pilots and aviation users. It provides camera operations restoral activities, logistics management, and technician training, and it manages all of its procurement and contract requirements including telecommunication services and site facility leases and agreements. Images are updated every 10 minutes and stored for six hours to be used in a loop function for weather trending analysis by pilots. These images are available through a user-friendly, web-enabled application: http://avcamsplus.faa.gov. In addition to improving aviation safety benefits, the cameras improve operator efficiency by reducing unnecessary flight time caused by weather-related deviations while in-flight.

For FY 2022, $2.0 million is requested to complete the installation of weather camera services in Hawaii. The funding for Hawaii was first appropriated in FY 2020.

What benefits will be provided to the American public through this request and why is this program necessary?

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 deviations. With the expansion of camera services to Hawaii, it is expected that the aviation community will obtain similar increases in safety and efficiency. The actual accident statistics associated with this program were reduced from .28 accidents per 100,000 operations in 2007 to .04 accidents per 100,000 operations in 2014, the last year that the metrics were calculated.

Detailed Justification for - 2D01 Very High Frequency (VHF) Omnidirectional Radio Range (VOR) Minimum Operational Network (MON)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Very High Frequency (VHF) Omnidirectional Radio Range (VOR) Minimum Operating Network (MON)	$20,000	$19,000	$5,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
VOR Minimum Operational Network (MON) Program Phase 2	---	$5,900.0

What is this program and what does the funding level support?

The Very High Frequency Omnidirectional Range Minimum Operational Network program is repurposing the Very High Frequency Omnidirectional Range network in the Contiguous United States to serve as a backup during Global Positioning System outages. The scope of the program includes the following:

- Amendment, cancelation, and replacement of Instrument Flight Procedures
- Flight inspections of procedures and new service volumes
- Relocation of any services and equipment dependent on a Very High Frequency Omnidirectional Range

The program will transition the legacy network of 896 Very High Frequency Omnidirectional Ranges in the Contiguous United States to a Minimum Operational Network of approximately 589 with a target date of FY 2030. The Minimum Operational Network will allow aircraft to navigate and land under Instrument Flight Rules in the event of disruption in a Global Positioning System signal; however, the planned backup capability will be less than the current network.

As the need for Very High Frequency Omnidirectional Range based procedures and routes decreases due to the transition to Performance Based Navigation, resources that are currently being spent in sustaining and operating the conventional airspace can be shifted for more efficient use.

For FY 2022, $5.9 million is requested to meet phase 2 program goals. The program will discontinue up to 31 Very High Frequency Omnidirectional Ranges and fund discontinuance work for 34 systems in FY 2023. Procedure work takes multiple years.

What benefits will be provided to the American public through this request and why is this program necessary?

The FAA is transitioning the National Airspace System to more efficient Performance Based Navigation routes and procedures, therefore fewer Very High Frequency Omnidirectional Ranges are needed. The benefits of reducing Very High Frequency Omnidirectional Ranges include opportunities for reduced operations and maintenance costs of instrument flight procedures, flight inspection, and opportunities to avoid potential recapitalization costs. This program will result in a more optimized National Airspace System, where the more efficient Performance Based Navigation operations will be primary and a Minimum Operational Network of Very High Frequency Omnidirectional Ranges will be retained to serve as a backup in the event of a Global Positioning System outage or interference.

Detailed Justification for - 2D02 Wide Area Augmentation System (WAAS) for GPS

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Wide Area Augmentation System (WAAS) for GPS	$80,000	$83,900	$97,143

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Wide Area Augmentation System Phase 4B	---	$97,143.0

What is this program and what does this funding level support?

WAAS consists of a network of 38 precisely located ground reference stations distributed across the United States, Canada and Mexico that monitor the GPS satellite signals. GPS errors caused by ionospheric distortion must be corrected within seconds to provide the accuracy and integrity required for a precision approach. Three master stations collect reference station data and calculate corrections and integrity messages for each GPS satellite. These corrections are sent from master stations to Geostationary Uplink Stations for transmission to three leased Geostationary communications satellites. The satellites receive the messages and subsequently broadcast the messages across the National Airspace System to user receivers. User receivers process the WAAS message to obtain a precise navigation position.

The FAA will continue to work collaboratively with the Department of Defense to assure GPS aviation safety and security, and to make sure changes to GPS don't adversely affect aviation, while supporting changes that improve GPS.

In 2022, the Program Office plans to obtain a final investment decision for Phase 4B, followed by the award of a new prime contract. WAAS Phase 4B will focus on developing and deploying an initial Dual Frequency Service that will enable testing and prototyping of a future new operational satellite signal. In addition, to sustain current services, the FAA must replace one of the GPS signals with new signal before the old is 'sunset.' For those users who do not upgrade their avionics, WAAS will continue to

support current single frequency based service on an existing frequency. The program will include continued sustainment of the constellation of geostationary satellites required to broadcast the WAAS signal.

A. WAAS Phase 4B

For FY 2022, $97.1 million is requested to execute planned tasks that include:

- Maintain existing three geostationary satellite leases.
- Initiate the new Dual Frequency Operations Segment 2 Contract and transfer development and test equipment to the contractor.
- Conduct a Security Transition Study to align was with new FAA Security Standards.
- Develop software to integrate and field the Geostationary Uplink Station receiver replacement.
- Support agency wide initiative to transition to performance based navigation through the development and publication of Localizer Performance with Vertical Guidance/Localizer Performance approach procedures.
- Develop the prototype for Dual-Frequency Multi-Constellation Service and assess its performance.
- Conduct technical engineering and program support to include:
    - System Engineering and Hardware and Software development oversight
    - Hazardously Misleading Information analysis and Reliability-Maintainability-Availability analysis
    - System performance assessment
    - Global Positioning System IIIF satellite safety and security analysis
    - Complete Fiscal Year 2022 Security Authorization

What benefits will be provided to the American public through this request and why is this program necessary?

WAAS directly supports national air space modernization by supporting the Performance-Based Navigation framework and providing additional precision approach services.

It reduces the impact of constrained aircraft navigation that is tied to the location of ground-based Navigation Aids, which restrict aircraft paths and available airspace. GPS operations remove the requirement for a direct link between aircraft navigation and a Navigation Aid, thereby allowing aircraft better access and permitting flexibility of point-to-point operations.

The program also supports operations by providing over 4,700 satellite-based low visibility landing procedures for aircraft to a Decision Altitude as low as 200 feet above the runway and is available on an estimated 132,000 aircraft, as of December, 2020. Equipage is expected to continue to grow until Instrument Flight Rules operators outside of major airports commonly use these procedures. Performance-Based Navigation framework is supported by the program in the enabling of technology that transmits precision position, navigation, and timing services that supports Automatic Dependent Surveillance-Broadcast.

The Dual Frequency Operations 2 Prime contract award as part of Phase 4B will provide the infrastructure for dual frequency satellite operations. Dual Frequency allows for greater safety as well as a higher chance of completing an approach in inclement weather conditions. For many paved public airports without a precision approach, the use of a satellite based approach with minima of ½ mile visibility can be achieved without requiring significant airport improvements such as; taxiways, marking, lighting, and signage. The program will continue to publish procedures until all qualified runways are equipped with a WAAS approach based capability.

Real time data and plots, daily plots, performance videos and performance analysis is available at the following website: http://www.nstb.tc.faa.gov/.

Detailed Justification for - 2D03 Instrument Flight Procedure Automation (IFPA)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Instrument Flight Procedure Automation (IFPA)	$1,100	$0	$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Instrumental Flight Procedure Sustainment 3	---	$1,000.0

What is this program and what does this funding level support?

Much like on-ramps, off-ramps, and highways in the sky, Instrument Flight Procedures provide commercial airline and general aviation pilots with approach and departure paths into and out of airports that are clear of obstacles such as cell towers, buildings and trees. The IFPA suite of Information Technology systems are used in the design/development, documentation, and tracking/reporting of Instrument Flight Procedures in the FAA.

For FY 2022, $1.0 million is requested to begin IFPA commercial off-the-shelf Personal Computer hardware technology replacement and continue the modular development and testing of Terminal Area Route Generation, Evaluation and Traffic Simulation (TARGETS) tool for Instrument Flight Procedure design/development capabilities. The TARGETS tool, one of the IFPA suite's information technology tools, provides three-dimensional design capabilities for Performance Based Navigation, which is satellite based, and conventional, which is ground based, navigation for Instrument Flight Procedures.

What benefits will be provided to the American public through this request and why is this program necessary?

The IFPA tool suite provided productivity gains for all Aeronautical Information Services' major work products. Since the program's inception, the development time required for new and amended Instrument Flight Procedures, Notices to Airmen

generation time, and obstacle evaluation time have all been reduced. These efficiency gains are multiplied by the hundreds and thousands of these products produced on an annual basis and they reduce the costs for these activities to the American public.

In addition, IFPA enables the efficient design, documentation, and publication of new and revised Instrument Flight Procedures increasing the airport arrival capacity for the nation's busiest airports and metropolitan areas when visibility is restricted. IFPA increases automated capabilities for all types of precision and non-precision flight procedures including Performance Based Navigation and conventional navigation.

Detailed Justification for - 2D04 Runway Safety Areas (RSA) – Navigational Mitigation

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Runway Safety Areas (RSA) – Navigational Mitigation	$1,400	$1,800	$800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Runway Safety Areas (RSA) Phase 2	---	$800.0

What is this program and what does this funding level support?

For FY 2022, $800,000 is requested to supply the RSA Phase 2 Program with additional funds. This amount will fully fund approximately three projects to be completed in FY 2023.

The scope of the work will range from the installation of frangible connections on identified structures to the relocation of facilities within and outside the RSA. These facilities or structures are classified as: 1) fixed by function and 2) not fixed by function. Objects that are fixed by function are permitted within the RSA as long as it meets the frangibility requirements. The RSA must be free of all objects that are three inches above the grade and are not frangible, do not break apart into fragments. Objects that are not considered fixed by function will be moved outside the RSA to extent practical.

What benefits will be provided to the American public through this request and why is this program necessary?

Compliance with the RSA standards provide a measure of safety in the event of an aircraft's excursion from the runway by significantly reducing the extent of personal injury or aircraft damage during overruns undershoots and veer-offs. Thus, the primary benefit of the RSA Phase II program is the prevention of loss of life from aircraft striking non-compliant Navigational Aids located in designated safety areas.

Detailed Justification for - 2D05 Landing and Lighting Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Landing and Lighting Portfolio	$36,000	$64,930	$63,416

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Very High Frequency Omni Directional Range collocated with Tactical Air Navigation	---	$2,000.0
B. Instrument Landing System Sustainment	---	4,715.0
C. Distance Measuring Equipment Sustainment	---	6,078.4
D. Navigational Aids Sustainment	---	6,000.0
E. Visual Navigation Aids for New Qualifiers	---	2,011.6
F. Runway Visual Range Sustainment	---	32,461.0
G. Approach Lighting System Safety Enhancement	---	5,000.0
H. Replace Visual Approach Slope Indicator with Precision Path Approach Indicator	---	3,000.0
I. In-Service Engineering	---	2,150.0

What is this Program and what does the funding level support?

The Landing and Lighting Portfolio contains critical ground infrastructure that collectively enables all aircraft to navigate the established aircraft routes in the sky as well as the ability to safely descend and land on the airport runway. The work under this portfolio includes assessment of the systems to determine the need for system relocations, operational modifications, sustainment work to maintain and/or improve system performance, and to procure and install systems as needed.

A. Very High Frequency Omni Directional Range Collocated with Tactical Air Navigation

Relocates and refreshes technology at Very High Frequency Omni Directional Range facilities as well as Very High Frequency Omni Directional Range that are collocated

with Tactical Air Navigation facilities. This project improves Very High Frequency Omni Directional Range operational performance by procuring and installing Doppler electronic kits and Doppler antenna hardware kits to upgrade the conventional systems. Numerous systems have radial restrictions because of encroachment by obstacles that block the transmission of the signals. Doppler upgrades eliminate signal reflection restrictions caused by newly constructed tall buildings, nearby industrial parks with a high concentration of metallic buildings, overhead transmission lines, radio, television and cellphone towers, and wind farm stations. The Very High Frequency Omni Directional Range and Very High Omni Directional Range Collocated with Tactical Air Navigation systems provide navigational guidance for civilian and military aircraft in both the en route and terminal areas. For FY 2022, $2.0 million is requested for engineering and technical services/support and funding to complete one on-going Doppler Very High Frequency Omni Directional Range project.

B. Instrument Landing Systems

Supports the establishment and sustainment of Instrument Landing Systems and/or the associated runway approach lighting systems that support all categories of instrument landing approaches. An Instrument Landing System precision approach is comprised of a grouping of electronic devices that include:

- Localizer
- Glide Slope
- Marker Beacons
- Ancillary aids such as Distance Measuring Equipment, Approach Lighting Systems, and Runway Visual Range

These systems provide landing aircraft with both electronic guidance and visual landing aids. These systems allow properly equipped aircraft to land safely in adverse weather conditions. The Instrument Landing System provides both vertical and lateral guidance information for the pilot to allow safe landing to touchdown and rollout. The components of an Instrument Landing System sends information to the cockpit so that the pilot can maintain a predetermined flight path to the runway even in low visibility conditions. The Instrument Landing Systems also provides a backup landing capability in the event of a loss of Global Navigation Satellite System service. For FY 2022, $4.7 million is requested for engineering and technical services/support, procure one instrument landing system, and complete two (2) instrument landing system sustainment projects.

C. Distance Measuring Equipment

Pilots use this radio navigation aid to determine the aircraft slant distance from the Distance Measuring Equipment location. The program is procuring and installing state-of-the-art Distance Measuring Equipment systems to:

- Support replacement of systems that have exceeded their service life expectancy
- Establish new systems at qualifying airports
- Relocate Distance Measuring Equipment facilities
- Establish Distance Measuring Equipment systems in lieu of Instrument Landing System marker beacons

Distance Measuring Equipment reduces the need for less desirable step-down non-precision approach procedures in which a pilot descends to the minimum allowable altitude to locate the runway visually. These systems lead to better specification and control over the vertical descent profile as well as reducing controlled-flight-into-terrain risk. For FY 2022, $6.1 million is requested for program management, system engineering, logistics support, procurement of 15 Distance Measuring Equipment systems, to complete 15 establish or replacement Distance Measuring Equipment projects.

D. Navigational Aids Sustainment

Renovates or replaces airport approach lighting systems at sites where there is a high risk for failure and where that failure would result in loss of the primary precision approach. Navigational Aids include:

- Medium Approach Lighting System with Runway Alignment Indicator Lights for Category I approaches
- High Intensity Approach Lighting System with Sequencing Flashing Lights systems for Category II/III approaches
- Lead-In Lights
- Precision Approach Path Indicator

For FY 2022, $6.0 million is requested for engineering and technical services/support to award a contract to procure Semi-Flush Steady Burning Fixtures for High Intensity Approach Lighting System with Sequencing Flashing Lights and Medium Approach Lighting System with Runway Alignment Indicator Lights. This equipment will be used to complete one Medium Approach Lighting System with Runway Alignment Indicator Lights installation project and to complete five Replacement Lamp Monitoring Systems installations.

E. Visual Navigational Aids for New Qualifiers

These 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 Navigation Aid equipment. This program supports the procurement, installation, and commissioning of Precision Approach Path Indicator systems and Runway End Identifier Lights systems. The Precision Approach Path Indicator provides visual glide slope information on approach to pilots and enables them to make a stabilized descent with a safe margin of approach clearance over obstructions. The system 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.

Runway End Identifier Lights are a visual aid that provides the pilot with a rapid and positive identification of the runway end in use during approach. The system consists of two simultaneously flashing white lights, one on each side of the runway-landing threshold. For FY 2022, $2.0 million is requested for engineering and technical services/support; to procure two Precision Approach Path Indicator systems and to install Precision Approach Path Indicator at two locations.

F. Runway Visual Range Replacement and Establishment

Allows airports to conduct takeoff and landing operations during conditions of low visibility. Replaces older equipment with Personal Computer Based equipment as well as equipment for sites that have qualified for an upgrade from a Category I to a Category II/III precision approach. Runway Visual Range provides air traffic controllers with a measurement of the visibility at key points along a runway that is used to decide whether it is safe to take off or land during limited visibility conditions. During reduced visibility weather conditions, Runway Visual Range 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.

Runway Visual Range decreases diversions and delays at an airport by providing an accurate measure of the runway visibility. This information affects airline scheduling decisions and air traffic decisions regarding whether flight plans should be approved for an aircraft to fly to or take off from an airport with low visibility. For FY 2022, $32.5 million is requested for engineering and technical services/support, procurement of systems, and spare equipment. In addition, the request will fund replacement of Runway Visual Range at approximately 40 locations.

G. Approach Lighting System Safety Enhancement

Upgrades and enhances aging approach lighting systems in the National Airspace System. The project 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 Sequencing Flashing Lights 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 Approach Lighting System with Runway Alignment Indicator Lights provides visual information on runway alignment, height perception, roll guidance, horizontal references for Category I Precision, and Special Authorization Category II Approaches. For FY 2022, $5.0 million is requested for engineering and technical services/support; the program will procure Light Emitting Diode lamps, procure Medium Approach Lighting System with Runway Alignment Indicator Lights ancillary equipment, and complete Medium Approach Lighting System with Runway Alignment Indicator Lights replacement at one location.

H. Replace Visual Approach Slope Indicator with Precision Approach Path Indicator

The International Civil Aviation Organization has recommended that all international airports replace the Visual Approach Slope Indicator lights with Precision Approach Path Indicator 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 Precision Approach Path Indicator systems in order to comply with this recommendation. For FY 2022, $3.0 million is requested for engineering and technical services/support; to procure four Precision Approach Path Indicator systems, and to replace the Visual Approach Slope Indicator systems with Precision Approach Path Indicator systems at four locations.

I. In-Service Engineering

For FY 2022, $2.2 million is requested for in-service engineering activities that provide an immediate response to emerging technology issues.

What benefits will be provided to the American Public through this request and why is the program necessary?

The FAA is transitioning the national airspace system to more efficient Performance Based Navigation routes and procedures that rely on satellite technology. To achieve the transition, FAA is aggressively pursuing the implementation of satellite navigation and the sustainment of the ground based navigation infrastructure.

Ground Based Navigational Aids will continue to provide a backup function, as required, in the event of a Global Positioning System outage to ensure consistent and reliable landing operations and provide resiliency in the navigation domain.

Visual Navigation Aids must continue to identify runway parameters, provide visual landing cues, and identify visibility constraints to commercial and general aviation pilots. These visual systems provide enhanced safety of operations for landing aircraft and the American public.

Detailed Justification for - 2D06 Distance Measuring Equipment (DME), Very High Frequency (VHF) Omni-Directional Range (VOR), Tactical Air Navigational (TACAN) (DVT) Sustainment Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
DVT Sustainment Portfolio	$0	$10,000	$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
DVT Sustainment Portfolio	---	$10,000.0

What is this program and what does the funding level support?

The FAA is committed to ensuring that the national airspace system navigational infrastructure remains safe, secure, sustainable, and resilient. This program system are over 30 years old and must be sustained/replaced to provide resiliency during any Global Positioning System service interruptions. The DVT Sustainment Program intends to provide long-term sustainment/replacement of Distance Measuring Equipment, Very High-Frequency Omni-Directional Range, and Tactical Air Navigation services.

Distance Measuring Equipment provides slant range (Distance) information to all aircraft and enables area navigation service for air carrier aircraft. Area navigation service is a method of instrument flight rules navigation that allows an aircraft to choose any course within a network of navigation beacons rather than navigate point to point.

Very High-Frequency Omni-Directional Range systems provide azimuth (position) information for En route navigation and approach services. This navigational allows aircraft to fly point to point along established airways between systems.

Tactical Air Navigational systems provide azimuth information to military aircraft and slant range information to military and civilian aircraft.

The DVT Sustainment Program will sustain/replace Distance Measuring Equipment, Very-High Frequency Omni-Directional Range and Tactical Air Navigational systems installed in the National Airspace System, and there are approximately 1500 systems at approximately 1000 locations included in the DVT sustainment program.

For FY 2022, $10.0 million is requested to continue the Tactical Air Navigational systems Antenna contract. The funding is planned for the execution of the contract, systems engineering support, site assessment and program management support.

What benefits will be provided to the American public through this request, and why is this program necessary?

The DVT Sustainment Program will ensure this resilient navigational backup infrastructure is available for the foreseeable future by providing effective, cost-efficient operations and maintenance solutions that improve Navigational Aid reliability and availability and address long term sustainment challenges.

Detailed Justification for - 2E01 Fuel Storage Tank Replacement and Management

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Fuel Storage Tank Replacement and Management	$26,400	$32,400	$38,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Fuel Storage Tank Replacement and Management	97	$38,900.0

What is this program and what does this funding level support?

The Air Traffic active tank system inventory includes over 3,700 units that support communication, navigation, weather, and surveillance missions. Fuel storage tank (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, the Oil Pollution Act, and the Resource Conservation and Recovery Act, among others, with significant penalties for compliance failures. The FST program operates to attain three primary objectives:

- Sustain national airspace system 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 air traffic control facility outage

- Mitigate environmental damage and regulatory non-compliance - Fiscal impacts include 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

For FY 2022, $38.9 million is requested to fund tank unit replacements, modernization, and upgrades at approximately two En route Air Traffic Control Centers and 95 General National Airspace System locations across the national airspace system. In coordination with the Electrical Power Systems – Sustain/Support budget line item, the FST program will perform power systems modifications, engine systems replacement, or engine system removal when circumstances are warranted to save funding and align schedules across dependent programs for FST and power systems implementation work at the same facilities.

What benefits will be provided to the American public through this request and why is this program necessary?

Executing an FST lifecycle sustainment program achieves the cost benefit of sustaining availability of the systems for national airspace 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.

Monthly tracking confirms fuel systems continually achieve the goal of 99.7 percent sustained operational availability. Operating modern equipment, sustainable, and regulatory-compliant fuel systems mitigate damage and associated costs resulting from incidental release of hazardous, toxic, or dangerous materials and assures the travelling public and aviation stakeholders a reliable and safe transit experience.

Detailed Justification for- 2E02 Unstaffed Infrastructure Sustainment (UIS)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Unstaffed Infrastructure Sustainment (UIS)	$36,800	$60,200	$116,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Unstaffed Infrastructure Sustainment (UIS)	129	$111,200.0
B. FAA Employee Housing/Life Safety Shelter System Services	22	2,500.0
C. In-Service Engineering	---	2,300.0

What is this program and what does this funding level support?

The UIS program sustains national airspace supporting infrastructure at approximately 12,000 sites in the national airspace system, which enable the reliable and continuous operations of surveillance, navigation, communication, and weather equipment. Unstaffed infrastructure protects electronic equipment from weather hazards and unauthorized entry. UIS sustainment includes major repairs to and replacement of real property assets and structures that are normally not staffed, such as:

- Major repair, refurbishment, and replacement of national airspace system antenna and equipment towers such as those at Remote Transmitter Receiver (RTR) and Remote Communications Air/Ground (RCAG) sites

- Major repair, refurbishment, and replacement of buildings; shelters; roofs; Heating Ventilation and Air Conditioning equipment; electrical panels and distribution wiring; locks and alarm sensors; lighting; access roads; grounds; and fencing

- The national NAS radio tower assessment program

A. Unstaffed Infrastructure Sustainment (UIS)

For FY 2022, $111.2 million is requested to complete 129 unstaffed infrastructure sustainment projects, which are spread across the United States and adjacent countries/US territories. The UIS Program sustains the buildings, broadcast towers, air conditioning systems, roads, fences, and other related infrastructure at approximately 12,000 unstaffed sites. This infrastructure, which houses and enables essentially all of the FAA's Communications, Surveillance, Weather, and Navigation systems, is past its service life and requires a comprehensive sustainment effort to ensure the integrity of the national airspace system.

B. FAA Employee Housing/Life Safety Shelter System Services

For FY 2022, $2.5 million is requested to complete 17 Employee Housing and Life Safety Shelter projects. The FAA owns housing units for FAA employees at remote locations (e.g. islands in the Bering Sea) and also owns a network of life safety emergency shelters in harsh environments (e.g. remote arctic and mountaintop locations). Employees who use these facilities provide air traffic control services and/or national airspace system facilities maintenance services.

C. In-Service Engineering

For FY 2022, $2.3 million is requested for in-service engineering activities that provide an immediate response to emerging technology issues.

What benefits will be provided to the American public through this request and why is this program necessary?

The American Public will benefit from the national airspace system infrastructure sustained by this program. This program will extend the operational service life of national airspace system remote facilities that protect and enable critical Communications, Surveillance, Weather, and Navigation systems.

The UIS Program has the second largest backlog in the Facilities Infrastructure Portfolio at approximately $1.3B. A significant portion of this backlog is associated with the 7,700 radio towers in the NAS.

Detailed Justification for - 2E03 Aircraft Replacement and Related Equipment Program

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Aircraft Replacement and Related Equipment Program	$10,900	$36,100	$35,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Aircraft Related Equipment Sustainment	---	$5,000.0
B. Flight Program Fleet Modernization	---	30,000.0

What is this program and what does this funding level support?

This program requests funding for the FAA Flight Program Operations Fleet Modernization Strategy. The strategy incorporates all aspects of FAA flight program safety, administration, operations, training, and sustainment. Flight Program Operations conducts multiple missions in FAA aircraft (owned, leased, rented, unmanned aircraft systems etc.). The FAA is currently in the process of reducing the fleet from twelve different makes and models to two makes and models. In addition to standardizing the purchase of new aircraft, this program will continue to sustain and modernize the current fleet, improve flight operations infrastructure, and reduce aircraft downtime and maintenance costs.

A. Aircraft Related Equipment Sustainment

This project ensures FAA owned and operated aircraft continue to meet regulatory and sustainment requirements while avoiding obsolescence. For FY 2022, $5.0 million is requested for ongoing operational sustainment, modifications and upgrades to aircraft, avionics, and mission equipment.

B. Flight Program Fleet Modernization Phase 1

This project requests funding to procure replacement aircraft that will continue to meet all aspects of the FAA's flight program responsibilities. Additionally, these aircraft will

require equipage and modifications to achieve that mission. The aircraft will support the four FAA primary missions:

- **Aviation Safety Training:** Provides currency and proficiency services to aviation safety inspectors and flight test personnel who must remain qualified and current to inspect commercial aircraft and to operate FAA aircraft

- **Flight Inspection:** Validates navigational aids, surveillance systems, communication systems, and other ground infrastructure for both civil and military use. This mission ensures the integrity of instrument approaches and airway procedures that constitute our national airspace system

- **Research, Development, Test and Evaluation Support:** Airborne research, development, test, and evaluation of new navigational, surveillance and communication aids, air traffic procedures, and aircraft design improvements

- **Critical Event Response/Transportation:** Provides for continued FAA support in times of emergency or disaster, as well as support the National Transportation Safety Board in carrying out its duties.

For FY 2022, $30.0 million is requested for procurement of used aircraft in accordance with the Flight Program Operations fleet modernization strategy, aircraft modifications, and program support and acquisition planning.

What benefits will be provided to the American public through this request and why is this program necessary?

Safe, supportable, and regulatory compliant aircraft are necessary for the continued successful performance of the Flight Program Operations missions. This program provides the means to support standardization and sustainment of the FAA aircraft, and provide the infrastructure to manage the flight program and process mission results. This program will save taxpayer dollars through the replacement of obsolete and unsupportable components. In addition, standardization of the FAA fleet will improve the long-term efficiency in upkeep and provide continuity of service.

Detailed Justification for - 2E04 Airport Cable Loop Systems – Sustained Support

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Airport Cable Loop Systems – Sustained Support	$8,000	$9,000	$10,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Airport Cable Loop Systems Sustained Support	10	$10,000.0

What is this program and what does this funding level support?

For FY 2022, $10.0 million is requested for advanced engineering, construction activities, and Fiber Optic Transmission Systems equipment installations. The funding will be used for the initiation of five large-scale Airport Cable Loop projects, including Salt Lake City, Utah; Chicago Midway, Illinois; San Antonio, Texas; Seattle, Washington; Dallas Fort Worth, Texas; and continuation/completion of four large-scale projects, including Minneapolis St. Paul, Minnesota; Baltimore, Maryland: Honolulu, Hawaii; Newark, New Jersey: and Charlotte, North Carolina. In addition, funding will allow the program to start and complete four smaller scale projects on a regional level.

The program replaces existing on-airport, copper-based, signal/control cable lines that have deteriorated. It also replaces obsolete underground telecommunications cable infrastructure systems that are vulnerable to failure and have caused flight delays related to these cable outages. The primary focus will be on projects at airports with high traffic counts and enplanements. These lines feed airport surveillance radar, air/ground communications, landing systems data and information to the Air Traffic Control Tower, 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 program reduces the number of unplanned outages due to deteriorated copper lines, and improves signaling and communications, which allows for increased operational availability of infrastructure, such as navigation, surveillance, and communication

systems. There have been 1,498 delays and outages associated with on- airport cable loop from 2004 to 2015 for airports in the national airspace system, which the Airport Cable Loop program will reduce overtime.

This program, along with multiple other programs, has mutual dependencies on the telecommunications infrastructure. More than 15 FAA programs rely on Airport Cable Loop to provide connectivity to and from control facilities.

What benefits will be provided to the American public through this request and why is this program necessary

Airport Cable Loop is presently reducing on-airport telecommunication infrastructure related delays of core airports by approximately three percent annually. System reliability and safety are enhanced due to increased system performance from redundant or diverse pathways provided by the cable loop system. Standardizing requirements will simplify and reduce operation requirements for logistics, configuration management, training, procurement, and depot support, which saves taxpayer dollars.

Detailed Justification for - 2E05 Real Property Disposition

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Real Property Disposition	$9,000	$4,800	$9,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Real Property Disposition	75	$9,900.0

What is this program and what does this funding level support?

The Real Property Disposition program works with other FAA program offices to identify and plan for the timely disposition of real property assets that are no longer required by the agency. When the FAA decommissions a site or system, this program assesses the property to determine the best course of action for disposal. Planning for the orderly disposition of property at multiple locations across the country is prioritized considering cost, available technical resources, and potential environmental or safety impacts if disposition is delayed. Demand for disposal of real property is increasing as ground based sites are being minimized in the national airspace system as the FAA moves to satellite-based technology.

The program provides services to:

- Identify, verify, and schedule candidate sites and structures
- Investigate and document the structures to be removed, environmental conditions, and site restorations required to develop project scopes and schedules
- Preserve and protect environmental resources
- Abate and remediate hazardous materials

- Demolish and restore sites
- Develop environmental due diligence reports for the transfer of government-owned and leased properties
- Support the Acquisitions Office in the sale of property and the termination of leases

For FY 2022, $9.9 million is requested to fund the final disposition of decommissioned infrastructure at approximately 75 sites.

What benefits will be provided to the American public through this request and why is this program necessary?

The program provides cost savings by reducing operations and maintenance costs (e.g. grass cutting, snow removal, utility fees, communications frequency fees, etc.) and cost avoidance by eliminating lease costs. The final disposal of the FAA's unneeded real property assets supports effective financial management by optimizing maintenance costs and disposing of excess assets. This program has experienced great success since FY 2005. Between FY 2008 and FY 2019, the Real Property Disposition Program disposed of 1,829 facilities at a 10-year cost avoidance of $60 million.

Detailed Justification for - 2E06 Energy Management and Compliance (EMC)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Energy Maintenance and Compliance	$6,400	$7,400	$2,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Energy Management and Compliance	10	$2,600.0

What is this program and what does this funding level support?

The EMC program orchestrates cost-effective reductions of energy and water use at air traffic 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 program will not only reduce operational costs but will increase reliability of the national airspace system 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.

For FY 2022, $2.6 million is requested to support the following:

- Perform energy and water improvements at six high energy using facilities
- Perform advanced meter installation at four facilities
- Develop and implement performance-based contracts to maximize third-party investments in air traffic infrastructure
- Provide required quarterly and annual reports on progress against legislative and executive order mandates to the Department of Transportation, the Department of Energy, and the Office of Management and Budget

The EMC program has identified 325 facilities that comprise 75 percent of the ATO's energy usage. The mandates of the Energy Independence and Security Act and the Energy Policy Act require the agency to identify and implement recommended energy and water improvements to reduce utility usage and associated costs at these facilities. The program has already identified more than $200 million in recommended improvements to lower energy usage at air traffic facilities, many of which would pay back in fewer than 10 years.

What benefits will be provided to the American public through this request and why is this program necessary?

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 American public benefits from reduced energy consumption at FAA facilities as well as cost savings that are the result of those efforts.

Detailed Justification for - 2E07 Electrical Power System – Sustain/Support

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Electrical Power System – Sustain/Support	$130,000	$149,400	$175,066

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Electrical Power System – Sustain/Support	306	$175,066.0

What is this program and what does this funding level support?

For FY 2022, $175.1 million is requested to sustain components of the FAA's power system infrastructure necessary to operate the national airspace system. This program sustains components of the FAA's power system infrastructure to ensure air traffic operational needs are met with high quality electrical power. The Power Services Group manages this program by sustaining and supporting the existing electrical power components and systems that include primary power, power conditioning, power regulation, power distribution, backup power, grounding, monitoring, and electrical power cable infrastructure. Power Systems' performance is critical to national airspace system operations and any power disruptions are briefed daily to the administrator and senior management. The requested funding will address a large backlog and systemic problems by replacing obsolete equipment and electrical systems that power all national airspace systems.

The Electrical Power program sustains the following electrical power systems areas:

- Program Management and System Engineering: provides system engineering to define and document customer requirements for national airspace power systems. It administers requirements from inception to the end of the system operational life. This effort includes identifying alternatives, preparing drawings, administering training, and completing power projects in support of the specific power programs listed below.

- Engine Generators: provides backup power when commercial power is unavailable or becomes unreliable. Engine generators have a 20-year expected system operational life. In coordination with the Fuel Storage Tank program, the program performs fuel systems modifications, fuel tank replacement, or fuel tank removal when circumstances are warranted to save funding and align schedules across dependent programs at the same facilities.

- Power Conditioning System and Uninterruptible Power Supply: provides a short-duration Alternating Current power source that prevents commercial power disruptions and surges from adversely affecting electronic system performance and critical national airspace services. This equipment has an expected system operation life of up to 15 years.

- Lightning Protection, Grounding, Bonding and Shielding: minimizes electrical hazards to personnel, facilities, and electronic equipment caused by lightning, voltage surges, electrostatic discharge and power faults at national airspace facilities. Sites are protected to minimize or preclude outages.

- Direct Current Back up Systems: Using commercial power as the source, Direct Current Back up Systems provides and distributes conditioned Alternating Current and Direct Current power to national airspace electronic equipment. It provides a medium-term power source at facilities with limited power needs. These systems have an expected operational life of up to 15 years.

- National Airspace System Batteries: large "stationary" battery banks that support Power Conditioning Systems, Direct Current Back up Systems, Very High Frequency Omnidirectional Range, Backup Emergency Communication and selected Surveillance, GNAS, Communications and Navigation equipment. The Program tracks stationary batteries for NAS equipment, replacing battery banks that have a service life that is less than the equipment it supports or experience degradation.

- Electrical Line Distribution: consists of underground distribution cables, transformers, and switchgear at airports and ancillary facilities that distribute utility level electrical power to national airspace facilities.

- ARTCC Critical and Essential Power Systems: provides high-quality and high-reliability power to 21 En Route ARTCC's and three large Terminal Radar Approach Control (TRACONs) Facilities. The system consists of engine generators, switchgear, and uninterruptable power supply systems. Most of this equipment is obsolete with engine generators having an average age greater than 50 years, which is beyond its expected system operational life of 20 years. The uninterruptable power supplies are more than 20 years old, obsolete, out of production and unsupportable. ARTCC Critical and Essential Power Systems represent the largest portion of the Power Systems sustainment backlog.

- Critical Power Distribution System: supports FAA mission critical Terminal facilities such as Combined Control Facilities, large TRACONs and most significant Air Traffic Control Towers. It provides a highly reliable power systems with multiple by-pass points that support efficient maintainability. It significantly improves personal safety during maintenance activities, addresses obsolescence, ensures effective national training, and timely logistics. This system consists of electrical distribution equipment, transfer switches, engine generators, uninterruptable power supplies, and batteries. The Power program maintains design and configuration control of all of these systems throughout the national airspace system.

- Environmental Remote Monitoring System: provides power system sensors and interfaces to the Environmental Remote Monitoring System network, which reports power system status to the operations control centers. The information provides the FAA with real-time data on the status of the systems, allowing a prompt response to system-related issues that might otherwise go undetected.

- Alternative Energy Systems: sustains and supports a broad range of clean energy technologies to meet national airspace operational demands. These technologies reduce the FAA's carbon footprint and help to achieve the goals of Executive Order 13693, Federal Leadership in Environmental, Energy, and Economic Performance. These systems reduce fossil fuel dependencies and include solar energy, wind energy, fuel cell, and geothermal. This project sustains the electronics at 10 years and photocells at 20 years.

- Visual Navigational Aids Cabling: provides power through dedicated, long runs of underground cables supporting Visual Navigational Aid systems at airports. These systems include Approach Lighting System with Sequenced Flashing Lights and Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights. Visual Navigational Aids provide guidance information to help pilots locate the runway and land safely. Outages can affect Instrument Flight Rules equipped aircraft in limited visibility weather conditions.

What benefits will be provided to the American public through this request and why is this program necessary?

The Power program funds the replacement, refurbishment, purchase, and installation of components to sustain national airspace electrical power infrastructure valued at approximately $2 billion, which in turn sustains billions of dollars' worth of national airspace services to the American public. Commercial power disruption can result in flights being kept on the ground, placed in airborne holding patterns, or re-routed to other airports.

This program prevents expensive damage to Air Traffic Control electronic equipment and enhances the safety of national airspace operations. The FAA's independent Investment Planning and Analysis Office determined that a single ARTCC Critical and Essential

Power Systems outage results in an economic impact to national airspace users of approximately $2 million per hour in terms of Aircraft Direct Operating Costs and Passenger Value of Time savings. This estimate is based on an August 15, 2016 En Route Automation Modernization (ERAM) outage event at the District of Columbia ARTCC. This program is vital to maintaining and increasing national airspace capacity, reliability, and availability through sustainment of power equipment so that systems and electronics can deliver their required availability.

Detailed Justification for - 2E08 Child Care Center Sustainment

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Child Care Center Sustainment	$1,500	$1,000	$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Child Care Center Sustainment	12	$1,000.0

What is this program and what does this funding level support?

The FAA-owned centers are reaching a facility age of 20 - 25 years; many are in need of roof replacements, Heating Ventilation and Air Conditioning system upgrades, and modernization to meet safety and building code requirements. This program is a multi-year sustainment program that will address facility requirements for the 12 FAA Operated Child Care Centers. The Child Care Centers 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 according to local building codes and regulations, and are safe and secure.

For FY 2022, $1.0 million is requested to modernize the 12 FAA Operated Centers that are in need of major projects and other expenses unique to a childcare 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 childcare center facility.

What benefits will be provided to the American public through this request and why is this program necessary?

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. It will increase the employee retention rate, employee satisfaction, loyalty, and decreases job vacancies. Employee satisfaction leads to more productive employees that benefit the American Public by making government more efficient. Additionally, these Centers have a 100 percent national childcare accreditation rate compared to only five percent nationwide.

Detailed Justification for - 2E09 FAA Telecommunications Infrastructure

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
FAA Telecommunications Infrastructure	$38,500	$34,700	$64,200

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. FAA Enterprise Network Services	---	$47,000.0
B. Time Division Multiplexing – to – Internet Protocol Migration	---	17,200.0

What is this program and what does this funding level support?

A. FAA Enterprise Network Services

This project is the successor to the existing FAA Telecommunications Infrastructure 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 and the FAA. As the FAA Telecommunications Infrastructure program comes to an end, this new project is necessary to ensure there is no interruption to the national airspace system and FAA operations. The current FAA Telecommunications Infrastructure project is providing services today with its contract ending in 2022. FAA Enterprise Network Services will provide high-availability, low latency telecommunications services for national airspace 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.

FAA Enterprise Network Services will be responsible for establishing a modern infrastructure that is capable of meeting the FAA's future demands for telecommunications services through 2036. This project will provide a robust competitive environment for meeting the FAA's future telecommunications needs. For example, FAA Enterprise Network Services will implement modern Internet Protocol based infrastructure to replace legacy Time Division Multiplex based infrastructure that will no longer be supported in the commercial marketplace. The new network

infrastructure will support the connectivity requirements of programs such as System Wide Information Management and Data Communications.

For FY 2022, $47.0 million is requested to fund the necessary resources, program and contract support to:

- Develop FAA Enterprise Network Services enterprise-level networking functions
- Establish prime tools and FAA tools for network management and operations, service ordering and invoicing tracking
- Conduct requirements review on the solution development
- Support communications network planning and engineering, security management and operations

B. Time Division Multiplexing – to – Internet Protocol Migration

Time Division Multiplexing is a lower bandwidth, 1960s technology that is reliant on copper wires, and increasingly outdated, unsupportable equipment that is labor intensive and costly to sustain. More than 90 percent of the services obtained under the FAA Telecommunications Infrastructure contract are Time Division Multiplexing based to meet the interface requirements of systems like surveillance radar, air to ground voice, and ground to ground voice. FAA Telecommunications Infrastructure uses the infrastructure of commercial telecommunications carriers to reach more than 4,000 facilities operated by the FAA. All major carriers have notified the FAA that Time Division Multiplexing based infrastructure and services are being phased out and transitioned to broadband Internet Protocol based technology. This will render thousands of low speed Time Division Multiplexing access connections within the national airspace system inoperable in 2024.

The FAA has received telecommunication carrier network service discontinuance notices from major telecommunications carriers including AT&T, Century Link, and Verizon that affect 33 percent of sites within the national air space. These carrier network services are slated to be decommissioned beginning now through FY 2024. These discontinuances will affect the FAA's ability to make cost-effective changes to its telecommunication infrastructure as service needs evolve and will result in severe service disruptions. In addition, FAA has developed a Time Division Multiplexing – to – Internet Protocol Migration strategy that will:

- Modernize FAA systems and or system interfaces to utilize Internet Protocol technology to take advantage of a modern broadband/carrier Ethernet based network and reduce dependence on Time Division Multiplexing technology
- Reduce dependence on obsolete low speed Internet Protocol technology that is being discontinued by commercial telecommunication providers nationwide

- Replace communication carrier copper with fiber where cost effective and available

- Reduce the risk to national airspace system operations related to the sun setting of Time Division Multiplexing technology

- Provide program conversion solutions

For FY 2022, $17.2 million is requested for Remote Telecommunications Infrastructure Replacement (RTIR) to address Time Division Multiplexing discontinuances, develop, and implement an Enterprise Interface Modernization Solution, which will allow us to communicate between systems like Air to Ground Voice, Ground-to-Ground Voice, Automation, Communication, Navigation, Surveillance and Weather service categories. Without this solution, FAA will be unable to communicate between facilities or control the vast array of national airspace system equipment by the year 2024.

What benefits will be provided to the American public through this request and why is this program necessary?

The FAA Telecommunications Infrastructure program will benefit the American Public directly and indirectly:

- 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 System Wide Information Management enterprise messaging services.

The work under this program supports FAA initiatives to improve the resiliency of the national airspace system through a robust infrastructure that has the ability to auto-recover during outages in a manner that is transparent to FAA end user systems and results in a reduction in air traffic delays.

Detailed Justification for - 2E10 Operational Analysis and Reporting Systems

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Operational Analysis and Reporting System	$7,100	$15,900	$15,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Data Visualization, Analysis and Reporting System	---	$4,500.0
B. Operations Analysis and Reporting System Phase 1	---	3,100.0
C. Operations Network Replacement	---	5,000.0
D. Operational Analysis and Reporting System Phase 2 Planning	---	900.0
E. Operational Analysis and Reporting System Phase 2	---	2,000.0

What is this program and what does this funding level support?

A. Data Visualization, Analysis and Reporting System

The Data Visualization, Analysis, and Reporting System will serve as a replacement and technology insertion and upgrade to the current Performance Data Analysis and Reporting System. The current system, is an important part of the System Capacity, Planning, and Improvements Program and has served as a critical tool in assisting the FAA in modernizing and improving the National Airspace System infrastructure. Data Visualization, Analysis, and Reporting System will serve as a critical toolset, providing wide-spread access to the capabilities that will ensure maintenance of a safe and modern National Airspace System infrastructure. Data Visualization, Analysis, and Reporting System will provide modular processing, integrated visualization and reporting tools allowing users to access quality National Airspace System data through an enterprise data solution accessible on the FAA network to perform modeling, analysis, and trending.

For FY 2022, $4.5 million is requested to complete implementation of Data Visualization, Analysis and Reporting System data and processing system capabilities. This funding will also allow for the development of new visualization and reporting capability requirements. Critical enhancements and transition support to sustain the

existing the Performance Data, Analysis and Reporting System will also be funded from this project.

B. Operational Analysis and Reporting System Phase 1

Will provide the Air Traffic Organization with data-sharing capability among legacy and future systems used for safety risk analysis. The result will provide the end-user with quick and easy access to consistent, accurate, and timely data to allow more efficient, comprehensive, and proactive analyses of risk in the national airspace system. Operational Analysis and Reporting System will be delivered in multiple phases. Phase 1 will develop a single portal user interface to all current legacy safety tools and improve the login and security features for over 40,000 users. Phase 1 will re-host selected legacy applications into the FAA's cloud infrastructure. The legacy applications that will be part of Phase 1 are:

- Comprehensive Electronic Data Analysis and Reporting
- Falcon Rapid Air Traffic Replay Tool
- Traffic Analysis and Review Program
- Risk Analysis Process Tools (Airborne, Surface and Service Integrity)
- Search and Rescue database

For FY 2022, $3.1 million is requested to complete Phase 1 system implementation, and for system engineering and program management support.

C. Operations Network Replacement

A system of data collection that consists of an automated component collecting data from multiple systems, and a manual component requiring data entry from personnel at each facility. The Operations Network reporting components generate and distribute delay and traffic activity reports to the Department of Transportation (DOT) and FAA Executive leadership, Air Traffic Management decision makers, and the Aviation Community. Primary uses of Operations Network include national airspace system performance monitoring, post-operational assessments of traffic management initiatives, measurement of system improvements, financial benchmarking, facility reviews and classifications, and investment planning.

The existing Operations Network system is outdated and constrained by difficulties in correlating data from multiple sources to resolve flight delay issues. This replacement program will replace and modernize the existing system to provide a comprehensive and accurate accounting of delays with appropriate attribution of causal factors. The replacement system will provide near real-time delay reporting capability for evaluation of performance during the day-of-operation. The replacement system will automate, to

the maximum extent possible, the collection of operational data and minimize manual entries.

For FY 2022, $5.0 million is requested for activities that support the migration from the legacy system with the goal of achieving Initial Operating Capability in 2022.

D. Operational Analysis and Reporting System Phase 2 Planning

Operational Analysis and Reporting System Phase 2 will deliver the Operational Analysis and Reporting System application and re-host a second set of select legacy capabilities. In FY 2022, $900,000 is requested for the Phase 2 for program planning and investment analysis work.

E. Operational Analysis and Reporting System Phase 2

Operational Analysis and Reporting System Phase 2 will build upon the single portal established in Phase 1, delivering the Operational Analysis and Reporting System safety application and replacing legacy capabilities, such as Quality Assurance/Quality Control, Safety Event Detection, Replay, and Risk Analysis Process. Phase 2 will also continue to address the lack of flexibility and expandability of legacy applications by re-hosting a second set of legacy applications to the common enterprise host environment delivered in Phase 1. Those legacy applications are Runway Safety Tools, Safety Management Tracking System, Compliance Verification Tool, and Compliance Services Group Tool.

For FY 2022, $2.0 million is requested to support the development of the Phase 2 application and re-hosting of legacy capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

Planning for facility and system enhancements requires the ability to track, monitor, and analyze the daily national airspace system operations information. The modernization of the systems in this portfolio will provide a modernized enterprise cloud solution inclusive of data processing, visualization, and reporting. FAA will realize efficiencies by modernizing and enhancing air traffic control services after determining root causes for performance and risk issues in the national airspace system as identified and monitored by information in these systems. Additionally, FAA will realize productivity gains for the personnel that track and monitor the information provided by these systems.

Detailed Justification for - 3A01 Hazardous Materials (HAZMAT) Management

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Hazardous Materials (HAZMAT) Management	$20,000	$26,000	$30,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Hazardous Materials (HAZMAT) Management	28	$30,800.0

What is this program and what does this funding level support?

The FAA operates the hazardous materials, or HAZMAT management program, to clean up approximately 677 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 as part of enforcement agreements with regulatory agencies. These agreements require the FAA to remediate contaminated soil and groundwater. Extensive contamination at the William J. Hughes Technical Center in Atlantic City, New Jersey prompted the Environmental Protection Agency to place the site on its National Priority List 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.

For FY 2022, $30.8 million is requested to continue the management and remediation of 677 contaminated areas of concern, as of October 2020. During FY 2020, the HAZMAT program both removed 99 areas of concern and added 99 more to the program.

To achieve compliance with Federal, State, and local environmental cleanup statutes, including the Resource Conservation and Recovery Act of 1976, the Comprehensive

Environmental Response, Compensation, and Liability Act of 1980, and the Superfund Amendments and Reauthorization Act of 1986, the FAA must continue mandated program activities. Highlight activities include:

- Continue remediation activities at the Superfund site at the William J. Hughes Technical Center.

- Move the status of sites listed on the Environmental Protection Agency Federal Hazardous Waste Compliance Docket (Docket) to "No Further Remedial Action Planned" status. The majority of non- "No Further Remedial Action Planned" 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 four remaining FAA Docket sites include the Mike Monroney Aeronautical Center, Ronald Reagan Washington National Airport, William J. Hughes Technical Center, and the Guam Center Radar Approach Control Systems Support Center.

- Continue to perform investigations and remediation projects at all other identified contaminated sites under Federal, State, and local mandates to limit future liability to the agency and foster environmental stewardship.

Postponing remedial activities at these contaminated areas of concern can lead to noncompliance with the Federal, State, and local environmental cleanup statues. Noncompliance with these statues includes maximum penalty amounts that range from $1,000 (Bahamas) to $100,000 (Alaska) for the first day of violation, and that range from $1,000 (Bahamas and Idaho) to $50,000 (Hawaii, New Hampshire, and New Jersey) for each day after the first day of violation.

What benefits will be provided to the American public through this request and why is this program necessary?

The direct outcome of closing these sites leads to overall decreased environmental remediation liability to the FAA. Investigating, remediating, and obtaining site closure at the FAA's contaminated areas of concern also increases employee and public safety by minimizing exposure to toxic and hazardous substances at these sites. From FY 2009 through FY 2019, the HAZMAT management program has closed 1,047 areas of concern.

The FAA is currently analyzing alternate remedial technology that optimizes remediation and cost efficiency. A new remediation procedure is being employed at the William J. Hughes Technical Center that has removed 121,000 lbs. of jet fuel contamination during the first ten months of the remediation operation which comparably would have taken approximately 41 years to remove using the previous groundwater pump and treat extraction remediation system.

Detailed Justification for - 3A02 Aviation Safety Analysis System (ASAS)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Aviation Safety Analysis System (ASAS)	$19,700	$23,500	$30,502

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Regulation and Certification Infrastructure for System Safety	---	$22,502.0
B. FAA Critical Infrastructure for System Safety	---	8,000.0

What is this program and what does this funding level support?

The FAA workforce must have a modern reliable information technology infrastructure and tools to effectively perform its data-driven analytical safety work and collaborate with both internal FAA and external aviation stakeholders. Periodically, information technology infrastructure components must be modernized in order to maintain safety operations without disruption due to failure or security vulnerabilities. Funding is required in order to deploy modern Commercial-Off-the-Shelf information technology products and services in the following areas:

- Mobile Technologies and End User Devices: Notebook computers, tablet computers, and peripherals used by the workforce.
- Network Infrastructure and Data Services: Telecommunications switching devices and bandwidth services at FAA facilities.
- Remote Connectivity Telecommunications: Mobile device telecommunications services for the safety workforce.
- Consolidated Server/Data Storage Systems: Hardware infrastructure where critical mission and safety data is stored/accessed.

- Safety and Business Application Hosting Services: Hardware infrastructure, as well as cloud services, that is used to host business applications.

- Enterprise Commercial-Off-The-Shelf Software and Infrastructure.

- Management Tools: Software and tools used to support the workforce and efficiently/securely manage the information technology infrastructure.

- Disaster Recovery: Disaster recovery solutions required to ensure business applications and data are not lost if a catastrophic event occurs.

- Implementation and Planning Support Services: Vendor services required to plan and implement information technology infrastructure enhancements across the enterprise.

- End User Technology Training: Developing training courses and instructional aides to support the use of hardware and software solutions deployed by the investment.

These products and services ensure continuity of operations for critical and non-critical Mission Support safety and business systems. Additionally, these services ensure that critical safety data is safeguarded against loss by providing a secure, reliable and timely back up of data. Modern information technology infrastructure and services also safeguard against evolving security threats that cannot be mitigated by outdated hardware and software solutions.

A. Regulation and Certification Infrastructure for System Safety

For FY 2022, $22.5 million is requested for Regulation and Certification Infrastructure for System Safety in order to provide all the information technology infrastructure components that support the Office of Aviation Safety's 6,400-person safety workforce and ensure standard and reliable accessibility to safety data. This program provides safety data to the Aviation Safety's workforce while they are mobile and conducting safety inspections and investigations of airlines, manufacturers, pilots, accidents, etc. It also provides methods to access all of Aviation Safety's national safety applications developed by:

- System Approach for Safety Oversight

- Aviation Safety Knowledge Management Environment

- Aerospace Medicine Safety Information System

- All other Aviation Safety national safety programs including the Pilot Records Database

Regulation and Certification Infrastructure for System Safety also supports the coming integration of Aviation Safety's disparate safety data, where individual stove-piped applications' data sets are combined into an enterprise level data store that isolates the data from the applications. In this new environment, safety workers assemble data as needed from various data sources to support new business processes.

The program supports the Aviation Safety workforce in their effort to reduce aviation accidents by making real-time safety data immediately accessible to and from all related parties, e.g., inspectors, engineers, investigators, and medical examiners. The program infrastructure was designed to be flexible and scalable, allowing adaptation to meet emerging Aviation Safety business requirements. Further, by enabling the Aviation Safety workforce with the ability to perform its work from nearly any virtual workplace, the Regulation and Certification Infrastructure for System Safety infrastructure facilitates increases to workload capacity and performance without additional staffing requirements.

B. FAA Critical Infrastructure for System Safety

For FY 2022, $8.0 million is being requested to begin technology refresh of the legacy Mission Support information technology infrastructure. FAA Critical Infrastructure for System Safety will provide similar infrastructure products, services, and benefits as Regulation and Certification Infrastructure for System Safety to the nearly 50,000-person FAA workforce not included under the Regulation and Certification Infrastructure for System Safety program. FAA Critical Infrastructure for System Safety will be the information technology infrastructure that most FAA Mission Support systems and Capital Investment Programs will rely on. Currently, there are over 600 legacy FAA Mission Support business applications and several Capital Investment Programs, such as Unmanned Aircraft Systems; Traffic Analysis and Review Program; Knowledge Services Network; Data Visualization, Analysis, and Reporting System; and Operations Network Replacement, that will utilize this infrastructure.

This program will be responsible for maintaining the availability and reliability of the Mission Support infrastructure at national airspace system facilities. Personnel at both national airspace system and Mission Support sites will utilize this infrastructure to access applications and data vital to the health of the national airspace system, including weather-related data and services. For example, national airspace system facilities management uses the Mission Support network for logging maintenance tasks and certification status of equipment, tracking outages, and dispatching technicians for maintenance/repair assignments.

Unlike Regulation and Certification Infrastructure for System Safety, the infrastructure this program seeks to modernize has not been proactively replaced in accordance with prescribed technology life cycles. As a result, the infrastructure is becoming increasingly less reliable, insecure and more prone to failures that can cause disruption to operations and the possible loss of critical data and applications used by the FAA workforce. FAA Critical Infrastructure for System Safety will enable greater scalability and flexibility to meet the needs of the FAA workforce as it continues to adapt to a rapidly changing

aviation environment. Proactive planning and modernization of the FAA Critical Infrastructure for System Safety infrastructure will result in fewer operational disruptions and more efficient utilization of fiscal and personnel resources.

What benefits will be provided to the American public through this request and why is this program necessary?

A proactive technology refreshment and modernization approach will positively affect the reliability, maintainability, and availability of the information technology infrastructure components supporting the critical applications and data systems utilized by the FAA Safety and Mission Support workforce. Operational disruptions caused by out-of-lifecycle infrastructure components will be minimized and the security of vital data will be enhanced. Further, proactive technology refreshment, modernization, and standardization of the infrastructure will reduce maintenance costs and allow greater scalability and flexibility for the infrastructure to meet evolving business needs, including mitigation of events that could adversely affect the flying public and aviation industry revenue.

Detailed Justification for - 3A03 National Air Space Recovery Communications (RCOM)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
National Air Space Recovery Communication (RCOM)	$12,000	$12,000	$12,338

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
National Air Space Recovery Communication (RCOM)	---	$12,338.0

What is this program and what does this funding level support?

For FY 2022, $12.3 million is requested for RCOM. This program supports the Office of Security and Hazardous Material Safety's Command and Control Communications Division. The Command and Control Communications/RCOM program has Presidential and Congressional mandated responsibilities to provide reliable communications support to the White House, DOT, FAA, and other government agencies during national security events, disaster recovery efforts, accident investigations, government exercises, and special invitational events. To achieve this mandate, the RCOM program provides survivable, secure, and redundant communications and facilities that enables the FAA to respond to emergencies, assist in restoration of the national airspace system, protect national security, and enable the continuity of FAA operations. Facilities, equipment and services provided by the RCOM program to fulfill its program mission and Presidential and Congressional mandates include, but is not limited to:

- Equipping air traffic technical operations and emergency response personnel with Very High Frequency/Frequency Modulated radio networks, communication fly away kits, and a fully equipped Emergency Response Vehicle to assist with ground communications in emergencies and data/network connectivity, such as the restoration of air traffic operations at Lake Charles Airport, LA, in the aftermath of Hurricane Laura.

- Installing fixed-based satellite communication terminals in critical air-traffic control facilities for use during interruptions in communication services caused by damage either to commercial communications infrastructure, or by a surge in demand exceeding the capacity of that infrastructure.

- Providing decision-makers and emergency response personnel with information technology infrastructure and applications via the FAA's Emergency Operations Network to facilitate the exchange and visualization of data during emergencies, such as the FAA COVID-19 dashboard developed to inform FAA decision-making and FAA employees regarding COVID-19 statistics related to U.S. Government "Opening Up America Again" guidelines.

- Maintaining a national High Frequency radio, Microwave and information technology networks, for use by FAA and other Federal agencies and Departments in the National Capital Region, and Emergency Operations Facilities to ensure compliance with Presidential Policy Directive 40, *National Continuity Policy*. Most recently, FAA used its Emergency Operations capabilities and Facilities for COVID-19 response, to accommodate social distancing of essential emergency response personnel, and to provide a safe and secure work environment during demonstrations and civil unrest in the Washington, D.C. area.

- Maintaining national security systems to enabling the appropriate handling of classified information and communications agency-wide, to help ensure the safety and security of the National Airspace System.

For FY 2022, $12.3 million is requested to support the RCOM program. The funding requested meets the minimum support necessary to refresh, maintain and improve the infrastructure mandated by mission needs and Federal continuity directives

What benefits will be provided to the American public through this request and why is this program necessary?

The FAA's RCOM program ensures the FAA can reliably and continuously communicate to exchange information, including during times of crisis and natural disaster, to maintain the timely flow of information to support agency-wide decision making. Investments made by the FAA's RCOM program enable the FAA to bypass disrupted common carrier communication circuits and systems to coordinate national airspace system restoration when disrupted by natural disasters, wartime events, terrorist activities, or other catastrophic events. The RCOM program provides the resiliency needed for the FAA to maintain mission essential functions, such as air navigation services. Maintaining these services minimizes impacts to air travel and supports continued national defense and law enforcement operations during times of crisis, to safety and benefit of the American people.

Detailed Justification for - 3A04 Facility Security Risk Management (FSRM)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Facility Security Risk Management (FSRM)	$15,100	$22,000	$26,007

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Facility Security Risk Management (FSRM)	66	$26,007.2

What is this program and what does this funding level support?

In 1999, the FAA established the FSRM program, which implements standardized facility protective measures at all FAA-staffed facilities. These measures include personnel access control (via card readers, fencing, gates, and security guards), surveillance (cameras), vehicle access control (barriers), visibility enhancements (lighting), and X-ray machines. The FSRM program participates in the construction of facilities that secure FAA personnel and assets, such as guardhouses, and facility retrofitting to protect against blast or explosive attacks.

The FSRM program manages contracts that install security systems, and that provide maintenance services to installed security systems regardless of age, manufacturer, or condition. In addition to the protection of FAA personnel and assets, another program goal is one of standardization across the national airspace system. The standardization of security equipment and processes will result in a substantial cost savings to the FAA.

The FSRM Sustainment program is instrumental in ensuring that FAA efficiently and cost effectively implements all issued Presidential Directives aimed at securing Federal facilities and personnel. For FY 2022, $26.0 million is requested to support security upgrades that will result in increased security at FAA-staffed facilities.

- Construction/Installation for security upgrades

- Engineering design and equipment installation for the Eastern and Western Pacific regional offices

- Security Personal Identification Verification upgrades at Facility Security Level 2 and 3 facilities

- Technology refresh of security systems at Facility Security Level 2, 3, and 4 facilities to replace outdated security equipment

- Begin installation of cameras and Personal Identification Verification card readers at all access points to areas housing critical national airspace systems in all Air Route Traffic Control Centers, Airport Traffic Control Towers and Terminal Radar Approach Control facilities that support the busiest United State terminal areas

What benefits will be provided to the American public through this request and why is this program necessary?

The FSRM program has contributed to obtaining security accreditations at over 980 FAA facilities. This continues to be accomplished through the program's management of national contracts that assess and upgrade security measures such as X-ray machines, cameras, card readers, gates, and vehicle barriers at FAA-staffed facilities. This program is necessary in order to continue the assessment and upgrade of obsolete and unsupportable security systems, reducing the risk of intrusion and unauthorized entry to FAA-staffed facilities nationwide.

Detailed Justification for - 3A05 Information Security

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Information Security	$23,300	$18,500	$22,589

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Information Systems Security	---	$12,000.0
B. National Airspace System Critical Infrastructure Cyber Enhancements	---	10,589.0

What is this program and what does this funding level support?

The Federal Information Security Management Act of 2014 requires that the FAA must identify and provide information security protection. FAA must prevent unauthorized access, use, disclosure, disruption, modification, or destruction of information that supports the Agency, aviation safety and security, and the national airspace system. This includes detection of alerts and attacks generated against the FAA/DOT infrastructure, mitigation of cyber events, and prevention of privacy breaches. The FAA Security Operations Center, a 24x7x365 operation, is the central reporting point for all cyber events occurring within the FAA and DOT.

The transition of the national airspace system to a fully Internet Protocol based infrastructure increases the threat of damage from cyber-attacks. Damage to FAA systems and aviation safety related information such as Air Traffic, Airway, and Airport Information Systems; or Pilot and Airman Medical processing and Certifications data, can have potentially serious consequences for the entire aviation community and the American public.

A. Information Systems Security Enhancement

For FY 2022 $12.0 million is requested to support a comprehensive cybersecurity strategy to improve management security controls, incorporate software development and life-cycle processes, and address the interdependencies between aircraft and air traffic

systems. The Mission Support Information Systems Security Program supports efforts that fortify the security and protection of FAA networks and infrastructure, including:

- Cybersecurity Operations (includes FAA Security Operation Center): provide 24x7 monitoring across FAA's three operation domains: Mission Support, National Airspace System, and Research, Engineering and Development, to improve the Agency's security posture and prevent, detect, analyze, and respond to cybersecurity incidents.

- Cybersecurity Test Facility: evaluates new technologies for their usefulness in preventing, monitoring, and mitigating cyber alerts, alarms and events prior to integration within the National Airspace System Domain and the Mission Support Domain.

- Cybersecurity Risk Model: provides an agency-wide strategy for identifying cybersecurity risk to services and potential countermeasures that may prevent or mitigate the risk.

- Zero Trust: a comprehensive network security model that requires strict identity verification for every user and device attempting to access FAA networks, applications and data.

B. NAS Critical Infrastructure Cybersecurity Enhancement

For FY 2022 $10.6 million is requested to support the National Airspace System Critical Infrastructure Cybersecurity Program in providing services and capabilities to enhance Air Traffic Control and ensure the national airspace system remains secure and resilient. Specific NAS Critical Infrastructure Cybersecurity Program security investments include:

- National Airspace System Centralized Software Security Management: provides a centralized capability for security patches and malicious code protection updates

- National Airspace System Security Enterprise Asset Management: provides centralized collection and analysis for asset hardware, software, vulnerability, and configuration information

- National Airspace System Cyber Management System: provides security event collection capabilities at FAA facilities and centralized event analysis

- Remote Management Access Gateway: provides secure remote authorized user access to air traffic operations assets from external domains

- Remediation of Vulnerabilities: provides centralized funding to remediate security weaknesses based on findings from internal assessments and external audits

- Solution Integration: provides funding for systems to integrate with developed enterprise security services

What benefits will be provided to the American Public through this request and why is this program necessary?

The continuing mission of the FAA is to provide the safest, most efficient aerospace system in the world. Such efforts include satellite communications, navigation, weather and aircraft worthiness to prevent aviation related fatality, injury or significant property loss. The FAA is undertaking multiple strategic and tactical initiatives in the development of a comprehensive and strategic framework to reduce cybersecurity risks to the national airspace system, civil aviation, and agency information systems.

The enhanced national airspace system Cybersecurity protection, detection and response capabilities identified above would significantly limit the likelihood of a major cyber-attack against the national airspace system being successful and, thereby, protect the American public from severe economic disruption and threats to safety. Implementing the initiatives at an enterprise level, rather than on a system-by-system basis, provides the agency with economies of scale and reduces or eliminates redundant costs.

Detailed Justification for - 3A06 System Approach for Safety Oversight (SASO)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
System Approach for Safety Oversight (SASO)	$23,100	$29,200	$35,400

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. System Approach for Safety Oversight (SASO) Phase 3	---	$11,500.0
B. System Approach for Safety Oversight (SASO) Phase 4	---	23,900.0

What is this program and what does this funding level support?

For FY 2022, the System Approach for Safety Oversight (SASO) program requests a total of $35.4 million for continued development of the Safety Assurance System.

The SASO program increases aviation safety and controls cost by adopting the International Civil Aviation Organization mandate to revise Safety Programs to incorporate Safety Management System principles. The SASO program also supports the FAA Administrator's transition to risk-based decision-making and integrated oversight philosophy. To accomplish this, the SASO Program is reengineering Flight Standards Service business processes and developing an oversight system based upon system safety principles. The scope of the SASO investment includes reengineering Flight Standards Service business processes and partially integrating Flight Standards systems. SASO serves approximately 4,800 FAA Aviation Safety employees across headquarters and approximately 100 field offices, and more than 25,000 additional aviation industry professionals managing aviation safety throughout the United States.

Flight Standards is responsible for oversight of nearly the entire civil aviation industry using the National Airspace System. Its legacy 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 remain which requires additional systems-based, data-supported analysis and assessment for their resolution. SASO closes the performance gap between a

"regulatory compliance-based" approach and the reengineered system safety-based approach to safety oversight.

Increases in technical and operational complexity of aviation operations and introduction of new technologies further stress today's oversight system. SASO implements a more structured data-supported risk-based oversight system, for the Flight Standards aviation safety inspector workforce. The primary product is the Safety Assurance System. Flight Standards uses this system for more efficient management of its statutory responsibility to oversee National Airspace System certificate holders, and as a hazard identification and risk assessment tool to formulate surveillance plans and target Flight Standards, resources to the highest risk areas in the National Airspace System. The Safety Assurance System core functionality was first deployed in 2016 for oversight of three Title 14 Code of Federal Regulations (14 CFR) parts, a subset of Flight Standards overall responsibility.

SASO Phase 3 implements the SASO program requirements associated with safety oversight of aviation training schools and adds an interface with the Designee Management System. SASO Phase 3 enhances the Safety Assurance System functionality in the areas of activity recording, office workload list, risk profile, and the Certificate Services Oversight Process. Finally, SASO Phase 3 develops Safety Management System safety educational materials and support systems for general aviation certificate holders.

During FY 2022, the program intends to continue transitioning offices to the new system and achieve last production site initial operational capability in May 2022. An aggressive change management effort will accompany the deployment to ensure successful transition of the workforce from the legacy system.

The program will continue SASO Phase 4 activities, including business process re-engineering via integrated product teams for core Phase 4 objectives. SASO is introducing an iterative release strategy that will take advantage of agile software development and waterfall releases in the Safety Assurance System functionality. The first functionality release will be identified, mature and nearly ready to deploy.

SASO Phase 4 will align with FAA's Integrated Oversight Philosophy and Compliance Program; implement Unmanned Aircraft Systems and Foreign Air Carriers into the Safety Assurance System: expanding and enhancing the risk profile model; integrate the Safety Assurance System into other lines of business and programs including Aeromedical, Flight Standards Inspector Resource Program and Hazardous Materials Safety. In addition, Phase 4 will include mobile device capability and other information technology programs, including Operations Approval Portal System and Web-Based Operations Safety Systems integration.

The success of the SASO program depends upon continued development funding through FY 2027 to achieve and sustain full benefits. The required funding supports further Safety Assurance System automation development, policy updates, training, and

implementation to achieve the full oversight capabilities and benefits as envisioned during the business process re-engineering analysis and design phase of the program.

What benefits will be provided to the American public through this request and why is this program necessary?

The primary benefit of the SASO program to the American public is its contribution to the reduction of aviation accidents and fatalities. By implementing the system safety principles, FAA oversight of the aviation industry results in fewer accidents attributable to FAA oversight gaps or failures. The new processes and tools developed under this program allow Flight Standards to focus its resources on the highest risk areas in the National Airspace System. The flying public is the primary beneficiary of SASO's system safety-based safety oversight system of the aviation industry.

Detailed Justification for - 3A07 Aviation Safety Knowledge Management Environment (ASKME)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Aviation Safety Knowledge Management Environment (ASKME)	$5,300	$9,700	$9,800

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aviation Safety Knowledge Management Environment (ASKME) Enhancement 1	---	$9,800.0

What is this program and what does this funding level support?

The ASKME program was established to provide a comprehensive suite of Information Technology applications and other services to support critical safety processes within the Aircraft Certification Service of Aviation Safety. Segment 1 completed in 2014, and Phase 2 completed in September 2020. ASKME Enhancements will include:

- Business Process analysis to identify automation gaps in Aircraft Certification Service business processes
- Enhancements to previously funded applications, including the development of portals to allow external users to enter data directly into applications in support of Aircraft Certification Service processes
- New automation of Aircraft Certification Service business functions that were not included in ASKME Segment 1 or Phase 2
- Data transformation and support for the Information Management Strategy for Aircraft Certification Service, coordinating with Enterprise Information Management and the Safety Data and Analysis Team initiatives

For FY 2022, $9.8 million is requested to complete the following activities:

- Data Transformation that includes consolidating and standardizing data among the ASKME applications

- Software Development and Integration:

  - Enhancing existing ASKME applications so they support updated Aircraft Certification business processes and meet new requirements from system users

  - Developing an application to help FAA analyze safety data and make oversight plans based on risk, which will lead to a more efficient use of FAA personnel

  - Developing application external portals to allow users (i.e. aircraft manufacturers, suppliers, etc.) to provide data directly into ASKME applications, which will remove the need for FAA personnel to manually enter information from these external sources

What benefits will be provided to the American public through this request and why is this program necessary?

ASKME Enhancement 1 will increase productivity and efficiency of the Aircraft Certification Service by providing a centralized system to share aircraft certification information that promotes quicker and more effective decision-making, for example: identifying the highest risks to aviation safety (production, design, or a specific company, etc.), and determine where FAA inspectors should prioritize their efforts with inspections or audits. The program promotes rapid data sharing through an external public portal that allows faster access to FAA resources. This fast exchange allows rapid identification of potential safety trends and reduces safety risks to the traveling public.

Detailed Justification for - 3A08 Aerospace Medical Equipment Needs (AMEN)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Aerospace Medical Equipment Needs	$13,800	$26,800	$6,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Aerospace Medical Equipment Needs (AMEN) – Sustainment 3	---	$4,900.0
B. Wind and Wave Evacuation/Survival Facility Phase 1	---	2,000.0

What is this program and what does this funding level support?

Civil Aerospace Medical Institute research and training personnel discover methods and recommend strategies to enhance the safety, security, health, and performance of the most important aspect of the National Airspace System, the human operator and the public that she/he serves. Civil Aerospace Medical Institute is the only federal entity that performs this work on behalf of the U.S. The AMEN investment supports research that includes assessments of human performance under various conditions of impairment, human error analysis and remediation, and agency workforce optimization. To perform their missions, Civil Aerospace Medical Institute personnel require sophisticated, highly technical, and specialized equipment. Much of the laboratory equipment used by FAA's scientists, physicians, and engineers is old and becoming obsolete.

A. Aerospace Medical Equipment Needs Sustainment 3 (AMEN 3)

FAA will replace a number of critical and highly technical pieces of specialized equipment. These items must be replaced because of advanced age, lack of support, diminished technology capability, and limited strategic resource optimization. For FY 2022, $4.9 million is requested to support the replacement of items for Aerospace Medical and Human Factors research and training. The required equipment supports three main program objectives: 1) Perform research simulation and training, 2) analyze and investigate aviation accidents and incidents, and 3) collect and analyze the data for patterns and trends. Specifically, AMEN equipment will support the following.

- Assessment of crash environments to determine restraint performance and safety device effectiveness

- Evaluation of emerging technologies and procedures, including simulation studies on the usability of proposed automation concepts, and the effects of these concepts on Air Traffic Controller workload, situational awareness, and performance

- Education of student pilots on the effects on the body of low pressure and oxygen depletion, symptoms recognition, and the action to be taken

- Training of flight crews on in-flight fire identification and suppression procedures

- Development of procedures to detect aeromedically unsafe conditions and trends

- Development and assessment of performance measures for Air Traffic Control and technical operations specialists

- Medical monitoring of human subjects required for aviation safety research

B. Wind and Wave Evacuation Survival Facility

The Civil Aerospace Medical Institute team plans to construct a new Wind and Wave Evacuation and Survival Facility, to be located west of the Civil Aerospace Medical Institute building. The new 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 emergencies. No other such capability currently exists within the civil aviation industry.

For FY 2022, $2.0 million is requested to enable the Wind and Wave Evacuation and Survival program to replace the aging Water Survival Research Facility at the Civil Aerospace Medical Institute. The funding is to complete the final construction and implementation phases of the new facility and will support the first year of the operation and maintenance.

What benefits will be provided to the American public through this request and why is this program necessary?

These investments will allow for the 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.

Detailed Justification for - 3A09 NextGen – System Safety Management Portfolio

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
System Safety Management Portfolio	$24,500	$21,500	$18,294

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Aviation Safety Information Analysis and Sharing	---	$15,000.0
B. System Safety Management Transformation	---	3,294.0

What is this program and what does this funding level support?

This portfolio contains activities that ensure that changes introduced with NextGen enhance and do not degrade safety while delivering benefits. The work under this program will enable the development of tools to convert both text and digital data into safety information to support predictive analyses. It will also support the development of anomaly detection and visualization capabilities to enable causal/contributing factor analyses and risk assessments, utilizing machine-learning capabilities. 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.

A. Aviation Safety Information Analysis and Sharing

The mission of Aviation Safety Information Analysis and Sharing is to provide a global resource to identify emerging, systemic aviation safety hazards affecting the National Airspace System and the global air transportation system, to inform timely development of safety mitigations and reduce risks. The program is a collaborative government/industry initiative to analyze data and share aviation safety analysis, in order to discover safety concerns before accidents/incidents occur. Aviation Safety Information Analysis and Sharing participation includes more than 150 stakeholder organizations across the aviation community (including commercial and corporate aviation, general aviation and rotorcraft, trade associations, government agencies, universities and others) who contribute various safety data for use in safety analyses.

This funding includes program efforts to address new and emerging risks in collaboration with the aviation community.

For FY 2022, $15.0 million is requested to:

- Conduct predictive analytic activities to extract information from aviation-related data
- Develop controlled stakeholder access to Aviation Safety Information Analysis and Sharing data for customized safety analyses/studies, through a shared analytic environment
- Conduct activities leveraging artificial intelligence/machine learning technologies
- Provide an expanded aviation data repository with information from new sources
- Deliver enhanced metrics based on radar surveillance data merged with digital flight data and aircrew safety reports, infused with additional data sources; these metrics are based on tools, algorithms and models to analyze priority safety issues

B. Safety Systems Management Transformation

This project is a stakeholder-driven, cross-functional program that 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. Safety Systems Management Transformation incorporates integrated safety risk models, enables customization of models from the National Airspace System to a single operator or region, and provides identification of, data about, and replay of detected candidate safety events for surface and En route operations.

For FY 2022, $3.3 million is requested to provide the following:

- Validate and verify safety risk models and lead safety risk assessments for FAA Lines of Business. The selected model(s) will be created or, if existing, restructured, quantified with the best available data to reflect baseline risk in FY 2022 and will be based on emergent safety risks identified by the FAA as critical for FY 2022 National Airspace System operations.
- Improve automated methods for identifying, extracting, parsing, and analyzing commercial aviation safety data available in both text and digital formats.
- Improve modeling techniques of commercial aviation safety risk, employing advanced analytics and Artificial Intelligence.
- Expand data extraction methods to process new FAA data sources using latest technology.

- Conduct safety risk impact assessments of NextGen Operational Improvements.

What benefits will be provided to the American public through this request and why is this program necessary?

The planned growth and complexity in the air transportation system requires a fundamental change in the way the air transportation community manages safety. System safety management research provides a shared, proactive approach to identifying, assessing and mitigating risk, enabling all stakeholders to be more effective in their approach to managing safety. The primary benefit of this program is the development of safety analysis to proactively reduce aviation incidents and fatalities.

Detailed Justification for - 3A10 National Test Equipment Program (NTEP)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
National Test Equipment Program (NTEP)	$3,000	$3,000	$3,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
National Test Equipment Program (NTEP)	---	$3,000.0

What is this program and what does this funding level support?

The NTEP supports National Airspace Systems on the following platforms: communication, automation, surveillance, power, navigation, and weather. NTEP is responsible with procuring and maintaining test equipment. Furthermore, ensuring the National Airspace System is operating to optimal standards by troubleshooting, repairing, and re-certifying both new and legacy systems.

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 Platforms. Failure to achieve certification of critical National Airspace System systems (at any of 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.

A large portion of the test equipment is either damaged or rife with supportability and maintenance issues. The problem affects Mean-Time-To-Restore, safety, maintenance cost, and inventory management for every system within the National Airspace System; no other FAA program office or initiative currently addresses this problem.

For FY 2022, $3.0 million 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 oscilloscopes,

universal data test sets, vector network analyzers, and reducing the test equipment backlog. The majority of test equipment has reached its end of life cycle and can no longer be maintained or repaired by the FAA Logistic Center or the Original Equipment Manufacturer.

What benefits will be provided to the American public through this request and why is this program necessary?

The NTEP mission is to support the restoration of Air Traffic services by procuring and delivering functioning test equipment throughout the National Airspace System. Technicians need up to date calibrated test equipment in order to make necessary adjustments and alignments to major National Airspace Systems. The lack of up to date test equipment poses a serious risk that will result in delaying the restoration of critical Air Traffic systems that are crucial for the protection of the flying public.

Detailed Justification for – 3A11 Mobile Assets Management Program

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Mobile Assets Management Program	$1,800	$2,500	$2,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Mobile Assets Sustainment	---	$2,500.0

What is this program and what does this funding level support?

The Mobile Assets Sustainment Project provides transportable National Airspace System equipment to restore certain operations during periods of extended equipment outages. The FAA's mobile assets deploy to support relief efforts during natural disasters such as earthquakes, forest fires, and hurricanes and ensures continuity of National Airspace System operations. The Mobile Assets Sustainment Project provides mobile assets that function as air traffic control towers and terminal radar approach control facilities, remote transmitter/receiver sites, remote communications air/ground sites, and other facilities/systems that experience unexpected outages or planned system downtime for non-routine maintenance, modernization, or upgrade.

This mobile equipment provides for the continuity or restoral of air traffic control when an Air Traffic Control Tower or other National Airspace System equipment is out of service due to a disaster or an extensive repair, modernization, or upgrade. The Mobile Assets Sustainment Project provides assets needed to augment air traffic control in support of major public events such as NASCAR and the NFL Super Bowl.

For FY 2022, $2.5 million is requested to ensure that a sufficient number of the FAA's mobile assets are available to restore continuity of aviation operations by procuring mobile assets and equipment upgrades/technology refreshes.

What benefits will be provided to the American public through this request and why is this program necessary?

The American public will benefit from the efficient restoration of air traffic control operations in emergencies or natural disasters within hours of the mobile assets arriving on site. The program will be working 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.

Detailed Justification for - 3A12 Aerospace Medicine Safety Information System (AMSIS)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Aerospace Medicine Safety Information System (AMSIS)	$13,800	$20,200	$25,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aerospace Medicine Safety Information System (AMSIS) Phase 1	---	$25,000.0

What is this program and what does this funding level support?

The AMSIS program is developing a new aerospace medical information network that integrates critical medical information associated with pilots, air traffic controllers, and other aviation related personnel. The Office of Aerospace Medicine is responsible for advancing the field-of-study of aerospace medicine and for the medical certification of pilots, Air Traffic Control Specialists and other safety critical personnel. Office of Aerospace Medicine processes approximately 450,000 medical applications annually and maintains records on millions of past examinations as part of their role in the oversight of 600,000 pilots and approximately 15,000 Air Traffic Control Specialists.

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 is 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 AMSIS Program will eliminate 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, including denials due to disqualifying medical conditions or substance abuse issues, to identify safety trends that could affect system safety. Specifically, AMSIS is necessary to:

- Improve safety for the public by reducing fraudulent certification
- Improve FAA's responsiveness to the individual/pilot with reduced turn-around times, enhanced ability to track status, and to protect health and identifying information
- Improved visibility for airlines and other employers on the certification history of their pilots
- Deliver a better product for use by Aviation Medical Examiners

AMSIS will be implemented in two phases. Phase 1 delivers automation improvements to the following processes:

- Common Functionality (such as user management and support)
- Medical Certification (Airman) and Medical Clearance (Air Traffic Control Specialists)
- Industry Substance Abuse Oversight and Management
- Workflow Management
- Reporting and Data Services

AMSIS Phase 2 will deliver automation improvements to the following processes:

- Internal Substance Abuse program support module
- Aerospace Medical Analysis support module
- Budget process support module

For FY 2022, $25.0 million is requested to continue Phase 1 testing and implementation, fund initial operational support of the deployed system, and to provide for program office system engineering and program management support. In addition, the requested funding will support Phase 2 Investment Analysis and requirements development.

What benefits will be provided to the American public through this request and why is this program necessary?

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. These systems will securely interface with approximately 4,250 FAA Medical Examiners to perform pilot and Air Traffic Control Specialist medical examinations.

AMSIS will provide increased access to medical history and support earlier National Driver Register 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.

Detailed Justification for - 3A13 Configuration, Logistics, and Maintenance Resource Solutions (CLMRS)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Configuration, Logistics, and Maintenance Resource Solutions (CLMRS)	$0	$26,350	$23,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Logistics Support Systems and Facilities Segment 2	---	$2,100.0
B. Logistics Support Systems and Facilities Segment 3	---	7,900.0
C. Automated Maintenance Management System	---	1,700.0
D. Remote Monitoring and Logging System Sustainment	---	3,200.0
E. Configuration Management Automation Phase 1	---	8,600.0

What is this program and what does this funding level support?

A. and B. Logistics Support Systems and Facilities Segment 2/3

This project is a mission support procurement that automated the FAA's logistics management and supply chain processes. The processes include planning, procurement, sales, maintenance, repair, overhaul, quality, inventory management, finance, and engineering of National Airspace System equipment for the Air Traffic Organization. Logistics Support Systems and Facilities automates these processes for routine and emergency logistics products and services to FAA customers at facilities nationwide, as well as to the Department of Defense, Department of Homeland Security, state agencies, and foreign countries.

For FY 2022, $2.1 million is requested for Segment 2 to perform operational functionality corrections and decommissioning of the legacy Logistics Inventory System.

For FY 2022, $7.9 million is requested for Segment 3 to begin the enhancements phase for additional capabilities. These additional capabilities include implementation of

accurate depot inventory in the Industrial Financial System, which includes but is not limited to subsuming the Warehouse Management System.

C. Automated Maintenance Management System

FAA will deliver benefits through technology and infrastructure by interfacing dispersed maintenance system within the currently existing System Wide Information Management Service Oriented Architecture environment to include an interface to Industrial Financial System the system that automates configuration management and logistics. This investment standardizes system interfaces, and governance is 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.

For FY 2022, $1.7 million is requested to perform software and hardware engineering activities to continue solution implementation based on the chosen alternative for Automated Maintenance Management System activities. The key capabilities include: single event logging, interface with logistics, flight check, and notices to airmen.

D. Remote Monitoring and Logging System Sustainment

Will replace aging legacy core hardware components to accommodate National Airspace System growth and ensure that the legacy National Logging Network and the National Remote Maintenance Monitoring Network infrastructure supports the agency's storage, bandwidth, and security needs. This program is necessary because the hardware upgrade will allow the Remote Monitoring and Logging System infrastructure to comply with the FAA's mandated security requirements.

For FY 2022, $3.2 million is requested to perform hardware-engineering activities to continue solution implementation. Remote Monitoring and Logging System Sustainment contractor support will perform hardware install, assemble, test and checkout of Remote Monitoring and Logging System equipment at eight locations, and provide program management to assist with program solution implementation.

E. Configuration Management Automation

The goal of FAA's Configuration Management is to record technical information, including system specifications and installation data, of all systems installed in FAA facilities. In addition, Configuration Management requires documentation for all proposed and actual changes to these systems in order for maintenance technicians and replacement programs to have accurate and up to date information for maintaining or replacing existing systems. The primary tool currently used to support Configuration Management has become obsolete.

The investment will utilize a phased approach to replace the legacy tool and establish lifecycle traceability and enhanced interfaces (Phase 2) with updated functionality. This will align the FAA with industry best practices and lifecycle management of agency assets and restructure interfaces to meet industry standards that support emerging transfer technology. Configuration Management Automation will have the ability to effectively manage business rules, trace, predict, and manage an asset's status, opportunities, and risks during any phase of the lifecycle.

For FY 2022, $8.6 million is requested for corrective improvements and decommissioning of the old system known as WebCM.

What benefits will be provided to the American public through this request and why is this program necessary?

The elements included under this program will meet the demands of sustaining the National Airspace System in a more efficient and cost competitive manner by managing inventory levels, optimizing delivery channels to meet National Airspace System availability requirements, and reducing cycle time of parts acquisition, ensuring and documenting standardized configurations. This program will upgrade existing systems with current hardware and software that support all of FAA sustainment and inventory supply chain management. The current systems are obsolete and unsupportable. The new technology will reduce FAA operating costs because they offer efficiencies and will not require intensive maintenance, as do the current systems.

Detailed Justification for: 3B01 Aeronautical Center Infrastructure Sustainment

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Aeronautical Center Infrastructure Modernization	$18,000	$14,000	$21,500

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Aeronautical Center Infrastructure Sustainment	1	$21,500.0

What is this program and what does this funding level support?

The Mike Monroney Aeronautical Center is an aging facility of 137 leased and FAA-owned buildings. The ages of the buildings vary from a few months to 73 years. Missions are accomplished in Mike Monroney Aeronautical Center facilities whose personnel train controllers to direct air traffic across the country and at airports and train technicians to maintain National Airspace Systems. Parts and repair services are provided by logistics personnel in these facilities and comprise the FAA's centralized National Airspace System inventory, sharing support of some systems with Department of Defense and foreign countries having common systems. There is $50 million 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 many buildings. The requirements can be addressed with systematic funding to improve conditions and assure the aging infrastructure remains viable in future years.

For FY 2022, $21.5 million is requested for the following:

- To award design and renovation construction for replacement of building systems that include: heating, ventilation, air conditioning, electrical, plumbing, roofs, energy systems (lighting, insulation) and building automation systems.

- 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.

- To provide National Airspace System Integration Support Services and Technical Support Services Construction inspectors.

- To award contracts for mechanical and electrical system upgrades in Building #204 and Building #001.

- To award contracts for electrical switchgear and motor control center replacements in multiple buildings.

- To award energy conservation and building recommissioning projects in multiple buildings.

What benefits will be provided to the American public through this request and why is this program necessary?

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. It extends the useful life of the buildings, 25 to 30 years, for current and future generations of the FAA work force.

Detailed Justification for - 3B02 Distance Learning

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Distance Learning	$1,000	$1,000	$1,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Distance Learning	---	$1,000.0

What is this program and what does this funding level support?

Training has a direct impact on safety and competency in the National Air Space System and the international community. This program delivers state-of-the-art course delivery to geographically dispersed students. This capability reduces, and in some cases eliminates, the need for resident-based training.

Provides the infrastructure to deliver simulations and training to all personnel at the FAA, U.S. Customs and Border Protection, Commercial Space Transportation, and to international students. Distance Learning Platforms, the FAA Academy Virtual Training Network, Microsoft HoloLens, and Virtual Training Studios channel the interactive information exchange. The requested funding will provide resources for a necessary technology refresh of the Distance Learning Platforms, the FAA Academy Virtual Training Network, and Virtual Training Studios equipment located at every Air Traffic, Federal Contract Tower, and Airway Transportation Systems Specialist facility in the National Airspace System. The Distance Learning Platforms need a technology refresh to support high-performance media/simulation requirements and to replace the obsolete parts of current platforms. The funding will also provide resources for establishing connectivity between multiple field sites and the Academy Virtual Training Network system; thereby, allowing virtual training at an expanded number of field locations. The funding will support the acquisition, configuration, and installation of 350 modernized Distance Learning Platforms. In addition, Academy Virtual Training Network and Virtual Training Studios equipment will be upgraded at various locations. Additionally, the technology refresh will support the FAA initial and qualification training of all Air

Traffic Control and Airway Transportation Support Specialist personnel, as well as training for Customs and Border Protection, Commercial Space Transportation, and international personnel.

What benefits will be provided to the American public through this request and why is this program necessary?

These two projects allow air traffic controllers and technicians to build and maintain competencies within their areas of expertise. A major cost savings benefit of distance learning is the substantial reduction in time, travel, and per diem costs associated with resident-based training. In addition, distance learning delivery methods increase training effectiveness and opportunities for all FAA employees, as well as provide flexibility in training schedules through local management control.

Detailed Justification for - 4A01 System Engineering and Development Support

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
System Engineering and Development Support	$38,000	$39,100	$37,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. System Engineering Support	---	$35,000.0
B. ATC/AFN Systems Support Program Evaluation	---	2,000.0

What is this program and what does this funding level support?

For FY 2021, $37.0 million 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 National Airspace System.

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 requirements. The Enterprise Architecture 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. The contract also provides support to FAA's planning and budgetary processes and contract administration, ensuring consistent application of the Acquisition Management System policy.

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 National Airspace System facilities.

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 and Analyses, Enterprise Integration Services, Forecast Analysis and Investment Planning and Analysis for the life of the NextGen Program.

- Supports critical programs such as National Airspace System Enterprise Architecture (integrate and align the Enterprise Architecture portal), Segment Implementation Plan, and Safety Process Improvement are procured through this budget line item.

- Supports the oversight and administration of contract portfolios consisting of multiple prime contractors with large subcontracting teams who 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 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 National Airspace System.

- Funds data warehouse enhancements that expand upon existing financial management and accounting analytics and reporting capabilities.

- Provides cost estimating, cost and benefit analysis, operations research, risk and schedule analysis, market surveys, and business case analysis and development in support of investment analyses for NextGen and the National Airspace System. Conduct Engineering Analysis on NextGen systems.

- Supports application and upgrades to program management financial tools. Supports the design, development, maintenance, training, and reporting on all aspects of

Simplified Program Information Reporting and Evaluation, FAA Acquisition System Toolset, Financial Management System, and other management tools.

B. Air Traffic Control/Finance and Management Systems Support

Supports technical analysis and oversight of acquisition programs goals and performance reporting

What benefits will be provided to the American public through this request and why is this program necessary?

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 cost effective 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. The economies of scale created by the contracts under this project will allow for a reduction in award time of new tasks and a shorter cycle time for product implementation into the National Airspace System. It also increases agility in response to stakeholder requirements and serves to track funding costs and resources efficiently and effectively.

Detailed Justification for - 4A02 Program Support Leases

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Program Support Leases	$48,000	$48,000	$15,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Program Support Leases	---	$15,000.0

What is this program and what does this funding level support?

For FY 2022 $15.0 million is requested to pay rents on approximately 2,800 real estate leases, for land and facilities that are managed by this program. This request level reflects a one-time correction to reduce unobligated carry over balances. Funds are also required to provide the necessary real property rights for land, tower space, aerial easements, and technical operational space. These leases and property rights directly support air traffic control. Requirements include:

- Payment of rents for land and space leases that directly support navigation, communication, weather observation and reporting, air traffic control, maintenance of equipment and other functions that support the National Airspace System
- Funds for conversion of existing leases to fee ownership or perpetual easements
- Payments for condemnation (leasehold or fee) of real property interests
- Costs for land surveys, real estate appraisals, market surveys, title reports, environmental due diligence audits and other costs associated with the acquisition and management of real property assets
- Costs to record land leases for public record

- Funds for all costs associated with the relocation of offices, facilities, personnel, and equipment (e.g. move, furniture, Information Technology Telecommunications, finishes)

- Funds for the downsizing, consolidation, or combination of multiple offices when technically feasible and economically advantageous

- Funds for the development of technical and administrative space lease evaluation 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 benefits will be provided to the American public through this request and why is this program necessary?

Maintaining operational ground based navigational aids, towers, facilities, and equipment is paramount to the safety of the flying public. Accurate management will prevent FAA from incurring significant costs associated with defaults 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 effective use of taxpayer dollars.

Detailed Justification for - 4A03 Logistics and Acquisition Support Services

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Logistics and Acquisition Support Services	$11,800	$12,000	$12,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Logistics and Acquisition Support Services	---	$12,000.0

What is this program and what does this funding level support?

For FY 2022, $12.0 million is requested to fund property and acquisition support services. These funds are requested to obtain contract resources that provide:

- Acquisition support
- Improvement of real estate processes
- Execution of capitalization activities
- Drawing and design support for the space management at
  - The three FAA Logistics Service Areas located in Atlanta, Ft. Worth, and Seattle
  - The William J. Hughes Technical Center in Atlantic City
  - New England Region (Boston)
  - Great Lakes Region (Chicago)
  - Mike Monroney Aeronautical Center in Oklahoma City

Contract resources are also used to support the Defense Contract Audit Agency program. The program is required by the FAA Acquisition Management System, to audit 100 percent of the all the contract types greater than $100 Million and a minimum of 15 percent of all non-firm fixed priced contracts. These contracts include support for National Airspace System capability development and critical services. This support provides:

- Contract management and support of activities supporting the National Airspace System
- Asset tracking and documenting of capitalized assets
- Performance of contract activities in support of FAA Capital Investment Plan projects, including contract oversight and audits that ensure that no unallowable or unreasonable costs are being paid

What benefits will be provided to the American public through this request and why is this program necessary?

Maintaining appropriate oversight of the acquisition and management of these assets will ensure that tax payer dollars are utilized in the most prudent and transparent manner.

Detailed Justification for - 4A04 Mike Monroney Aeronautical Center (MMAC) Lease

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Mike Monroney Aeronautical Center (MMAC) Lease	$20,600	$21,100	$14,600

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Mike Monroney Aeronautical Center (MMAC) Lease	1	$14,600.0

What is this program and what does this funding level support?

The MMAC 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 1,067 acres of land, having a leased facility replacement value of $804 million. The MMAC provides facilities that support the work of 6,300 employees, students, and contractors on a daily basis and is the largest concentration of FAA personnel outside of Washington D.C. Approximately 11,000 visitors come to the Aeronautical Center annually.

The MMAC requires large parcels of land as National Airspace System 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 would have serious impact on the National Airspace System. For FY 2022, $14.6 million is requested to pay rent under the long-term lease agreement. This request level reflects a one-time correction to reduce unobligated carry over balances. These facilities support 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 National Airspace Systems to all FAA Airway Facility locations, Air Traffic, and approximately 70 Department of Defense and international organizations

- Engineering services for National Airspace Systems modification and repair

- Aviation research of medical and human factors impacting aviation personnel

- Regulation certification of safety related positions and equipment, airmen and aircraft records and registration

What benefits will be provided to the American public through this request and why is this program necessary?

This program benefits the American Public and National Airspace System and by leasing cost effective space in the Oklahoma City, Oklahoma market which has one of the lowest lease and utility rates in the nation. Facilities allow flexibility and growth to support National Airspace System operations and maintenance support. Investments made at the MMAC decrease energy consumption and operations costs by replacing old equipment with more efficient systems.

Detailed Justification for - 4A05 Transition Engineering Support

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Transition Engineering Support	$21,000	$17,000	$19,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
NAS Integration Support Contract	---	$19,000.0

What is this program and what does this funding level support?

The National Airspace Integration Support Contract program provides engineering and technical resources to the FAA organizations responsible for National Airspace Systems transition and implementation. The National Airspace Integration Support Contract team, working in partnership with these organizations, ensures that capital investments and regional projects are implemented most effectively to support the National Airspace System mission. 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 National Airspace System modernization.

For FY 2022, $19.0 million is requested to support the modernization schedules for National Airspace System programs. The requested level is necessary to provide continual National Airspace Integration Support contract management and infrastructure support for the prime contractor for the National Airspace Integration Support Contract 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 Information Technology support services for the National Airspace Integration Support contract tracking system and reporting system, other indirect contractor costs, and other program management support.

What benefits will be provided to the American public through this request and why is this program necessary?

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 National Airspace Integration Support Contract 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. This 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.

Detailed Justification for - 4A06 Technical Support Services Contract (TSSC)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Technical Support Services Contract (TSSC)	$28,000	$28,000	$28,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Technical Support Services Contract (TSSC)	---	$28,000.0

What is this program and what does this funding level support?

For FY 2022, $28.0 million is requested to continue the TSSC infrastructure. Funding the TSSC infrastructure sustains the FAA's national capability to supplement and leverage Federal workforce skills during site-specific National Airspace System 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 National Airspace System modernization. The TSSC program is the agency's vehicle to provide a workforce multiplier that installs equipment and supports the capital budget improvements to the National Airspace System 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 funding pays for the following:

- Project implementation safety, security, and quality control efforts

- The prime contractor's costs to award and administer subcontracts to accomplish $35 million of annual public works efforts on behalf of the FAA
- Contractor management of its personnel, office rent, communications, and utilities
- Award and transition from the present contract to the next support contract.

What benefits will be provided to the American public through this request and why is this program necessary?

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.

Detailed Justification for - 4A07 Resource Tracking Program (RTP)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Resource Tracking Program (RTP)	$8,000	$8,000	$8,000

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
Resource Tracking Program (RTP)	---	$8,000.0

What is this program and what does this funding level support?

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 process is the Air Traffic Organizations method to implement approved projects and to standardize National Processes in support of the National Airspace System. The Corporate Work Plan system, which falls under the RTP program, enables users to share FAA's project data during the various stages of implementation (e.g., planning, scheduling, budgeting, execution, and closeout). Corporate Work Plan and its supporting data are continuously used for reporting project metrics to project managers, responsible engineers, program offices, and various other customers.

For FY 2022, $8.0 million is requested to continue to keep hardware and software licenses current, program/project management support for the National Airspace Systems, upgrade training documentation, and continue to provide training to users and data administrators. In addition, hardware and software licenses will be maintained to keep the cost of upgrades to a minimum. The hardware and software for the Corporate Work Plan must be constantly maintained and upgraded, to support FAA and the processes that will be impacted as it continues to evolve. The Corporate Work Plan is used to track all Air Traffic Organization capital projects from cradle to grave. This

system is also used to develop the Corporate Work Plan and work releases for the Technical Support Services Contract.

This system interfaces with DELPHI and Fund Control Module and various other systems. The Corporate Work Plan is a centralized system with load-balanced servers residing in Oklahoma City, Oklahoma.

What benefits will be provided to the American public through this request and why is this program necessary?

The Corporate Work Plan contributes to improving the efficiency of the FAA and enhances program management of FAA capital programs. This project provides 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 Corporate Work Plan. This product improves 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.

Detailed Justification for - 4A08 Center for Advanced Aviation System Development (CAASD)

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Center for Advanced Aviation System Development (CAASD)	$57,000	$57,000	$57,000

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

What is this program and what does this funding level support?

CAASD is an FAA-sponsored Federally Funded Research and Development Center operated under a Sponsoring Agreement with the MITRE Corporation since 1990. 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, under the Capital Investment Plan. CAASD provides support and guidance in an environment aligned with the FAA and free of competitive pressures because a Federally Funded Research and Development Center neither competes with private industry nor manufactures hardware products or software.

CAASD provides the FAA with key operational and technological concepts, analysis, and inputs, including the transfer of technology, capabilities, and investigatory prototypes based on years of research, systems engineering, and technical and operational expertise and analysis to meet and advance FAA and industry milestones. CAASD is uniquely positioned with its significant knowledge of the FAA and a profound perspective of the National Airspace System as well as global challenges through its international work encouraged by the FAA. CAASD understands the challenges across the aerospace and transportation landscape; has strong relationships across the aviation community; this offers a unique vantage point and an objective and independent view.

The support provided by CAASD is critical for the continuing development for the future of National Airspace Systems and the Enterprise Architecture. CAASD provides a unique system-wide integrated understanding, tools, labs, and other capabilities that are

fundamental to FAA's ability to address its challenges. The required development of system architecture and comprehensive research, development, and system engineering services can only be provided by an Federally Funded Research and Development Center 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 National Airspace Systems.

For FY 2022, $57.0 million is requested to fund technical, engineering, as well as research and development support for the CAASD program. The FY 2022 funding will support core MITRE research and systems engineering work as well as technical and operational analyses. Efforts to be supported in FY 2022 include:

- Research and Analysis of new innovations evolving National Airspace System capabilities and their accelerated implementation under a service-based approach that solicits and encourages industry to provide early insights into new innovations.

- Cyber and operational security research and operational resiliency analysis for aviation and other transportation systems.

- Safety operational risk approach analysis and assessments, applied under real-time safety concepts.

- Research and analysis of emerging technologies and practices including data analytics, artificial intelligence and machine learning.

- Research of unprecedented problems that require simulation and modeling; innovation; and investigatory prototyping to include follow-on prototype requirements analysis and definition. Affordability assessments with long-term economic implications of National Airspace System investments, and proposed FAA Policies.

- Analyses of United States and International Air Traffic Management Enhancements.

- Identification and assessment of advance capabilities and standards mitigating Safety issues in the National Airspace System.

- Assessment of Industry equipage (inventories and capabilities) alignments with proposed National Airspace System operational improvements.

What benefits will be provided to the American public through this request and why is this program necessary?

This is a critical time for the Agency and the evolution of the National Airspace System beyond NextGen. FAA's development of Trajectory Based Operations is underway and CAASD provides key research and infrastructure support to those efforts across the FAA. MITRE leverages commercial aviation industry data (such as fleet equipage, pilot incident information, and airline operations planning) to directly assist FAA in its decision-making; acting as a "trusted partner" for both the FAA and the commercial airline industry. Finally, MITRE's long-term experience provides crucial support to agency rule making activities from an Aviation Safety standpoint. Specific immediate benefits to the American public include:

- Improvements in Airport Operations through demand analysis and modeling
- Improvements to Arrival/Departure Scheduling through Time Based Flow Management under the Traffic Flow Management System
- Flight Safety improvements through Trajectory Based Operations, Procedure Design improvements
- Operations Integration with Performance Based Navigation
- Improvements to the National Airspace System Cybersecurity Operations and Resiliency; and security of our Global Navigation Satellite Systems
- Airspace Policy and Rulemaking improvements focused on integration of Unmanned Aircraft Systems and Commercial Space Operations into the National Airspace System

Detailed Justification for - 4A09 Aeronautical Information Management Program

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Aeronautical Information Management Program	$5,300	$7,500	$8,900

COST ESTIMATE OF WORK TO BE FUNDED THIS YEAR

Activity Tasks	Locations/ Quantity	Estimated Cost ($000)
A. Federal Notices to Airmen System Sustainment	---	$6,000.0
B. Aeronautical Information Management Modernization Enhancement 1	---	2,700.0
C. Independent Operational Assessment	---	200.0

What is this program and what does this funding level support?

A. Federal Notices to Airmen System Sustainment

Notices to Airmen provide important information describing temporary changes to components of the National Airspace System such as Airport Configuration, Obstacles, and Procedures. These notices help the aviation community identify where to fly, any issues with departure and arrival airports, and other crucial aviation safety information.

The purpose of this investment is to accelerate the migration of the current United States Notices to Airmen System to the new system, creating a sole Notices to Airmen repository and accomplishing one of the requirements of the 2018 Reauthorization Act 394 (H.R.302). Federal Notices to Airmen System Sustainment will continue fulfilling the Agency's Top 5 Safety Priorities by providing a single consolidated and baselined notification platform. This migration activity will address issues with failing "vintage" hardware and software modules associated with the current United States Notices to Airmen System.

In FY 2022, $6.0 million is requested to fund the prime vendor to complete software code development and conduct testing activities for Federal Notices to Airmen System Sustainment. Funding will also support the initiation of operational testing and User Acceptance Testing by Second Level Engineering.

B Aeronautical Information Management Modernization Enhancement 1

This project will develop and integrate information flows for the management and maintenance of aeronautical information in a digital format for machine-to-machine exchange with National Airspace automation systems. The digital format is essential for enabling National Airspace System automation integration and information distribution to consumers involved in National Airspace System decision support, flight planning, and pilot briefing. Program work will include:

- Providing an enterprise airspace tool that consolidates capabilities of several legacy tools and provides a single access point to publish digitally all airspace descriptions

- Integrating the Notices to Airmen system with enterprise airspace tool to provide a digital graphical representation of airspace Notices to Airmen

- Delivering Notices to Airmen in International Civil Aviation Organization approved format associated with the international aviation community

- Enhancing Aeronautical Common Service to provide scalable delivery platforms with flexible architecture to support onboarding new authoritative data sources; and enables conversion to, and distribution of, industry-standard data formats

For FY 2022, $2.7 million is requested to initiate design and development activities to include preliminary and critical design reviews, software requirements specification, software design document development, and contract support.

C. Independent Operational Assessment

For FY 2022, $200,000 is requested for Independent Operational Assessment to identify any safety hazards and/or operational concerns with AIMM capabilities.

What benefits will be provided to the American public through this request and why is this program necessary?

The Aeronautical Information Management Modernization Enhancement program is necessary because there will be a reduction in accidents attributable to pilot briefing errors, missing information, or accidents caused by violation of National Airspace System flow constraints and restrictions. Flight efficiency and reduction in delays will improve as airplane operators realize savings from better information leading to improved flight planning and pilot briefing. The FAA will realize costs benefits through infrastructure enhancement and System Wide Information Management connectivity as well as reduced cost of aeronautical information gathering, management, and utilization across the National Airspace System enterprise.

Aeronautical Information Management Modernization Enhancement 1 will complete the automation portion of the remaining 2018 Reauthorization mandates; achieve FAA commitments made to stakeholders and aviation industry; and address one of FAA's Top Five Safety Priorities.

Detailed Justification for – 5A01 Personnel and Related Expenses

($000)

Activity/Component	FY 2020 Actual	FY 2021 Enacted	FY2022 Request
Salaries and Benefits	$486,663	$507,352	$522,812
Non-Pay	28,337	37,648	27,188
Total	**$515,000**	**$545,000**	**$550,000**
FTE	2,849	2,851	2,851

What is this program and what does this funding level support?

This request provides funding for the personnel, travel and related expenses for the Facilities and Equipment (F&E) workforce performing work essential to FAA's efforts to sustain and modernize the National Airspace System (NAS). These employees are assigned to all phases of managing and implementing major capital acquisitions including site engineering, installation and implementation, and oversight of capital programs.

The F&E workforce includes electronic, civil and mechanical engineers; electronics technicians; quality control and contract specialists; Operations research analysts, and safety inspector personnel. The F&E workforce resides in Air Traffic, Aviation Safety, NextGen, and Finance and Management offices. Approximately, seventy-five percent are located in the field.

F&E personnel and related expenses are distributed across FAA Organizations as follows:

(Dollars in Thousands)

Organization	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
ATO	$367,253	$391,809	$396,256
AVS	11,446	12,158	12,362
AFN	38,802	40,758	39,900
ANG	97,499	100,275	101,482
Total	**$515,000**	**$545,000**	**$550,000**

F&E employees perform essential services in managing the acquisition and installation of new systems 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.

On average, the FAA has over 8,000 active projects and completes approximately 2,500 every year. 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. 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.

What benefits will be provided to the American public through this request and why is this program necessary?

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 continues a wide-ranging transformation of the United States air transportation system. NextGen will 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. The FAA requires a stable workforce in order to sustain the current infrastructure of air traffic control facilities staffed and unstaffed and to move toward completion of the NextGen transformation.

3C. Reseach 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, **[**$198,000,000**]** *$258,500,000*, to be derived from the Airport and Airway Trust Fund and to remain available until September 30, **[**2023**]** *2024*: *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**[**: *Provided further*, That funds made available under this heading shall be used in accordance with the explanatory statement described in section 4 (in the matter preceding division A of this consolidated Act): *Provided further*, That not to exceed 10 percent of any funding level specified under this heading in the explanatory statement described in section 4 (in the matter preceding division A of this consolidated Act) may be transferred to any other funding level specified under this heading in the explanatory statement described in section 4 (in the matter preceding division A of this consolidated Act): *Provided further*, That no transfer may increase or decrease any funding level by more than 10 percent: *Provided further*, That any transfer in excess of 10 percent shall be treated as a reprogramming of funds under section 405 of this Act and shall not be available for obligation or expenditure except in compliance with the procedures set forth in that section**]**. *(Department of Transportation Appropriations Act, 2021.)*

PROGRAM AND FINANCING
($ in Millions)

Identification code: 69-8108-0-7-402	FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
Obligations by program activity:			
0011 Improve aviation safety	120	89	32
0012 Improve Efficiency	15	3	……
0013 Reduce environmental impact of aviation	51	7	8
0014 Improve the efficiency of mission support	7	20	4
0015 Research, Engineering and Development	……	123	203
0100 Subtotal, direct program	193	242	247
0799 Total direct obligations	193	242	247
0801 Research, Engineering & Development (Airport & Airway Trust Fund (Reimbursable)	16	9	9
0900 Total new obligations (total)	209	251	256
Budgetary resources available for obligation:			
1000 Unobligated balance brought forward, Oct 1	167	172	128
1021 Recoveries of prior year unpaid obligations	1	……	……
1050 Unobligated balance (total)	168	172	128
New budget authority (gross), detail:			
Appropriation, discretionary:			
1101 Appropriation (special or trust fund)	193	198	259
Spending authority from offsetting collections, discretionary:			
1700 collected	15	9	9
1701 Change in uncollected payments, Federal sources……..	6	……	……
1750 Spending Auth from offsetting collections, disc (total)…….	21	9	9
1900 Budget authority (total)	214	207	268
1930 Total budgetary resources available	382	379	396
Memorandum (non –add) entries:			
1940 Unobligated balance expiring	-1	……	……
1941 Unexpired Unobligated balance, end of year	172	128	140
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	6	6	6
1953 Expired Unobligated balance, end of year	5	6	6
1954 Unobligated balance canceling	2	……	……
Change in obligated balances:			
Unpaid obligations:			
3000 Unpaid obligations, brought forward, Oct 1 (gross)	128	165	180

3010 New obligations incurred, unexpired accounts	209	251	256
3020 Outlays (gross).....	-169	-236	-295
3040 Recoveries of prior year unpaid obligations, unexpired	-1	……	……
3041 Recoveries of prior year unpaid obligations, expired....	-2	……	……
3050 Unpaid obligations, end of year.....	165	180	141
Uncollected payments:			
-3060 Uncollected payments, Federal Sources, brought forward, Oct 1……..…….	-4	-9	-9
3070 Change in uncollected pymts, Fed sources, unexpired……...	-6	……	……
3071 Change in uncollected pymts, Fed sources, expired……..…..…	1	……	……
3090 Uncollected payments, Federal sources, end of year ...	-9	-9	-9
Memorandum (non-add) entries:			
3100 Obligated balance, start of year	124	156	171
3200 Obligated balance, end of year	156	171	132
Budget Authority and outlays, net:			
Discretionary:			
4000 Budget authority, gross.....	214	207	268
Outlays, gross:			
4010 Outlays from new discretionary authority.....	46	96	123
4011 Outlays from discretionary 0balances	123	140	172
4020 Outlays, gross (total)	169	236	295
Offsets against gross budget authority and outlays			
Offsetting collections (collected) from:			
4030 Federal sources	-14	-9	-9
4033 Non-Federal sources……..	-2	……	……
4040 Offsets against gross budget authority and outlays (total)	-16	-9	-9
Additional offsets against gross budget authority only:			
4050 Change in uncollected pymts, Fed sources, unexpired………..	-6	……	……
4052 Offsetting collections credited to expired accounts…..	1	……	……
4060 Additional offsets against budget authority only (total)	-5	……	…….
4070 Budget Authority, net (discretionary)……..….	193	198	259
4080 Outlays, net (discretionary)…….……..	153	227	286
4180 Budget authority, net (total)	193	198	259
4190 Outlays, net (total).....	153	227	286

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 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 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Direct obligations:			
	Personnel compensation			
11.1	Full-time permanent	26	31	32
12.1	Civilian personnel benefits	9	10	11
21.0	Travel and transportation of persons	1	1	1
25.1	Advisory and assistance services	26	35	35
25.2	Other services from non-Federal sources	34	40	41
25.3	Other goods and services from Federal sources	7	9	9
25.5	Research and development contracts	13	17	17
25.7	Operation and maintenance of equipment	……	1	1
26.0	Supplies and materials	1	1	1
31.0	Equipment	2	3	3
32.0	Land and Structures	……	1	1
41.0	Grants, subsidies, and contributions	74	93	95
99.0	Direct obligations	193	242	247
99.0	Reimbursable obligations	16	9	9
99.9	Total new obligations	209	251	256

Employment Summary

Identification code: 69-8108-0-7-402	FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
1001 Direct civilian full-time equivalent employment	197	217	217

EXHIBIT III-1
RESEARCH, ENGINEERING & DEVELOPMENT
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	FY 2020 ACTUAL	FY 2020 CARES Act	FY 2021 ENACTED	FY 2021 CRRSA	FY 2021 American Rescue Plan	FY 2022 PRESIDENT'S BUDGET
Research, Engineering and Development	$ 192,665		$ 198,000			$ 258,500
TOTAL	$ 192,665	$ -	$ 198,000	$ -	$ -	$ 258,500
FTEs						
Direct Funded	197		217			217
Reimbursable, allocated, other						

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 2021 TO FY 2022
Appropriations, Obligations, Limitations, and Exempt Obligations
($000)

	$000		FTE
FY 2021 ENACTED	$198,000		217
ADJUSTMENTS TO BASE:			
Annualization of FY 2021 FTE	0		
Annualization of Prior Pay Raise(s)	104		
FY 2022 Pay Raise 2.7%	847		
GSA Rent			
Working Capital Fund			
FERS Increase in FY2022	286		
Non-Pay Inflation	836		
etc.			
SUBTOTAL, ADJUSTMENTS TO BASE	**2,073**		**0**
PROGRAM REDUCTIONS			
SUBTOTAL, PROGRAM REDUCTIONS	**0**		**0**
PROGRAM INCREASES			
Research, Engineering and Development	58,427		
SUBTOTAL, PROGRAM INCREASES	**58,427**		**0**
FY 2022 REQUEST	**258,500**		**217**

Detailed Justification for A11.a Fire Research and Safety

FY 2022 – A11.a Fire Research and Safety – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	4,295	4,378	4,466
Program Costs	2,905	2,758	3,109
Total	**7,200**	**7,136**	**7,576**
FTE (if applicable)	**24**	**24**	**24**

What is this program and what does this funding level support?

The Fire Research and Safety program focuses on the prevention of accidents caused by in-flight fires and improvement of survivability during post-crash fires. The catastrophic consequences of an uncontrollable fire — large loss of life and the destruction of the aircraft — make this program essential. Research in this program is conducted to understand the fire safety implications of new technologies and materials introduced by the aviation industry in order to decrease aircraft weight and increase operating efficiency.

This research is used to develop effective mitigation procedures and update existing regulations, which often do not address the unique behavior of these new technologies. Research is also conducted to better understand and mitigate the threat of lithium battery cargo fires. These fires continue to cause concern due to the increasing number, sizes, and energy densities of batteries being shipped, and due to the unusual and severe hazards associated with lithium battery fires.

The program maintains extensive partnerships and collaborates with all aspects of the international aviation industry, academia, and with fire science researchers. Research supports the Department of Transportation's Pipeline and Hazardous Materials Safety Administration for hazardous material transport and the FAA's Commercial Aviation Safety Team for the Mitigation of Hazardous Materials Fires (SE126) safety enhancement program.

The requested funding supports the fire safety facilities at the FAA's William J. Hughes Technical Center in Atlantic City, NJ, where the majority of the program's research is conducted. Research is led by internationally recognized experts in aircraft fire safety research at the most extensive civil aircraft fire test facilities in the world.

The research center includes a full scale fire test facility which houses wide-body and narrow-body test fuselages with extensive instrumentation capabilities. These tools allow researchers to perform highly controlled testing of any aircraft fire scenario and the ability to measure factors affecting occupant survivability.

The testing is also supported by a variety of smaller scale testing labs where new flammability requirements are developed and inflight atmospheric conditions can be replicated. In addition,

researchers can collect, test, and measure fire combustion gases and conduct innovative fire science experiments using an on-site chemistry lab.

The technical expertise developed through the use of these facilities has continually contributed to aviation safety through the ability to quickly and effectively address newly emerging fire hazards. As a result, the international aviation community looks to the FAA for leadership in aircraft fire safety research and development.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Evaluating fire hazards associated with electrical power sources, including lithium and other types of batteries in support of international research.
- Developing new and/or revised aircraft materials flammability standards. These include new requirements for materials used in inaccessible areas of an aircraft, newly introduced structural and component materials, and new manufacturing processes such as additive manufacturing.
- Performing tests to support the development of new standards for fire detection and containment in cargo containers, and tests to evaluate new fire suppression agents and systems for aircraft cargo compartments.
- Performing tests to evaluate novel designs for freighter aircraft fire suppression systems
- Performing tests to evaluate new chemical agents and systems for suppressing fires in aircraft engines and auxiliary power units.
- Developing a capability to verify and validate computational models proposed to the FAA for certification-by-analysis in lieu of performing fire tests. This includes creating standardized fire test fixtures that simulate aircraft engines, cargo compartments, and hidden spaces to generate experimental data for model validation.

Goals for FY 2022 Funding:

- By 2026, develop the enabling technology to prevent accidents caused by in-flight fires in large cargo and passenger transport aircraft by improving fire detection and suppression capabilities, and upgrading the flammability requirements for materials in inaccessible areas.
- By 2026, enable the introduction of new, lightweight/energy efficient, fire-safe materials and components into commercial transport aircraft — such as composite structures, additive manufacturing components, magnesium, and other metallic alloys, cabin furnishings, and advanced electrical power sources.
- By 2026, support and facilitate the evaluation and replacement of Halon fire extinguishing agents and halogenated cabin material flame-retardants with effective and practical alternatives.
- By 2026, develop validation methodologies for certification-by-analysis, including standard practices for experimental validation of computational models.

What benefits will be provided to the American public through this request and why is this program necessary?

The primary benefit of this research to the American public is the prevention of catastrophic aircraft accidents caused by in-flight fires and increased survivability during post-crash fires. Other benefits include technologies to prevent accidents caused by fires in freighter aircraft and hidden in-flight fires in passenger-carrying airplanes, as well as the development, validation, and transfer of cost-effective aircraft fire safety technology to the aviation industry.

The aircraft fire-related fatality rate has shown measurable improvement in recent years for traditional aircraft construction techniques and materials. This program is necessary to ensure the continued safety of transport aircraft as materials and construction methods evolve.

Research helps prevent catastrophic consequences of uncontrollable aircraft fires, including loss of life and the destruction of the aircraft. The testing supports the need to upgrade aircraft certification standards to keep pace with the emerging technologies used by aircraft manufacturers. The electrical power requirements of modern aircraft continue to increase and manufacturers are employing new sources and configurations to meet those needs. This potentially introduces new and unforeseen failure scenarios and ignition sources.

Metallic structure and components are increasingly being replaced with composite materials with different flammability and heat transfer properties. Additive manufacturing (3-D printing) is becoming more common and the change in flammability is generally unknown. The ability to conduct full scale, realistic testing to evaluate the fire safety of these new materials and systems will allow the safe implementation of these technologies, resulting in improved fuel efficiency, lower production costs, and reduced environmental impact.

Detailed Justification for A11.b Propulsion and Fuel Systems

FY 2022 – A11.b Propulsion and Fuel Systems – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	913	1,994	2,034
Program Costs	1,187	2,221	1,087
Total	**2,100**	**4,215**	**3,121**
FTE (if applicable)	**4**	**10**	**10**

What is this program and what does this funding level support?

The FAA is the sole US entity that certifies engine designs as well as the continued airworthiness of existing aircraft propulsion systems. To support this role, the FAA develops and issues certification policy, guidance, and rulemaking as appropriate to govern the approval of new turbine engine designs and the continued airworthiness certification of existing aircraft propulsion systems. As propulsion system technology evolves and new designs are introduced, standardized, science-based methods of compliance, inspection and common design analyses tools are essential to assuring that certification and continuing operational safety requirements are met.

This program provides the research, data and analyses necessary to develop recommended methods of compliance and standard analytical tools to promote uniform safety standards across the industry. Key program efforts are aimed at reducing the likelihood of and safety risk posed by uncontained engine failures. Uncontained jet engine failures consist of high energy rotating components breaking into fragments that can escape the engine case and impact other parts of the aircraft. This poses a serious threat to passengers and the continued safe operation of the aircraft. Since 2015, there have been seven high profile uncontained events involving blade and rotor disk failures. One of these events resulted in the first fatality on a U.S. passenger airline in nearly a decade. Other events involved loss of the front of the engine, loss of engine cowling, loss of passenger cabin air pressure, fires, evacuation, degradation of aircraft performance, and significant aircraft damage.

The Propulsion and Fuel Systems Program consists of Rotor Integrity Research (RIR) and Aircraft Catastrophic Failure Prevention Research (ACFPR) both of which aim to reduce safety risks due to uncontained engine failures. RIR works to develop improved damage tolerance design methods and nondestructive inspection tools to reduce the likelihood of high-energy engine rotor failures. ACFPR works to improve engine containment analysis and to mitigate uncontained hazards in the event that an engine does come apart.

The **Rotor Integrity Research (RIR)** produces data to determine that rotating engine parts such as fans, compressors, and turbine rotors are designed, manufactured, and serviced to avoid the

introduction of anomalies that could grow under stress and cause an uncontained engine failure. To that end, the program/s output data supports the development of a probabilistic damage tolerance-based design code called DARWIN® which is used by the FAA and industry to design and certify engine life limited parts in accordance with established Federal Aviation Regulations.

The **Aircraft Catastrophic Failure Prevention Research (ACFPR)** develops data to produce publicly available tools, FAA certification methods, and guidance to evaluate turbine engine blade containment systems and to protect critical aircraft systems from uncontained engine rotor debris. In particular, the program supports development of improved impact models that are crucial to improving engine containment designs to meet FAR 33.94 blade containment requirements. Another key research output is the public tool, Uncontained Engine Debris Damage Assessment Model (UEDDAM), developed as a method of compliance for AC20-128, which specifies design considerations to mitigate the hazards caused by uncontained engine failures.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Conduct testing of turbine engine nickel alloys to determine the detrimental effects of nickel material anomalies on fatigue life. This data will be used to enhance the DARWIN engine design code. **(RIR)**
- Support the LS-DYNA® Aerospace Working Group in developing predictive analytical models in the LS-DYNA® software to simulate the impact of metal and composite materials, along with associated test data, quality assurance problems and methods, sample problems, and guidance to advance analysis in certification. **(ACFPR)**

Goals for FY 2022 Funding:

- Develop an updated version of DARWIN able to analyze nickel alloys containing material anomalies. **(RIR)**
- Develop innovative methods to inspect critical rotating components to prevent uncontained turbine engine failures and accidents **(RIR)**
- Develop data and analysis methods for uncontained engine fragment impacts, and provide analytical tools for evaluating engine containment systems and protection from uncontained engine debris **(ACFPR)**

What benefits will be provided to the American public through this request and why is this program necessary?

Civil aviation is continuously changing and so must the analytical tools and research data that are used to certify new turbine engines, ensure their continued operational safety and thus reduce risks to public safety. Continuing program efforts are necessary to advance scientific understanding of the failures of turbine engines and develop tools to reduce the likelihood of such failures and thereby sustain or enhance air transportation safety.

Detailed Justification for A11.c Advanced Materials/Structural Safety

FY 2022 – A11.c Advanced Materials/Structural Safety – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	958	999	1,019
Program Costs	13,762	13,721	659
Total	**14,720**	**14,720**	**1,678**
FTE (if applicable)	**6**	**6**	**6**

What is this program and what does this funding level support?

The Advanced Materials and Structural Safety program conducts research to support FAA safety and regulatory activities in the technical areas of composites and other advanced materials, and their impact on flight safety. While composites have been used in non-critical components of aircraft for some time, they are now finding widespread use in primary and critical structures, bringing enormous challenges to the certification process.

This program provides the data required by FAA certification personnel to carry out the agency's oversight role of ensuring new technologies are adopted safely, as well as its mandate not place an undue burden on industry. Research is performed in several areas to fulfill this mission. The program focuses on potential issues with material and structural performance, as well as manufacturing quality control and assurance.

FAA personnel use research results as they evaluate certification applications to ensure that all safety issues are properly addressed in aircraft design, maintenance schedules, and procedures, as well as manufacturing, quality assurance, and quality control plans. Other research is performed to ensure adequate training of critical maintenance personnel and to make sure composite aircraft are as crashworthy as legacy aircraft.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Partner with industry to generate data, perform analysis, and provide recommendations that will support the FAA's ongoing efforts to develop industry guidance for design, certification, and process control for emerging advanced materials.
- Document best industry practices for certifying adhesively bonded joints and composite repairs, which are traditionally developed in a case-by-case, company-specific, proprietary manner, promoting standardization and increasing safety.
- Partner with academia and industry to investigate high-cycle fatigue behaviors of bonded rotorcraft blades, which have experienced higher than expected accident rates. There may be aging effects of the adhesive that we do not fully understand, and existing certification

protocols may not adequately represent the operating environment required to capture time-sensitive behaviors and ensure safety.

- Develop a comprehensive guideline that identifies key characteristics, key process parameters, and recommended tests to promote standardization in bonded joint design for new construction, and repairs for transport category aircraft and rotorcraft applications.

Goals for FY 2022 Funding:

- Partner with industry and academia to develop data for use in promoting performance-based safety standards for:
    - All aspects of composite maintenance such as repair design, maintenance processes, and inspection methods which are mostly non-standardized
    - Implementation of new seating systems made of composite materials, providing an update to current industry standards created for metallic seat structures
    - Certifying adhesively bonded joints and composite repairs
    - Implementation of innovative polymer-based additive manufacturing technologies in aviation products
- Partner with industry and academia to evaluate innovative materials and/or processing techniques, as well as new applications such as urban air mobility and commercial space with an emphasis on applications involving critical structures
- Partner with industry and academia to develop new industry standards for implementing composite and other innovative advanced material forms into aviation products

What benefits will be provided to the American public through this request and why is this program necessary?

The use of advanced materials and structural concepts is central to a vibrant aviation industry in the United States. Aircraft manufacturers are increasingly using advanced composite materials, which are stronger and lighter than metals commonly used to build older aircraft. As the methods of structural verification are being extended to new components and aircraft applications, it is important to understand acceptable design limits that have not been explored with composite materials and structures.

A National Transportation Safety Board review of accidents involving composite structures provides additional impetus for research required to understand advanced composite materials and structures as new technologies emerge.

Composites present a range of potentially catastrophic problems never considered on legacy aircraft such as water absorption, damage from exposure to elements, and heat damage. The research performed by this program has identified and investigated many other issues that were either unknown or poorly understood. This research will ensure that as more applications are introduced with composite aircraft structures, the safety record of the national airspace system is

maintained. This effort will ensure civil aircraft manufactured with these materials are safe and reliable.

The Advanced Materials and Structural Safety program takes a proactive approach by building a new body of knowledge through research rather than reactively through accident investigations. Without this program, some issues would almost certainly cause fatal crashes. This program saves lives by preventing accidents.

Currently, there are no existing structural crashworthiness requirements for transport airplanes. The FAA is seeking to develop a single policy for demonstrating crashworthiness that would be applicable to all transport airplanes regardless of the structure.

Research tasks and required funding levels outlined above are driven by industry advancements in construction of composite airframes and related components presented to FAA for certification.

Detailed Justification for A11.d Aircraft Icing

FY 2022 – A11.d Aircraft Icing – Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	1,067	1,098	1,120
Program Costs	3,433	423	1,352
Total	**4,500**	**1,521**	**2,472**
FTE (if applicable)	**6**	**6**	**6**

What is this program and what does this funding level support?

The FAA's Aircraft Icing research program focuses on aircraft ground deicing and anti-icing methods prior to takeoff. The Clean Aircraft Concept, meant to ensure that aircraft are aerodynamically clean at takeoff, guides FAA policy for ground icing. More broadly, the program efforts are aimed at ensuring continued safe aviation operations during adverse icing conditions and thereby support climate resiliency federal policy objectives.

The icing program conducts research to maintain safe winter ground operations, evaluate the effects of changing ground operations, develop testing and analyses methods to support these changes, and address the effects of new formulations of fluids used in deicing and anti-icing procedures. Thus the program supports current climate resiliency federal policy objectives.

The team uses recent or prior winter weather incidents and events reported by FAA inspectors, airline operators, airport authorities, deicing facility operators, and original equipment manufacturers to determine areas of research. The FAA works with these organizations to identify safety risks, and define research and development tasks that address safety concerns.

In House-Activities Include:

- Use of computational fluid dynamics to determine critical ice shapes on wings
- Engine ice crystal icing
    - On-going literature review of new technical publications
    - Analysis of existing tunnel and atmospheric data
- Support of FAA working groups
    - Icing intensity terminology
    - Special meteorological reports on snow
- Investigation of icing of urban air mobility vehicles

Major Activities and Accomplishments Planned in FY 2022 Include:

- Provide annual guidance to the airline industry for updating ground deicing programs

- Test and evaluate a new design for an artificial snow machine that will be used to determine how long anti-icing fluid provides protection from frozen contamination

Goals for FY 2022 Funding:

- Provide information for the annual ground icing notice issued by the FAA's Flight Standards organization

What benefits will be provided to the American public through this request and why is this program necessary?

Ground icing research enables the FAA to provide timely guidance to airlines on safety issues that arise each winter. Researchers promote uniformity and safety in ground deicing and anti-icing practices in the United States and around the world through their work on the SAE International ground deicing committee. This program is necessary for the FAA to continue to play an international leadership role in ground icing research.

This research will result in information that can be immediately applied by industry and FAA principal operations inspectors to improve ground icing practices and guidance, further reducing the probability of accidents and incidents. The research results will provide the aviation industry with guidance on how to improve winter weather operational capabilities and maintain safe operations through take off.

Detailed Justification for A11.e Digital System Safety

FY 2022 – A11.e Digital System Safety – Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	1,669	1,707	1,742
Program Costs	2,831	3,197	1,948
Total	**4,500**	**4,905**	**3,689**
FTE (if applicable)	**8**	**8**	**8**

What is this program and what does this funding level support?

Digital System Safety: Research focuses on existing and near-term certification challenges and emerging risks introduced with new architectures, tools, and technologies such as artificial intelligence (AI) and machine learning (ML) — either as stand-alone products or when integrated in a safety-critical on-board environment. Research includes the development of mitigation techniques to address these emerging risks early in the development process. Research concentrates on how assurance criteria and alternate assurance processes can be integrated into standards, guidance, and training to improve safety.

Onboard Network Security and Integrity: The aircraft industry is increasingly installing network-centric systems aboard aircraft. These technological enhancements are making aircraft more susceptible to cyber-attacks with the increase in wired and wireless connectivity to internal and external aircraft systems. Research will identify aircraft-connectivity cyber risk and provide recommendations for certification issues associated with the security vulnerabilities in net-centric aircraft systems.

Satellite Based Augmentation System (SBAS): There are currently six SBAS systems around the world that may require the implementation of an authentication scheme if standardized by the International Civil Aviation Organization (ICAO). Researchers will demonstrate compatibility and interoperability of SBAS systems, validate the avionics requirements for implementing authentication standards and procedures, document the results, and make recommendations. The results will be used in FAA Technical Standard Orders (TSO) for avionics.

Major Activities and Accomplishments Planned in FY 2022 Include:

- **Activity 1 – Implementation Methodologies for Automation Using Artificial Intelligence:** Introduction of AI technologies into safety-critical airborne systems pose risks if not thoroughly studied and assessed. The goal of this activity is to assess that risk and develop assurance criteria for different levels of criticality. Research outputs will include interim reports identifying safety issues related to system certification — delineating mitigation techniques and validating their efficacy.

- **Activity 2 – Pilot Studies to Evaluate the Concept of Abstraction Layer (AL) for Alternate Assurance Digital Systems/Report:** Study the new assurance approaches to certify AI implementations and assess the feasibility of these approaches in a certification environment by identifying potential improvements, clarifications, gaps, and issues with their use. Research outputs will include draft and interim reports identifying issues in certifying a product using the overarching properties, abstraction layer, or other means in lieu of the current, more prescriptive system, software, or electronic hardware standards.

- **Activity 3 – Integrated Service Reliability:** Currently there is a large gap in knowledge regarding the reliability of lead-free solder, semiconductor device wear-out models, alternative wire bonds, and thermal energy atmospheric neutron environments. The goal of this task is to use flight tests to study the risks associated with each of these areas. Research outputs will include plans, designs, reports, qualification, certification test results, and operation manuals.

Goals for FY 2022 Funding:

- Enable the introduction of new technologies into airborne systems without risking safety
- Develop secure communication between aircraft and satellites used for navigation
- Increase overall national cybersecurity

What benefits will be provided to the American public through this request and why is this program necessary?

Aircraft manufacturers are installing and modifying complex digital systems with newer technologies. This research will identify potential hazards and gaps in current guidance and standards, while helping to enable the safe introduction of newer on-board technologies that are consistent with the 2019 executive order on Maintaining American Leadership in AI. If digital systems are developed without the updated standards or a thorough understanding of potential risks, the safety of the flying public could be affected.

By identifying ways of certifying systems that contain AI/ML, non-deterministic methodologies, autonomous (non-piloted) components, neural networks with different learning types, and other technological advances, FAA research creates insight into how to safely approve these technologies. This research improves the safety and security of airborne systems and reduces adverse incidents, ensuring the safety of flying public and improving overall aviation safety.

The GAO released a report (GAO-15-370) titled *FAA Needs a More Comprehensive Approach to Address Cybersecurity*. Results from the Onboard Network Security and Integrity program will provide analyses and recommendations for the development of regulations, industry standards, FAA guidance, and FAA/industry training. The program will develop a Safety Risk Assessment (SRA) methodology that can be used independently by the FAA in coordination with industry or provided to industry for its use.

The SRA methodology will help identify initial cyber-safety risks and associated vulnerabilities on aircraft aviation systems, enabling stakeholders to focus on risks that are more critical. The research findings will enable the FAA to promote cyber-related aviation safety and industry to implement mitigations to reduce cyber safety risk for the flying public.

The FAA needs to validate the avionics requirements for the planned implementation of SBAS authentication methods proposed by ICAO in the 2020–2024 timeframe and demonstrate interoperability with SBAS systems. Research supports the critical priority areas of safety and cybersecurity by identifying ways to confirm data is being received from the original source. This effort is necessary to support development and publication of SBAS avionics TSOs and the associated advisory circular guiding the installation of equipment.

Detailed Justification for A11.f Continued Airworthiness

FY 2022 – A11.f Continued Airworthiness – Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	3,267	3,454	3,524
Program Costs	7,002	7,815	5,306
Total	**10,269**	**11,269**	**8,829**
FTE (if applicable)	**16**	**15**	**15**

What is this program and what does this funding level support?

The Continued Airworthiness research program supports the FAA's aviation safety oversight responsibility to ensure that aircraft maintain operational safety, as they age, or as new technologies are introduced. The FAA accomplishes this by anticipating aging issues during the certification process and ensuring risks are adequately addressed in operations, maintenance, and inspection protocols.

The agency monitors in-service data as it accumulates; identifying concerns at the earliest possible point, and communicates potential risks through advisories, directives, regulations, or other guidance. The program considers the aging of all aircraft systems. The FAA will perform research in the following areas in FY 2022:

- Structural integrity, fatigue, and damage tolerance of new metallic technologies including additive manufacturing and novel materials
- Structural health monitoring and advanced inspection technology to detect problems in the very early stages of deterioration
- Effect of turbulence on the life of general aviation aircraft
- Improved certification efficiency for small aircraft
- Aircraft electrical systems
- Flight controls and mechanical systems
- Rotorcraft systems

Major Activities and Accomplishments Planned in FY 2022 Include:

- Determine the relevance and standardize the use of different materials in helicopter fuel cell drop tests as prescribed in Fuel Cell Crash Resistance § 27/29.952
- Partner with industry and government to generate data to identify and demonstrate damage tolerance performance of new technologies that could be adapted by the aerospace community to improve safety, increase efficiency, and validate procedures
- Collaborate with NASA, DoD, and industry to develop tools, methodologies, and data to mitigate the risks associated with structural failures, and distribute updated standardized handbooks supporting aircraft certification and continued airworthiness

- Obtain data, develop methodologies, and create nonlinear models required to establish safe and realistic freeplay limits for control surfaces of transport category aircraft to prevent freeplay-induced vibrations
- Address the number one safety goal of the FAA's Small Airplane Standards staff, to reduce general aviation fatal accidents due to loss of control
- Develop changes to Part 23 and Part 27 of the Title 14 Code of Federal Regulations to address urban air mobility movement

Goals for FY 2022 Funding:

- Develop standardized acceptable design and certification compliance data to enable the FAA and industry to operate in a cost effective and efficient manner, while providing a level-playing field and uniform standards for all certification agents
- Generate technical information to support the development of industry standards, FAA policy documents, regulations, methods of compliance, advisory circulars, and performance-based rule making activities
- Generate data to develop mission-specific guidance, and performance-based rules and updates for airworthiness directives and guidance materials
- Partner with industry and government to conduct research on advanced technologies to promote transportation safety, efficiency, and technology innovation
- Use scientific methods and data-driven processes to guide safety programs, reduce prescriptive regulations, and enable innovative approaches to improving safety
- Develop data to support industry standards and means of compliance to provide urban air mobility vehicles a clear path to certification.
- Provide data on new technologies to develop policy and regulatory guidance that will support applications for new products and their potential use on legacy aircraft, and promote performance-based safety standards and measures
- Develop software to provide a data-driven risk-level distribution for a fleet of aircraft, which will enable the FAA to proactively provide safety guidance, and develop performance-based safety rules and consensus-based standards
- Develop a standardized tool for damage tolerance assessments used by the FAA and industry to meet performance-based safety standards and promote certification efficiency
- Investigate the flight characteristics of multiple rotor vehicles
- Create prototype wire cutting/detecting technologies and perform testing at the William J. Hughes Technical Center drop tower. The goal will be to develop a wire sensor detection system to reduce rotorcraft wire strikes.
- Generate data to quantify the effects of turbulence on structural integrity and maintenance of aircraft for use in performance-based rule making and to update airworthiness directives and guidance materials

What benefits will be provided to the American public through this request and why is this program necessary?

Continued Airworthiness program research is key to the FAA's ability to maintain safety for the flying public through the safe implementation of rapidly evolving aircraft technologies and emerging materials in aircraft products. These new technologies and the risks they pose as they age are not as well understood as the traditional systems they replace. They lack service history data to guide certification and continued operational safety decisions.

The program takes a proactive approach by creating a common understanding of the key failure mechanisms and processes that can occur while aircraft are in service. The program will also ensure new technologies are safely introduced to certified aircraft and help streamline certification efforts, ensuring continued airworthiness within the aerospace industry.

The Continued Airworthiness program ensures the safety of the flying public as new technologies are integrated by anticipating and resolving issues before implementation, thereby reducing aviation accidents.

Detailed Justification for A11.g Flight Deck/Maintenance/Systems Integration Human Factors

FY 2022 – A11.g Flight Deck/Maintenance/Systems Integration Human Factors – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	4,361	4,562	4,654
Program Costs	2,939	2,907	9,646
Total	**7,300**	**7,469**	**14,301**
FTE (if applicable)	**25**	**26**	**26**

What is this program and what does this funding level support?

The Flight Deck/Maintenance/System Integration Human Factors program addresses research and development requirements defined by technical sponsors in the FAA's Aviation Safety Organization. These requirements are driven by the human factors needs of Aircraft Certification and Flight Standards (AFS) personnel responsible for the certification, approval, and continued airworthiness of aircraft, as well as the certification of pilots and mechanics, and approval of certain flight operations.

Program outputs provide the research foundation to update and maintain human factors related rules, guidance, procedures, orders, standards, job aids, and other materials to support aviation safety and productivity. Program outputs also proactively address the human factors impact of rapid changes to current-day technologies, procedures, and emerging issues.

Major Activities and Accomplishments Planned in FY 2022 Include:

Advanced Vision Systems and Head Mounted Displays – Operational Standards and Approval Criteria:

- Conduct a human-in-the-loop (HITL) simulation to determine the contribution of a synthetic vision guidance system (SVGS) to a pilot's visual search and acquisition of a runway environment when conducting a non-precision approach in lower than standard minima, similar to special authorization category I instrument landing system minima
- Conduct an HITL simulation to determine the contribution of an enhanced flight vision system (EFVS) on a head-down display to a pilot's visual search and acquisition of a runway environment

Pilot Training, Qualification, Procedures, and Flight Operations:

- Survey industry to understand how lessons learned about human factors — from positive and negative event outcomes — are incorporated into pilot training

- Identify human factors related rules, guidance, standards, and other materials applied by AFS to evaluate the operational use of flight deck technologies, pilot procedures, and pilot training, including example FAA human factors field issues

Human Factors Considerations and Emerging Trends Associated with Helicopter Air Ambulance (HAA) Operations

- Evaluate HAA accidents and incidents from 2014 through the date of research execution to identify causal and contributing human factors to safety event outcomes
- Establish a current understanding of schedule-based fatigue across the HAA domain to develop a draft human factors fatigue risk baseline

Goals for FY 2022 Funding:

- Provide human factors data to potentially update policy, rules, guidance, and other materials, where appropriate, to expand localizer performance with vertical guidance operations to lower minima using SVGS technologies
- Provide human factors data that could be used to potentially expand the existing EFVS rule to include head-down operations
- Document the techniques used by industry to incorporate lessons learned from unexpected events into pilot training curriculums
- Develop a draft of a single source Human Factors Reference Document for human factors related rules, guidance, standards, and other materials applied by AFS personnel, including example FAA human factors issues
- Develop a draft rotorcraft human factors analysis framework which may be used to identify causal and contributing human factors issues across the HAA domain
- Develop a draft fatigue risk baseline representative of the HAA domain to inform potential improvements in the strategic use of rest facilities, fitness for duty requirements, and scheduling practices

What benefits will be provided to the American public through this request and why is this program necessary?

The American flying public depends on the FAA to ensure the safety of flight operations. This program supports that goal by providing scientific and technical information to those responsible for creating regulations and guidance to ensure safe pilot and maintainer performance.

Recent data from the National Transportation Safety Board shows human error is a significant contributor to aircraft accidents. Crashes such as Asiana, Colgan, and the 737 Max emphasize the continuing need to address flight crew performance, and human factors in aviation system design and testing. This program addresses some of the most critical areas for flight safety directly relevant to the flying public.

Detailed Justification for A11.h System Safety Management

FY 2022 – A11.h System Safety Management - Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	2,460	2,589	2,641
Program Costs	2,040	2,896	5,257
Total	**4,500**	**5,485**	**7,898**
FTE (if applicable)	**13**	**13**	**13**

What is this program and what does this funding level support?

The System Safety Management (SSM) program addresses emerging systematic safety risks and issues across all aviation operations. The program develops data collection methods, advances data and risk analysis techniques, and creates prototypes for risk-based decision-making capabilities to identify and analyze emerging safety issues in cooperation with aviation stakeholders. In addition, the program develops training solutions to mitigate key causes of fatal accidents. The SSM research applies these methods and techniques to increase safety across all NAS operations.

The program enables analysis of safety trends across the aviation community and thus provides for greater effectiveness in identifying broader safety issues and risk mitigation strategies than traditional approaches, which only examine individual certificated entities. (i.e., individual aircraft operators and/or air traffic facilities). The program also addresses issues identified in several National Transportation Safety Board (NTSB) recommendations as well as U.S. Government Accountability Office studies that call for the FAA to collect better data and improve efforts to identify and address safety issues.

The program supports continuing development and expansion of the Aviation Safety Information and Analysis Sharing (ASIAS) program, which enables the free exchange and analysis of de-identified safety information derived from government and industry sources.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Develop descriptive analytics and proof of concept tools to create safety performance indicators for surface operations.
- Develop concepts and models for a sector risk profile tool for aeronautical information services.
- Develop tools, techniques, and metrics, and provide analytical expertise to the Helicopter Issue Analysis Team. Examine safety data and methodologies to reduce the fatal accident rate within the vertical flight community.

- Create safety metrics and software prototypes for general aviation using surveillance broadcast services data, (e.g., Automatic Dependent Surveillance–Broadcast {ADS-B}), to better analyze risk within the general aviation community.
- Conduct a literature review and market survey for virtual reality and simulated air traffic control devices to improve commercial pilot training.
- Create improved mathematical/physics-based flight dynamics for helicopter simulator/flight training device models for semi-rigid and rigid rotor systems for aerodynamic conditions of interest to improve rotorcraft pilot training.
- Perform a comprehensive literature survey in the area of reducing human error through cognitive bias awareness, which can be used to improve pilot training.
- Document experimental data comprising mission-specific recommendations for proposed operational constraints/limitations/capabilities and technology concepts for vision systems.

Goals for FY 2022 Funding:

Use scientific methods and data-driven processes to:

- Identify and visualize risks using flight data monitoring data from helicopter operations.
- Develop runway operations safety analytics model, performance indicators, artificial intelligence, and machine learning algorithms for detecting and classifying safety event factors and anomalies on the airport surface.
- Develop data model and define concepts for safety performance and safety risk indicators of Aeronautical Information Services (AIS) to provide a sound foundation for the development of an AIS risk profile tool.
- Examine technologies to reduce safety risks via loss-of-control inflight.
- Develop better mathematical models of helicopter flight simulator conditions including outside the envelope flight in all levels of simulators and aviation training devices to lower the fatal accident rate.
- Evaluate applied research of transferring virtual reality technologies in piloted flight simulations.
- Evaluate the safety enhancement from utilizing innovative augmented reality concepts for displaying flight information for helicopter flights during normal and low-visibility operations.

What benefits will be provided to the American public through this request and why is this program necessary?

The SSM research improves aviation safety by analyzing trends, identifying precursors and addressing the critical safety issues that represent the leading causes of fatalities in the worldwide commercial transport, general aviation, and rotorcraft communities.

Research supports improved risk-based decision making, which allows the FAA to:

- Identify system-level vulnerabilities by evaluating and developing aggregate level data and metrics.
- Determine indicators of performance (safety metrics) and processes to identify potential risks.
- Identify and assess risks associated with anticipated changes in procedures or technologies.
- Develop training solutions and identify effective technologies to mitigate key causes of fatal accidents, such as loss of control, runway excursions, runway overruns, and low altitude helicopter operations.
- Develop safety standards in collaboration with the industry such as wet runway performance standards that reduce the risk of aircraft overruns/runway excursions on wet runways.

Detailed Justification for A11.i Air Traffic Control/Technical Operations Human Factors

FY 2022 – A11.i Air Traffic Control/Technical Operations Human Factors – Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	3,902	3,445	3,515
Program Costs	1,898	2,240	2,396
Total	**5,800**	**5,685**	**5,911**
FTE (if applicable)	**21**	**22**	**22**

What is this program and what does this funding level support?

The research program provides timely products and consultation services that focus on improving the safety and efficiency of complex air traffic control (ATC) systems. Research addresses FAA Air Traffic Organization (ATO) challenges in five human factors research and development (R&D) focus areas:

1. Improved safety, reduced hazards, and error mitigation in ATC
2. Automation effects and controller performance
3. Improved design and operation of ATC systems
4. Improved controller selection and training
5. Controller and technical operations workforce optimization

The program strives to provide useful human factors R&D results that support the ATO's development and implementation of new technologies and procedures in the national airspace system (NAS), in accordance with FAA Order 9550.8 Human Factors Policy, which specifically requires 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 ensure controller and technician capabilities are compatible with the advanced technology they use in their jobs, and the resulting level of air traffic system performance meets operational requirements and fulfills our safety and efficiency objectives. In addition, as required by the FAA Reauthorization Act of 2018 (P.L. 115-254), section 507 "Human Factors," a human factors specialist, separate from the research and certification groups, is directly involved with the NextGen [system acquisition] approval process. The human factors team at FAA headquarters continues to provide subject matter expertise to the Joint Resources Council and

coordinates with the ATO to document how acquisitions have complied with human factors design requirements, using the In-Service Decision review checklist process.

Funding in FY 2022 will enable the FAA to fulfill the requirements for human factors research specified in 49 USC Section 445, meeting ATO needs for scientific and technical human factors information to support the agency's safety and efficiency objectives.

Major Activities and Accomplishments Planned in FY 2022 Include:

Improved Safety, Reduced Hazards, and Error Mitigation in ATC

- **Continued research to develop guidance for ATC alerts and information displays, and controller training to address commonly occurring errors, 49 USC 44505(b)(4).** Develop a validated ATC and technical operations alerting guidance document, as well as a training outline for a controller and technical operations training course on managing alerts and tuning alarms and alerts.

Automation Effects and Controller Performance

- **Research leveraging related Enterprise Human Factors (HF) efforts to define human supervisory control interactions and performance measures for shared computer-human ATC (including advanced AI) in decision aiding system design, and ensuring effective human-system communication, 49 USC 44506(b)(1).** Develop a report, including a literature review and industry survey on human supervisory control interactions in aviation and relevant industries, with recommendations for performance measures for ATC methods using advanced artificial intelligence (AI) decision-aiding approaches.
- **Research to develop facility operational guidance and training for recognition and mitigation of workload effects on controller fatigue and performance, 49 USC 44506(a)(2).** Create a report to document prospective workload, performance, and fatigue measures that could be used to establish criteria to support recommendations for controller-workload-based fatigue-mitigation guidance and training.

Improved Design and Operation of ATC Systems

- **Research and analyses to incorporate the latest scientific and technical information into the Human Factors Design Standard (HF-STD-001) in the areas of design of automated ATC systems, information display and management, and design requirements for workstation arrangement and display characteristics, 49 USC 44506(b), 49 USC 44506(b)(2), 49 USC 44507(e).**

Improved Controller Selection and Training

- **Research to apply findings from the recently-completed ATC capability utilization project to develop recommendations for new ATC technology integration and controller training with advanced measures of controller performance and capability utilization, 49 USC 44506(a)(4).** Develop a report

identifying air traffic controller performance measures that are sensitive to the use of ATC automation capabilities, and initial candidate recommendations for controller training.

Controller and Technical Operations Workforce Optimization

- **Develop and execute a research plan to conduct foundational HF research, including guidance and scientific information to support decisions to automate ATC tasks, to reduce errors and measure performance, and to improve system design and training effectiveness, 49 USC 44507(g)**. Create a research plan and execution roadmap to address key human factors competencies and knowledge bases to aid in ATC task automation — reducing errors, improving system design, and enhancing the effectiveness of training.

Goals for FY 2022 Funding:

- By 2023, develop recommendations for new ATC technology integration and controller training with advanced measures of controller performance and capability utilization that the ATO's Program Management Organization can apply in the acquisition of new ATC technologies and capabilities
- By 2024, develop facility operational guidance and training for recognition and mitigation of workload effects on controller fatigue and performance, and recommendations for updates in the training course based on controller training program reaction measures
- By 2025, recommend potential predictors of ATC developmental success in training and differentiate aptitudes and skills needed for success in ATC towers, Terminal Radar Approach Control Facilities, and Air Route Traffic Control Centers to inform ATC option placement guidance and training approaches

What benefits will be provided to the American public through this request and why is this program necessary?

FAA's Human Factors research program provides products to enhance the quality of this service through the successful integration of the human into the total system. The research program contributes scientific and technical information to ATO to inform policies and system design decisions that will prevent and reduce transportation-related fatalities and serious injuries across the transportation system. The research is mandated by 49 USC Section 445 and the public benefit results from application of the research that enables improvements to air traffic safety and efficiency

Detailed Justification for A11.j Aeromedical Research

FY 2022 – A11.j Aeromedical Research – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	5,311	4,601	4,694
Program Costs	2,608	5,634	8,563
Total	**7,919**	**10,235**	**13,257**
FTE (if applicable)	**29**	**30**	**30**

What is this program and what does this funding level support?

The Aeromedical Research program develops new and innovative ways to support the FAA's regulatory and advisory missions to improve safety in civilian aerospace operations. Personnel supporting this program at the agency's Civil Aerospace Medical Institute (CAMI) research methods and recommend strategies to enhance the safety, security, health, and performance of the most important aspects of the national airspace system — the human operator and the flying public.

The program has been formulated to address emerging human safety risk issues, including the aging pilot population and changes in their health conditions; changes in passenger demographics; and advances in pharmacology, therapeutic tools, and surgical procedures. Research also focuses on improved aircraft materials, equipment, cabin configurations, and life support systems, as well as new flight vehicles, changes in aircrew requirements, and new evacuation assistive devices — all of which may affect survival from an aircraft accident. The program has been designed to address the complexity of software, technology, and systems integration practices as they continue to evolve.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Feasibility Study of an Inclusive Aerospace Medicine Data Table: This work will improve the efficiency of our medical research tasks. Current information contains many misspellings and other data issues. This includes a variety of memoranda, recommendations, presentations, and technical reports, as needed.
- Best Medical Transport Method Selection Tool: Research will look at the most effective and safe methods of medical transport. The team will issue a technical report with recommendations at the completion of the program.
- Cystic Fibrosis in Airmen, 5-Year Prognosis: Researchers will issue a technical report on the 5-year prognosis of airmen with Cystic Fibrosis to determine if and under what circumstances airmen with these conditions can safely continue to be medically certificated to fly.

- Intermediate Visual Acuity in Older Third-Class Pilots: The program will issue a technical report on the intermediate visual acuity of older third-class pilots to determine if pilots who are found to have some loss of vision — peripheral, or otherwise — are at increased risk of being involved in aircraft accidents and incidents.
- Acquiring Aviation Data from Textual Analysis of Social Media: The team will test various tools to gather aviation data from online social media applications, which will be used in processing autopsy, toxicology, and aeromedical data.
- Safety Experience of Pilots Holding Sport Pilot Certificates: The program will issue a technical report on the safety experiences of pilots holding sports pilot's certificates, versus other pilots, and any inferences that may be made of BasicMed safety experiences.
- Cognitive Screening Test Categorization and Assessment: The previous cognitive screening tool was compromised. The goal of this program is to identify and validate several new tools to provide more options. The team will issue a technical memorandum listing multiple categories of cognitive screening tests and a plan for assessing them.
- Effects of Medications on Human Performance at Altitude: The team will issue a plan for completing the project, including a list of medications that will be tested. Researchers will study pilot performance at altitude while taking various prescription drugs.
- Passenger Evacuation Review – Wide Body Aircraft Slide Egress: Researchers will investigate ways to mitigate injuries associated with slide egress from wide-body aircraft. The team will develop a project plan and a brief outline of the wide-body aircraft slide egress injury reports to be studied.
- Anthropomorphic Test Device Construction Harmonization Phases I–II: The team will provide technical reports that provide consistent measurement of pelvis load and an accurate assessment of spinal injury risk. These will be used to modify the regulations and standards for crash testing.
- Passenger Evacuation from Alternative Horizontal Cabin Configurations: Researchers will determine if alternative cabin configurations proposed by some airlines will meet the same level of safety as existing arrangements. The team will provide a technical report describing the impact of alternative horizontal cabin configurations on passenger egress times.
- Effects of Cabin Seat Pitch and Alternative Seat Configurations on Evacuations: Researchers will provide a draft technical report and recommendations to the Evacuation Aviation Rulemaking Committee on the effects of cabin seat pitch and alternative seat configurations on emergency egress.

Goals for FY 2022 Funding:

- Perform efficient research and generate empirical evidence for use in adjusting a variety of regulations to make them either more or less restrictive, as necessary, based upon the data

- Support performance-based safety rules by using empirical evidence to determine the best method for medical transport, based upon factors such as past outcomes
- Use performance data to assist in determining the safety of evacuating from new and differing aircraft cabin designs
- Certify additional cabin safety applications through more efficient analytical means, where and when possible, and safe to do so
- Use the results of injury mechanism analysis to identify and recommend potential safety improvements to rotorcraft manufacturers, and to inform regulations

What benefits will be provided to the American public through this request and why is this program necessary?

The flying public will benefit from increased safety in the event of an aircraft accident or incident. Industry will benefit from evidence-based regulations and standards designed to be as inclusive as possible, while ensuring continued operational safety.

Aeromedical Research is the only research program in the FAA that performs testing not only to ensure the safety of the flight crew, but also to ensure the continued safety, health, and survival of the passengers involved in aerospace operations.

Detailed Justification for A11.k Weather Research

FY 2022 – A11.k Weather Research – Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	1,023	1,046	1,067
Program Costs	11,888	5,190	12,719
Total	**12,911**	**6,236**	**13,787**
FTE (if applicable)	**4**	**4**	**4**

What is this program and what does this funding level support?

This program develops new capabilities to improve the observation, prediction and timely dissemination of integrated weather information to support air traffic management decisions. Weather is by far the largest cause of air traffic delay in the National Airspace System (NAS) and thus levies a very high cost on the airlines and the traveling public. This program aims to mitigate disruptions to air transportation due to adverse atmospheric/weather conditions and thus supports climate resiliency federal policy objectives.

Between 2007 and 2016, reduced air carrier delays due to weather resulted in $315M+ of annual savings for airlines and passengers. Forecast improvements and weather mitigation techniques developed by this program directly contributed to this reduction. However, $300 million in delay costs still occur annually, with 67% of all air traffic delays in FY19 due to weather, much of which are avoidable. Beyond air traffic delays, inadvertent flight into hazardous weather by General Aviation (GA) pilots poses a significant risk to air travel safety and avoiding such hazards requires timely, accurate and effective presentation of current and predicted weather information to pilots, controllers and airline operations personnel. The program directly supports the improvement of airport operations, air traffic and airspace management capabilities, as well as the reduction of weather impacts on aviation.

The requested funding provides for research, analyses, development and demonstrations aimed at advancing capabilities to observe and predict the onset of weather conditions that affect aviation operations. The program leverages advances in meteorological science to enhance observation methods, improve weather prediction models, and produce increasingly accurate forecasts of convective weather, turbulence, icing, and low ceiling and visibility conditions. Timely dissemination and presentation of such information provide decision support input to enable traffic flow managers, controllers, pilots and airline operations personnel to implement tactical and strategic traffic management initiatives to avoid encounters with severe weather, reduce delays and mitigate safety risks.

Strong partnership and collaboration with the National Weather Service provides an effective pathway for operational delivery of successful research results and is a foundational program element.

Major Activities Planned:

- Complete the transition of the **Ensemble Prediction of Oceanic Convective Hazards** tool into current operations in order to improve forecasts of convective storms
- Complete enhancements to incorporate artificial intelligence into the **Convective Weather Avoidance Model**, to improve forecast accuracy in preparation for operational transition
- Demonstrate a **Terminal Area Icing Weather Information for NextGen** prototype to improve the detection and discrimination of freezing drizzle and freezing rain diagnoses and forecasts
- Complete development of a ***convectively-induced turbulence forecast capability*** to include improved diagnoses of turbulence categories in order to improve forecasts and diagnoses of atmospheric turbulence
- Complete operational transition of ceiling and visibility analysis capabilities, and evaluate ***super compact low-energy usage ceilometer*** technology to address remote area data gaps in order to improve forecast and diagnoses of low cloud ceilings and restricted visibility conditions to reduce GA accidents in Alaska and the Rockies
- Development of new ***high-resolution icing detection, analysis and forecast capabilities*** using advanced weather satellite and radar data to better alert pilots and controllers of hazardous aircraft icing conditions and reduce GA accidents
- Create ***weather standards and minimum operational thresholds required for Unmanned Aircraft System*** integration into the NAS

What benefits will be provided to the American public through this request and why is this program necessary?

Adverse weather continues to be a major source of delay and disruption in aviation operations and inflicts considerable costs to airlines and the traveling public. In addition, inadvertent flight into hazardous weather will continue to pose risks to safe air travel and especially general aviation operations. This program will develop and enhance capabilities to observe, predict, disseminate and present information about aviation-relevant weather conditions with increasing accuracy, timeliness and effectiveness. The resulting capabilities will inform traffic management decisions resulting in adverse weather avoidance, reduced air traffic delays and increased air travel predictability for the flying public.

Detailed Justification for A11.l Unmanned Aircraft Systems Research

FY 2022 – A11.l Unmanned Aircraft Systems Research– Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	1,517	1,548	1,579
Program Costs	22,518	22,488	20,498
Total	**24,035**	**24,035**	**22,077**
FTE (if applicable)	**8**	**7**	**7**

What is this program and what does this funding level support?

The Unmanned Aircraft Systems (UAS) Research program supports the FAA's implementation of NextGen by studying the safety implications of introducing new aircraft operational concepts and technologies into the national airspace system (NAS), and by supporting the development of new and modified regulatory standards.

UAS are fundamentally shifting the aviation landscape and have the potential to provide a wide range of benefits to society. 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 the potential to address commercial applications, as well as scientific research needs.

This research program focuses on the technical and regulatory challenges the FAA must overcome to safely integrate these new concepts and technologies into the NAS. Integrating UAS potentially affects the entire NAS due to various sizes of UAS, a wide range of maximum take-off weights, large performance disparities compared to existing certificated aircraft, and varying capabilities to operate in all classes of airspace.

UAS weighing less than 100 pounds, for example, may be capable of operating in Class A airspace. The integration of a significant volume of UAS air traffic could potentially disrupt normal aircraft traffic flow and introduce unknown safety hazards.

Major Activities and Accomplishments Planned in FY 2022:

FY 2022 research activities are categorized according to key areas that directly support FAA Aviation Safety strategic goals.

<u>UAS standards research:</u>

- Develop and validate detect-and-avoid performance for both small (below 55 pounds) and large UAS, to enable beyond visual line of sight operations
- Develop and validate command and control link performance

- Analyze UAS standards to track and map existing standards, and identify gaps in standards
- Develop and validate UAS pilot and visual observer training and qualifications

Data collection and risk-based assessment research:

- Collect and analyze UAS data to identify safety risks for industry and government partners within the UAS safety team
- Identify and evaluate potential risks of UAS operations on and around the airport surface

Advanced UAS concepts and applications (including Urban Air Mobility) research:

- Evaluate UAS operations for wake turbulence considerations with emphasis on urban air mobility
- Evaluate demand and safety impacts, focusing on increased UAS autonomy for large cargo and passenger transport operations
- Explore UAS air carrier operations to inform future requirements and regulations
- Investigate the use of UAS in response to natural disasters and emergencies, focusing on coordination between federal agencies and state/local governments

Security research:

- Identify risks and proposed mitigations related to UAS security, including cybersecurity
- Explore counter-UAS detection technologies and their potential impacts on airport operations

Goals for FY 2022 Funding:

- Define new standards and enforce all relevant UAS standards
- Protect critical infrastructure, data, and aviation systems
- Define and mitigate the integration challenges posed by the expanding set of UAS use cases in order to ensure the safety of the NAS
- Assure that NAS systems, equipment, and procedures are robust and resilient in order to safely support the new technologies and practices being introduced into transportation systems from new UAS use cases
- Improve data collection methods and analyses

What benefits will be provided to the American public through this request and why is this program necessary?

The safe integration of unmanned aircraft into the NAS is a significant challenge. Current UAS research generates technical information to support development of rules, policies, guidance

materials, advisory circulars, and operational procedures needed for successful UAS integration. The UAS research program must remain agile and adaptive in order to keep pace with industry innovation and to support FAA and Department of Transportation priorities, as well as mandates by Congress.

The program will 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 the confidence of the American public that UAS flights can safely and efficiently operate in the NAS.

The research will facilitate approval and use of systems that prevent and help reduce the severity of UAS accidents. Research results will continue to drive the FAA's decision-making process, inform rulemaking, enhance operational procedures and air traffic management, and maintain safety.

Detailed Justification for A11.m Alternative Fuels for General Aviation

FY 2022 – A11.m Alternative Fuels for General Aviation – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	1,111	0	0
Program Costs	789	2,524	4,986
Total	**1,900**	**2,524**	**4,986**
FTE (if applicable)	**6**	**0**	**0**

What is this program and what does this funding level support?

Aviation gasoline (avgas) is the only remaining transportation fuel in the United States that contains lead. Over 170,000 piston-engine aircraft used in general aviation rely on this fuel for safe operation. The lead additive in avgas protects piston engines against damaging detonation at the higher power levels required by aircraft.

Operation with inadequate fuel performance can result in engine failure and aircraft accidents. Impending environmental regulations, along with production and distribution issues, threaten the continued availability of leaded avgas. General aviation operations are a key element of the national airspace system (NAS). Operational limitations resulting from restrictions on the availability of avgas will adversely impact the ability of the NAS to perform the critical role it plays in supporting our nation's economy and emergency services.

The general aviation industry has long recognized the impending demise of this crucial element of its supporting infrastructure, but is impeded from fielding an alternative unleaded fuel due to the structural limitations of the existing FAA certification regulations, the significant technical challenge imposed by the need to be "backwards compatible" with the existing fleet of aircraft, and the unsupportable business case of developing a new fuel for the relatively low volume consumed by the general aviation fleet.

In recognition of the seemingly insurmountable challenges faced by industry to address this issue alone, the FAA has been authorized by Congress[1] to facilitate the development and introduction of an unleaded replacement fuel for the general aviation fleet of aircraft. A key element of the FAA's role in this effort is the testing of candidate fuels at the William J. Hughes Technical Center under this research program.

Through screening and testing, this research program will provide the critical data necessary to identify a suitable replacement unleaded fuel and for the FAA to authorize its use on the existing fleet of piston engine-powered general aviation aircraft. Successful authorization of a suitable

[1] See section 565 of the FAA Reauthorization Act of 2018 (Pub. L. 115-254) and section 910 of the FAA Modernization and Reform Act of 2012 (Pub. L. 112-95)

replacement unleaded fuel will lead to elimination of lead emissions from the piston engine general aviation fleet and thus support climate change mitigation federal policy objectives.

The funding of this research will provide for engineering, technical, and management support. In addition, it will be used for test articles, test assets, test cell support, test equipment, supplies, and the engagement with Center Of Excellence and/or other research institutions to support overall propulsion research activities on existing and future GA fleet technologies.

Major Activities and Accomplishments Planned in FY 2022 Include:

In FY 2022, the program plans to complete fuel qualification and screening tests on candidate unleaded fuels, and advance the alternative fuel screening into full scale testing. Major activities and accomplishments planned include:

- Generate engine performance, detonation, durability and other operating data required to assess the suitability of candidate unleaded fuels through the use of ground level and altitude simulation capabilities in engine test cells
- Develop data and requirements necessary to support aircraft flight test clearance activities
- Generate materials degradation, aging, performance characteristic, and other property data changes to verify the suitability of these fuels for use with the existing fleet of general aviation aircraft through laboratory rig and materials compatibility testing
- Generate chemical and physical fuel property data for the candidate unleaded fuels and lube oils necessary to assess their suitability for use with the existing general aviation fleet

Goals for FY 2022 Funding:

- By 2023, provide data to support identification of unleaded fuel candidates that successfully meet the safety criteria for engine detonation thresholds with the existing general aviation aircraft fleet
- By 2023, provide data to support identification of unleaded fuel candidates that meet the safety criteria for rig and materials compatibility with the existing general aviation aircraft flee
- Complete the necessary flight clearance activities to initiate and continue flight testing activities through 2023 to validate the ground and in-flight handling and performance characteristics of qualified alternative unleaded fuel candidates

What benefits will be provided to the American public through this request and why is this program necessary?

1. **Support Continued Functionality of the NAS.** The general aviation fleet of aircraft are an integral element of the NAS, acting as a feeder to support seamless movement of cargo and people throughout the nation. The transport airline industry relies on support from the general aviation fleet in critical areas such as pilot training, commuter operations, and cargo operations. In addition, general aviation provides other unique services such as fire prevention, medical evacuation, tourist operations, and recreational

flying. Continued availability of a safe, well-vetted replacement unleaded fuel will enable continuance of these roles.

2. **Improve Air Quality in Proximity of Airports.** The general aviation community has access to over 16,000 public and private airports and landing facilities nationwide. Elimination of lead emissions from the sale of 165 million gallons of leaded fuel each year (2018 figures) across this nationwide infrastructure, will improve the environment for at-risk children and all Americans.

3. **Ensure Continued Safe Operations of General Aviation Aircraft.** The availability of a safe, well-vetted unleaded replacement fuel will eliminate the need for operators to seek less safe alternative fuels or modes of transportation. This will avoid unnecessary accidents resulting from the use of unsuitable fuels or ground transport.

4. **Avoid Economic Impact of Curtailed General Aviation Aircraft Operations.** These aircraft contribute to many different areas of the economy through their use in business and personal travel, instructional flying, aerial surveys, agriculture, firefighting, law enforcement, medical emergencies, and freight transport. 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 ($75B). Directly or indirectly, general aviation supported 1.2 million jobs and contributed over $247 billion to the U.S. economy in 2018. The general aviation industry, its economic contributions, and other benefits are at risk unless the fleet can safely transition to unleaded fuels.

This program supports research to ensure the safety and economic contributions of the general aviation segment are not impeded by the unavailability of a safe unleaded fuel. There are economic and environmental concerns regarding the continued viability of production of the lead additive used in today's avgas that may materialize into restrictions on its use at any time. This FAA research plays a vital role in addressing industry barriers to developing and deploying a suitable replacement fuel.

Detailed Justification for A11.n Innovation and Emerging Technologies

FY 2022 – A11.n Innovation and Emerging Technologies – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	0	0	0
Program Costs	0	0	8,500
Total	**0**	**0**	**8,500**
FTE (if applicable)			

What is this program and what does this funding level support?

Public and private sector investments in science and technology continue to yield discoveries and advance technologies, tools, and methods that can transform business operations across many sectors of the economy. Such advancements can lead to transformation in aviation operations and its supporting infrastructure, thereby improving air transportation safety, efficiency and mitigating the impact of aviation on climate change.

The Innovation and Emerging Technologies program will foster engagement with American innovators and invite participation in discovery and application of emerging science, engineering, and technology advancements to address challenges and opportunities in air transportation. The program intends to reach scientific, technical and engineering talent from diverse sectors of American society. To that end, it will aim outreach efforts at underserved communities to enable broad inclusion in opportunities to help shape the air transportation system of the future. Thus, the program design will support equity and economic growth federal policy objectives.

A key attribute of the program is continual surveillance of emerging technologies, and aviation problems and challenges. This allows the program to facilitate timely adaptation and integration of innovation, resulting in tangible air transportation safety and efficiency benefits for the American public. To that end, the program conducts a biannual emerging technology review examining significant sector-independent advancements in areas that can potentially transform aviation.

Current federal investments in infrastructure protection and resilience, data science and predictive analytics, artificial intelligence, computing, and autonomy are among the focus areas considered in the initial review. Additionally, the program engages stakeholders in the aviation sector to identify and define aviation safety, and efficiency challenges (current or forecast) that require exploratory study, development, and/or innovation. The resulting prioritized set of challenge statements provides the basis for public solicitation of research and innovation in the specified focus areas.

The program offers a pathway for early consideration, adaptation, and potential adoption of beneficial innovation. Modeled after similar federal cooperative research programs, this program engages innovators in industry and academia through competitive public solicitation to pursue the study and application of new technologies to address specified challenges in air transportation. A distinctive program objective is to advance promising innovation from the initial consideration phase to the knowledge transfer and adoption-readiness stage within three years.

The requested funding level supports formulation, review, and coordination of:

- A biannual emerging technology review
- An emerging aviation system challenge/opportunity review
- A program implementation and evaluation plan
- Issuance of a challenge statement and solicitation for innovation exploratory development.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Establish a program implementation framework
- Develop terms of reference and assemble a program oversight committee
- Develop an initial emerging technology review
- Develop and coordinate aviation challenge statements
- Release solicitation for innovation proposals

Goals for FY 2022 Funding:

- By 2023, issue up to five awards for innovation proposals responsive to high-priority aviation challenges
- By 2025, transfer initial research results and innovation outputs to early adopters and/or producers

What benefits will be provided to the American public through this request and why is this program necessary?

The rapid pace of advancement in science and technology presents significant opportunities to address known and emerging challenges in air transportation. This program supports discovery and advancement of innovation that may otherwise not find a pathway to real-world application. By ensuring broad access to and engagement of science, technology and engineering talent across the nation, the program will leverage increasingly diverse sources of American ingenuity to help improve the nation's air transportation infrastructure. Moreover, by pursuing broad inclusion and participation objectives the program will support economic growth and equity federal policy objectives.

Detailed Justification for A11.o Commercial Space Transportation Safety

FY 2022 – A11.o Commercial Space Transportation Safety – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	0	0	0
Program Costs	2,500	5,840	5,708
Total	**2,500**	**5,840**	**5,708**
FTE (if applicable)	**0**	**0**	**0**

What is this program and what does this funding level support?

Commercial Space Transportation research focuses on four priorities, which are aligned with FAA and National Space Council priorities. These are safe integration of commercial space operations into the national airspace system, spaceport infrastructure, systemic safety initiatives, and regulatory reform.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Develop improved hazard area and collision avoidance models, and methods to reduce overly-conservative airspace closures used to protect against launch or re-entry failures
- In collaboration with industry, initiate multiple large-scale activities to research areas of common interest to industry and the FAA

Goals for FY 2022 Funding:

- Improve understanding of phenomena impacting the calculation of important parameters by regulators when making decisions (e.g., maximum probable loss, probability of vehicles)
- Develop new sensors, materials, and technologies to improve safe operations of aerospace vehicles
- Collect and analyze data on human physiological responses to hypersonic spaceflight
- Improve understanding of policy, law, regulation, and market issues and trends

What benefits will be provided to the American public through this request and why is this program necessary?

Protecting the safety of the public and their property from the potential consequences of commercial space launches and reentries demands that the FAA keep pace with emerging technologies and operational concepts from a diverse and exponentially growing industry. The areas discussed above highlight critical topics that must be addressed by the FAA's Office of Commercial Space Transportation (AST) to meet its statutory missions.

Funding the program at the requested level will allow the FAA to continue to develop high-value research activities designed to ensure commercial space transportation is efficiently regulated in a streamlined manner that prioritizes public safety while facilitating the competitiveness of the United States in the international marketplace.

This research program will position the FAA to provide increasingly timely guidance and regulations, and improve our responsiveness to this emerging sector. Similarly, industry would benefit from improved techniques, practices, and technologies that result from a strong FAA commercial space research and development (R&D) program.

Although, the R&D conducted to support commercial space transportation is not specifically mandated by statute, the mission of FAA/AST is codified in Title 51 of the USC §50901, which states:

- "The United States should encourage private sector launches, reentries, and associated services and, only to the extent necessary, regulate those launches, reentries, and services to ensure compliance with international obligations of the United States and to protect the public health and safety, safety of property, and national security and foreign policy interests of the United States."
- "Providing launch services and reentry services by the private sector is consistent with the national security and foreign policy interests of the United States and would be facilitated by stable, minimal, and appropriate regulatory guidelines that are fairly and expeditiously applied."
- "The goal of safely opening space to the American people and their private commercial, scientific, and cultural enterprises should guide federal space investments, policies, and regulations."

"Private applications of space technology have achieved a significant level of commercial and economic activity and offer the potential for growth in the future, particularly in the United States."

Detailed Justification for A11.p Wake Turbulence

FY 2022 – A11.p Wake Turbulence – Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	781	804	820
Program Costs	4,219	2,894	2,908
Total	**5,000**	**3,698**	**3,728**
FTE (if applicable)	**4**	**4**	**4**

What is this program and what does this funding level support?

The Wake Turbulence research, engineering, and development (R, E, &D) program provides concept development and a feasibility assessment of operationally safe wake encounter risk mitigating solutions. The program increases the knowledge base of wake turbulence characterization, uses technology to collect wake turbulence data, conducts wake data collection/analysis to augment and validate wake turbulence numerical/analytical models, and provides wake transport/decay statistical data for safety assessments used to create safety risk management documents.

The research requires keeping the wake data collection infrastructure technology current and adding better instrumentation, as it becomes available, to increase collection of aircraft wake tracks over a wider range of weather conditions. The program uses the data to develop wake separation standards and concepts for technology-aided solutions that will increase throughput capacity in the national airspace system (NAS).

The program will provide recommended safe, throughput efficient, wake separation standards for new aircraft designs that will begin operating near-term in the NAS. The benefactors of the program's research are NAS users — general aviation, air carriers, and the military – which are being safely separated from the wakes of other aircraft.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Assess new aircraft types to establish wake risk mitigation separation standards: The team will complete wake track statistical database assessments, if the aircraft type is similar to another already operating in the NAS. If not similar, aircraft performance and design data will be modeled to determine safe wake separation standards for air traffic controllers to use until wake track data for specific aircraft types can be collected and analyzed.
- Collect and analyze wake track data to build a statistical basis for determining safe throughput-efficient wake separations between aircraft. Data analyses will be accomplished using collected wake track data.

- Assess proposed changes to air traffic control (ATC) procedures for wake encounter risk to include the finalized Wake Recategorization (Wake Recat) Total Wind terminal area dynamic wake separation solution. A safety assessment will be provided as a part of the solution's documentation and technical transfer package.
- Develop a subset of absolute wake hazard metrics to use where relative metrics are not feasible.

Goals for FY 2022 Funding:

- Determine wake mitigation separation standards for new aircraft types entering the NAS
- Collect data from ground-based and instrumented aircraft at flight level to set throughput capacity for efficient and safe aircraft wake separations
- Evaluate all changes to ATC safety procedures, including wake risk, before and after implementation
- Create an absolute wake hazard metric that will allow new aircraft types entering service in the NAS to be accurately assessed for data-driven wake separation recommendations
- Safely reduce required wake separations through the use of real-time weather sources such as ADS-B Wx, which could result in more throughput

What benefits will be provided to the American public through this request and why is this program necessary?

Wake R,E&D provides the necessary data, modeling, and concept developments to advance capacity-efficient ATC wake mitigation solutions that will allow more flights during periods of peak demand at our nation's airports and in crowded air corridors.

The Wake Recat project — funded through the Facilities and Equipment budgetary account — provides a two to five percent increase in airport runway throughput capacity when airports operate during instrument flight rules conditions. Increased airport and air corridor throughput capacity achieved through new wake mitigation solutions will result in:

- Lower operating costs for air carriers and the ability to expand their number of flights without airports having to invest in difficult and costly runway construction projects
- Reduced flight delays for passengers and air cargo flights during poor weather
- Increased flight choices for passengers and a potential for fare reductions due to increased competition between air carriers
- More direct flight paths, and a corresponding reduction in aircraft exhaust emissions and noise

Detailed Justification for A11.q NextGen – Air Ground Integration Human Factors

FY 2022 – A11.q NextGen – Air Ground Integration Human Factors – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	507	544	555
Program Costs	4,793	5,456	2,445
Total	**5,300**	**6,000**	**3,000**
FTE (if applicable)	**3**	**3**	**3**

What is this program and what does this funding level support?

The NextGen Air-Ground Integration Human Factors program addresses research, engineering, and development requirements defined by technical sponsors in the Office of Aviation Safety (AVS). These requirements are driven by the intersection points between FAA policy documents, NextGen changes, and enabling flight deck technologies and procedures.

Program outputs are transferred to technical sponsors to develop and maintain human factors related rules, guidance, procedures, orders, standards, job aids, and other materials to support NextGen flight operations. Functionally, NextGen Air-Ground Integration Human Factors work products benefit aircraft certification and flight standards personnel who evaluate and approve emerging flight deck systems, displays, devices, controls, procedures, and operations which may not be covered by existing human factors documentation.

In FY 2022, the NextGen Air-Ground Integration Human Factors program will address four topic areas:

- **NextGen Aircraft Systems and Control Research** will evaluate the human-system performance benefits and limitations of emerging flight deck technologies, systems, controls, and their respective mode(s) of operation.
- **NextGen Human Error Mitigation Research** will proactively evaluate and address human factors vulnerabilities which may be introduced by various flight deck technology design alternatives, automated flight deck systems, and future national airspace system (NAS) operations.
- **NextGen Flight Crew Readiness Research** will evaluate new concepts of operation to identify their impact on current pilot knowledge, skills, and abilities, and flight crew training and checking requirements.
- **NextGen NAS and Flight Crew Procedures** research will proactively identify and address operational integration issues that could result from the implementation of complex NAS procedures and advanced flight deck procedures.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Evaluate the effect of advanced vision systems, emerging sensor-based technologies (i.e., multiple sensor systems), and new display types — such as head-worn displays (HWD)

and helmet-mounted displays (HMD) — on pilot performance, human factors, and flight deck operations in transport category aircraft during low visibility operations
- Identify and understand the effects of new operator control mode inputs (i.e., voice, multi-touch, gaze), coupled with unique helicopter factors (vibration, space limitations, etc.), on human-system performance during single and multi-crew helicopter operations
- Evaluate the effects of planned air/ground system enhancements, flight deck system dependencies, and their respective NextGen concept of operation on the role of pilots, the expectations placed on flight crews, and human performance
- Identify and address air/ground human factors change management barriers which could prevent pilot participation in future time-based flight operations (e.g., pilot acceptance of NextGen changes, industry culture, etc.)

Goals for FY 2022 Funding:

- Provide human factors data to support the expanded use of HWDs and HMDs, with and without advanced vision capabilities, to conduct flight operations in lower than standard approach and landing minima
- Provide human factors data to support the evaluation of new operator control mode inputs — individual controls (voice, gaze, multi-touch) and combined controls — for use during single and multi-crew helicopter operations, including potential human factors design assumptions, limitations, and mitigations
- Provide foundational human factors data to address the impact of interdependent flight deck systems on failure detection, diagnosis, and mitigation in highly automated aircraft
- Provide human factors data to support the expanded use of planned air/ground communication, navigation, and surveillance capabilities needed for full Trajectory Based Operations (end-to-end time-based flight operations)

What benefits will be provided to the American public through this request and why is this program necessary?

Recent reviews of aviation accidents and incidents have identified human performance as a major in factor in civil aviation safety event outcomes. Because of this, NextGen conducts Human Factors research to develop advanced systems and new procedures that challenge the human components of the aviation system.

The American flying public benefits from improvements in aviation safety through human factors solutions. As the FAA and industry implement advanced systems and procedures, the tasks performed by pilots on the flight deck are increasingly automated. Advancements in information and control automation create increasingly abstract flight deck systems, requiring pilots to be more vigilant as they monitor the aircraft.

Human factors research addresses flight deck and air traffic service provider integration for each NextGen application considered, focusing on issues affecting the pilot side of the air-ground integration challenge.

Using simulations and demonstrations, this program assesses the interoperability of tools, develops design guidance, determines training requirements, and verifies procedures supporting certification, flight standards, and the FAA Air Traffic Organization's service units for ensuring safe, efficient, and effective human system integration. In addition, human factors research supports the development of policies, standards, and guidance required to design, approve, and operate equipment and procedures.

Detailed Justification for A11.r NextGen – Weather Technology in the Cockpit

FY 2022 – A11.r NextGen – Weather Technology in the Cockpit - Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	1,117	1,163	1,186
Program Costs	2,027	819	1,842
Total	**3,144**	**1,982**	**3,028**
FTE (if applicable)	**5**	**5**	**5**

What is this program and what does this funding level support?

Inadvertent flight into hazardous weather by General Aviation (GA) pilots poses a significant risk to air travel safety and avoiding such hazards requires timely, accurate and effective presentation of current and predicted weather information to pilots, controllers and airline operations personnel. The NextGen – Weather Technology in the Cockpit (WTIC) program develops recommendations for minimum weather service standards for aircraft operations. It is the only FAA program tasked with developing standards and guidelines for the quality and delivery of weather data to cockpits for pilot use and integration with cockpit decision support tools. These standards provide guidance to reduce weather delays, enhance air traffic management, aid in aircraft rerouting flexibility to avoid adverse weather, decrease weather-related safety risks, and lower gaseous emissions. The program defines the necessary meteorological information, including guidelines for accuracy, latency, and frequency of updates. The team determines how the information will be presented to safely and efficiently incorporate the data into the collaborative decision-making process to aid pilots in making weather-related navigation decisions. The WTIC program, in defining recommended Part 91 minimum weather service standards, also resolves or minimizes identified safety risks and gaps in weather training among GA pilots.

The WTIC program conducts demonstrations to evaluate and determine the benefits of new concepts and meteorological technologies for possible use in NextGen. The program uses innovation to develop techniques for observing, formatting, and rendering weather information in cockpits, and enabling efficient uplink/downlink/crosslink of weather data between airborne and ground stakeholders. The program works closely with multiple RTCA special committees, the European Organization for Civil Aviation Equipment, and other industry and stakeholder committees to further program objectives, as well as coordinate industry and government minimum systems standards.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Develop objective criteria and associated minimum weather service recommendations for issuing fully automated **Visual Flight Rules (VFR) Not Recommended (VNR)** statements
- Investigate ***cockpit weather-related gaps*** for helicopter operations

- Conduct research in support of ***minimum weather service recommendations for calculating turbulence information*** using downlinked Automatic Dependent Surveillance–Broadcast (ADS-B) reports and presenting the resulting turbulence forecast/nowcast information in cockpits to improve turbulence avoidance decision making
- Conduct research to ***produce meaningful visibility, ceiling, weather radar, and wind information for use in remote regions*** that lack infrastructure, the Automated Surface Observing System, and weather radar

Goals for FY 2022 Funding:

- Enhance helicopter safety by developing minimum weather service standards to resolve safety-related concerns identified in the current gap analysis project and provided by National Transportation Safety Board accident analyses
- Enhance general aviation safety by identifying decision thresholds to enable automating the issuance of VNR statements, which are currently only available through a voice service
- Increase turbulence observations by orders of magnitude to enable enhanced turbulence forecasts and nowcasts, which will enhance safety relative to turbulence encounters
- Expand weather training and pilot weather testing to resolve known and new knowledge gaps for GA and evolving operations pilots to ensure safe operations during adverse weather
- Develop methods to use ADS-B to downlink pilot weather reports (PIREPs) to increase the number of PIREPs and improve their accuracy, enhancing safety during adverse weather
- Use innovative crowd sourcing techniques to produce visibility, ceiling, wind and weather radar information to enhance access and freight delivery in remote areas
- Support evolving technological air traffic flow management solutions by identifying minimum performance standards for use in the development of new Technical Standard Orders for cockpit weather technology
- Create minimum weather service standards for remote weather sensors and non-traditional weather sensors such as cameras to provide information to evolving operations and general aviation pilots for adverse weather avoidance decisions
- Develop methods to notify pilots when weather information from certified observations at a distant location may not be reflective of the corresponding area of their flight operations

What benefits will be provided to the American public through this request and why is this program necessary?

The benefits to the flying public from this research will be less turbulence when flying, less flight delays, better aviation access to remote areas, more timely delivery of freight, less aircraft emissions, and less accidents and injuries. Adverse weather, in conjunction with insufficient weather information in the cockpit and pilot misinterpretation of that information, are primary

causal factors of accidents, incidents, and injuries for all types of aircraft. They are also primary causal factors of operational inefficiencies and reduced access to remote areas. WTIC research resolves gaps associated with these safety risks and operational inefficiencies.

WTIC research will vastly increase the number of turbulence observations and accuracy through ADS-B downlinked reports, which will enhance turbulence forecasts. WTIC research is also increasing the number of PIREPs via ADS-B and automation to reduce the impacts of adverse weather. Using crowd sourcing techniques to produce ceiling, visibility, wind, and weather radar information from non-traditional weather sources such as camera imagery, access to remote and rural areas will be increased with minimal infrastructure investment.

The program is decreasing pilot weather knowledge gaps that result in safety risks through improved weather training, updated weather standards, and enhanced weather information and technology in cockpits. WTIC research is also developing methods and recommendations for uplinking current convective information to the cockpit during oceanic flights to increase safety and efficiency.

Detailed Justification for A11.s NextGen – Flight Deck Data Exchange

FY 2022 – A11.s NextGen – Flight Deck Data Exchange – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	0		0
Program Costs	1,005	1,000	1,000
Total	**1,005**	**1,000**	**1,000**
FTE (if applicable)	**0**	**0**	**0**

What is this program and what does this funding level support?

Air carriers, along with business and general aviation users are seeking to leverage new technologies to enhance collaborative decision making between flight crews and ground operations through a variety of data exchange applications. The FAA is exploring the potential use of flight deck technologies to increase situational awareness and deliver safety-critical information to support digital communications between ground control and the flight deck.

To fully leverage these advancements, there is a need for robust data management applications and services to create a reliable and secured bridge between onboard avionics and the national airspace system (NAS) communication infrastructure. This research will develop a notional architecture environment to enable data exchange, and identify preliminary security standards for safe and secured operations.

The Flight Deck Data Exchange Requirements program will address cybersecurity concerns for the connected aircraft concept. The program will conduct cybersecurity risk assessments on different avionics systems and components to identify potential threats, vulnerabilities, and associated risks, and determine appropriate mitigation strategy to address those risks. This research will analyze existing avionics architectures and incorporate emerging technologies. Research findings will provide recommendations to support development of future standards and policies for connected aircraft.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Develop a prototype environment to enable secured information exchange for avionics equipment defined in the scope of the project, including but not limited to electronic flight bags, aircraft interface devices, and flight management systems
- Research existing security controls, rules, guidance, and policies to manage cybersecurity risks for exchanging safety-critical information and data
- Develop architecture and scenarios describing end-to-end data connections for securely exchanging safety-critical information such as flight clearance, and command and control instructions

- Identify and evaluate threats and vulnerabilities associated with current avionics, on-board aircraft systems, and associated safety-critical data elements, and provide mitigation strategies to address cybersecurity risks

Goals for FY 2022 Funding:

- Explore ways to protect safety-critical data and identify security defense mechanisms and approaches to prevent accidental or unauthorized modification, destruction, or disclosure of information
- Develop security mitigation strategies to enable the exchange of safety-critical data to aircraft avionics using Internet Protocol data links
- By 2025, expand research to include additional on-board aircraft systems, such as flight management systems and other certified avionics, to fully address the cybersecurity needs of connected aircraft

What benefits will be provided to the American public through this request and why is this program necessary?

Advancement in flight deck automation and communication technologies have allowed flight operators to stay connected through all phases of flight for collaborative decision making. This provides great advantages to airspace users and the air traffic management community. Nevertheless, these technologies are still limited due to cybersecurity challenges.

The program will identify cybersecurity risks and mitigation strategies for different avionics systems and components. Researchers will investigate the use of these avionics for safety-critical applications and identify associated risk management strategies. The outcomes of this project will inform future development of standards and policies enabling connected aircraft technologies and applications.

This program addresses the national aviation priority of flight deck and air traffic control integration for NextGen operational capabilities. Ongoing research conducted by this program will ensure that flight deck and ground information exchange will be achieved in a secure environment, enabling collaborative decision making and supporting the evolution to Trajectory Based Operations (TBO).

The American flying public benefits from safer flights, reduced delays, secured data exchanges, and more optimized and predictable flights. In the long term, a TBO environment enhanced by advanced flight deck capabilities will lead to lower operating costs for the FAA, as well as the airline industry.

Detailed Justification for A11.t Information Technology/Cyber Security

FY 2022 – A11.t Information Technology/Cyber Security – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	0	0	0
Program Costs	2,675	4,769	4,769
Total	**2,675**	**4,769**	**4,769**
FTE (if applicable)	**0**	**0**	**0**

What is this program and what does this funding level support?

The Information/Cyber Security research and development (R&D) program will conduct the research, analysis, demonstration, evaluation, and development of data science tools to detect and mitigate the effects of cyber-attacks.

The program uses Cybersecurity Data Science (CSDS) methodologies, including innovative concepts such as Machine Learning (ML) and Artificial Intelligence (AI) to defend the national airspace system (NAS) and select components of the aviation ecosystem against emerging threats and advanced persistent threats (APT). The research supports ongoing and future industry-government collaborative efforts, integration of innovative algorithms, execution of advanced technology concept exploration studies, and demonstrations and evaluations of promising cyber data science tools.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Develop CSDS algorithms and tools to detect emerging threats and APTs
- Identify and evaluate the initial set of requirements for cyber data analytics across select components of the aviation ecosystem
- Investigate the various data suites for cybersecurity threats across select components of the aviation ecosystem
- Establish proof of concept cyber data distribution models and analytical cells for select components of the aviation ecosystem
- Establish an event/data logging baseline for aviation ecosystem information/cybersecurity

Goals for FY 2022 Funding:

- Conduct research to understand and address cybersecurity vulnerabilities related to the deployment of connected and automated air transportation technologies and systems. This includes the development and integration of innovative algorithms, execution of

advanced technology concept exploration studies, and demonstrations and evaluations of promising data science tools.

What benefits will be provided to the American public through this request and why is this program necessary?

Three government reports state the critical need for such research to address cyber vulnerabilities. Government Accountability Office (GAO)-15-370 (Apr 2015) states the "FAA Needs a More Comprehensive Approach to Address Cybersecurity as Agency Transitions to NextGen." Another report, GAO-15-221 (Jan 2015), emphasizes that the "FAA Needs to Address Weaknesses in Air Traffic Control Systems."

A National Research Council report (Apr 2015) titled "A Review of the Next Generation Air Transportation System: Implications and Importance of System Architecture," points to the urgency for additional work in the area of cyber security for the NAS.

This program will enable critical research and development leading to enhanced capabilities for a more resilient, safe, and secure aviation system.

Detailed Justification for A11.u Environment and Energy

FY 2022 – A11.u Environment and Energy – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	2,628	2,718	2,773
Program Costs	15,385	17,586	17,563
Total	**18,013**	**20,304**	**20,336**
FTE (if applicable)	**12**	**12**	**12**

What is this program and what does this funding level support?

Noise and emissions generated by aircraft represent considerable challenges to the growth of aviation. Environmental impacts, especially aircraft noise, are often the number one cause of opposition to airport capacity expansion and airspace redesign (http://www.gao.gov/assets/310/309622.pdf). Concerns about the impacts of aircraft emissions on climate change could limit the growth of international aviation. Further, in some areas of the country, air quality is of concern. These challenges are anticipated to grow with increased use of the national air space for evolving operations, specifically unmanned aircraft systems (UAS), advanced air mobility (AAM) vehicles, civil supersonic aircraft, and commercial space vehicles. The FAA is working to understand, manage, and reduce the environmental impacts of aviation through research, technological innovation, policy, and outreach to benefit the public. The FAA's long-term vision is to remove environmental constraints on aviation growth by achieving quiet, clean, and efficient air transportation.

Technologies that reduce noise and emissions are regulated as a part of airworthiness certification. These environmental standards are harmonized internationally through the International Civil Aviation Organization's (ICAO) Committee on Aviation Environmental Protection (CAEP). A significant portion of this program is devoted to informing decision making at ICAO CAEP.

Scientific Knowledge and Innovation: The Environment and Energy (E&E) program is producing data and knowledge that are the scientific and technical foundation for the development of cost-effective measures to mitigate the environmental impacts of aviation noise and emissions. The program is advancing our understanding of the impacts of aviation noise on community annoyance, sleep, health, and children's learning. It is also advancing our understanding of aircraft particulate matter emissions and their impacts on air quality and aviation induced cloudiness, a contributor to climate change. The program is also quantifying the relative climate impacts of different aviation emissions to enable the development of cost effective measures to reduce the climate impact of aviation. As a part of this, the program is supporting the development of a decision support tool that could be used by industry to mitigate the climate impacts of aviation contrails and resulting aviation induced cloudiness.

Informed Decision Making: The program provides the data and analyses that are the basis for decision making on aviation noise and emissions standards, improved methods of certification,

and developing new environmental policies. The E&E program — in close collaboration with industry, NASA, and international partners through ICAO CAEP — is providing the technical basis for decision-making to enable the reintroduction of supersonic air transportation. The program will also support the development of any new noise and emissions standards for the existing subsonic fleet of aircraft.

Efforts under this program will also help the FAA understand noise generated by UAS and AAM vehicles, which are sometimes referred to as electric vertical takeoff and landing vehicles (eVTOL). By gathering needed noise data and developing modeling techniques, the FAA will be prepared to address certification and standards for noise before these vehicles enter service, as well as develop concepts for operational procedures that could reduce their noise. The program also continues to support the development of operational procedure concepts for the existing fleet of airplanes and helicopters that could reduce community noise.

Aviation Environmental Tools Suite: The E&E program is developing a comprehensive suite of analytical tools to quantify the environmental consequences and impacts of aviation to enable improved decision making. At the center of these analytical tools is the Aviation Environmental Design Tool (AEDT), which can quantify the noise, fuel burn, and emissions resulting from all aspects of aircraft operations. As a part of this effort, the program is working to develop an improved analytical model to quantify aviation-related pollutant concentrations around airports for compliance with the National Ambient Air Quality Standards. This model is needed to address shortcomings with the current compliance tool, which is negatively impacting the approval of federal airport and air space infrastructure projects. The program is also developing analytical tools to support cost benefit analysis of environmental standards and other policies to ensure that cost-effective solutions are developed.

Streamlining Environmental Approvals: The E&E program is providing knowledge and tools to improve and streamline the required environmental review processes for infrastructure projects and other federal actions. Given the sensitivity and high visibility of such activities in today's environment, the program is developing an improved screening tool that will allow users to rapidly and conclusively identify federal actions that do not require further environmental review, reducing the time and costs. The new tool will enable the FAA to perform effective screening analysis and provide users with powerful analytics to improve communications.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Provide the data and analysis necessary to support the development of international standards for subsonic and supersonic aircraft
- Provide data and analysis necessary to support the development of noise certification standards and processes for UAS and AAM vehicles
- Develop more efficient noise and emissions certification processes for subsonic aircraft and engines
- Continue the development of analytical tools for noise and emissions modeling, noise screening for environmental compliance, and fleet and operations scenarios forecasting

- Develop advanced operational procedural concepts that could reduce community noise exposure while maintaining safe flight operations and providing guidance for air space planners on how these concepts could be incorporated
- Develop a decision support tool to enable industry to mitigate the climate impacts of contrails and aviation induced cloudiness
- Develop the methodologies and data necessary to enable industry to design aircraft technologies with reduced noise and emissions
- Expand the scientific understanding of the impacts of aircraft noise on communities and aviation emissions on air quality and climate change

Goals for FY 2022 Funding:

- Conduct analyses to support the development of new international standards for subsonic and supersonic transport aircraft and engines in ICAO CAEP
- Conduct measurements and complete analyses to inform the development of noise standards for UAS and AAM vehicles
- Release AEDT Version 3e and the noise screening method
- Support the development of a more efficient and accurate environmental review process
- Support the development of more efficient certification processes
- Conduct analyses to support the development of operational procedure concepts to mitigate the environmental impacts of the current fleet of airplanes and helicopters

What benefits will be provided to the American public through this request and why is this program necessary?

The American public will benefit from the research conducted under this program through:

1. **Public Tools:** AEDT 3d (https://aedt.faa.gov) is the FAA's standard noise and emissions model. It is used internationally by academia, industry, and manufacturers in over 40 countries, establishing AEDT as the recognized reference tool for modeling environmental consequences and furthering the global leadership position of the United States.
2. **International Standard Setting:** Funding for the E&E program would ensure the United States leads the development of standards for all aircraft, including supersonic aircraft that could be established by the ICAO CAEP in the 2020s. Each of these impact the health and welfare of the American public, as well as having a multi-billion dollar impact on the aviation industry.
3. **U.S. Industry Benefits:** The U.S. aviation industry relies on the international harmonization of standards. The FAA negotiates standards at ICAO CAEP. In doing so, the agency certifies aircraft and engines comply with these standards and can be sold to airlines worldwide. Without this work, U.S. manufactures would need to seek certification directly from foreign governments, resulting in increased cost and delays in product launches.

4. **Workforce Development:** Much of the research in this program is carried out by the Aviation Sustainability Center (ASCENT), which supports 16 universities and over 200 students nationwide. In addition to producing world-class research, ASCENT — also known as the Center of Excellence for Alternative Jet Fuels and Environment (http://ascent.aero) — is developing a workforce that will help aviation overcome challenges posed by aviation noise and emissions for decades to come.

Civil aviation is evolving continuously, and so must the analytical tools and research that quantify and characterize the environmental consequences of civil aviation. The increased knowledge and analytical capabilities provided by the E&E program ensure the FAA has the ability to define and mitigate environmental issues to ensure sustained aviation growth.

This request would continue efforts to advance our scientific understanding of the environmental impacts of civil aviation, develop tools to quantify these impacts, and then use the tools to inform decision making and ensure that cost-effective solutions are developed to address the environmental and energy issues confronting aviation. More broadly, the program efforts directly supports climate change mitigation federal policy objectives.

Detailed Justification for A11.v NextGen – Environmental Research: Aircraft Technologies and Fuels

FY 2022 – NextGen – A11.v Environmental Research: Aircraft Technologies and Fuels – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	827	901	919
Program Costs	28,347	30,563	32,556
Total	**29,174**	**31,465**	**33,476**
FTE (if applicable)	**4**	**4**	**4**

What is this program and what does this funding level support?

The NextGen – Environmental Research: Aircraft Technologies and Fuels program supports efforts through the Continuous Lower Energy, Emissions, and Noise (CLEEN) program and the Aviation Sustainability Center (ASCENT) to develop new aircraft and engine technologies, and advanced sustainable aviation fuels. Technologies developed by this program will result in a fleet of aircraft that have lower noise, use less fuel, and produce fewer emissions. This program also provides test data, analyses, and methodologies to support the development and deployment of sustainable aviation fuels. Funds from this program ensure novel jet fuels are drop-in compatible with today's fleet of aircraft and are certified as being safe for use. They also ensure that sustainable aviation fuels, produced from renewable and waste feedstocks, and lower carbon aviation fuels, produced from fossil feedstocks, are appropriately credited under the International Civil Aviation Organization (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

Through the CLEEN program (http://faa.gov/go/cleen), the FAA and industry are working together to develop technologies that will enable manufacturers to create aircraft and engines with lower noise and emissions, as well as improved fuel efficiency. Technologies accelerated by the CLEEN program have relatively large technological risk. Government resources help mitigate this risk and incentivize aviation manufacturers to invest in developing these technologies. By cost sharing the development with the FAA, industry is willing to accept the greater risk. Once entered into service, the CLEEN technologies will produce noise, fuel burn, and emissions benefits throughout the fleet for years to come.

Funding from this program also supports efforts by ASCENT — the FAA's Center of Excellence (COE) for Alternative Jet Fuels and Environment — to develop innovative technological solutions to reduce noise, emissions, and fuel burn from subsonic and supersonic aircraft. Aircraft technology development projects under ASCENT complement the CLEEN Program's industry partnership approach by providing a venue for University-led research to expand knowledge broadly across the industry and develop technologies at all levels of maturity that will reduce noise, emissions, and fuel burn. The program also provides funding for alternative jet fuel testing and analysis efforts by ASCENT. This cooperative aviation research organization is co-

led by Washington State University and Massachusetts Institute of Technology (http://ascent.aero).

This program also supports the Commercial Aviation Alternative Fuels Initiative (CAAFI) in its effort to engage with commercial aviation and emerging alternative fuels industries (http://caafi.org).

CLEEN, CAAFI, and ASCENT are conducted in partnership with a wide range of aviation stakeholders that leverage resources from the private sector. CLEEN is a public-private partnership where industry contributes cost share that matches or exceeds the amount 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 the emerging alternative fuels industry. ASCENT, like all FAA COEs, requires cost-share from non-federal sources and benefits from an advisory committee with robust participation from a wide range of aviation stakeholders, including industry. The continuing work of CLEEN, CAAFI, and ASCENT to develop sustainable aviation fuels will help ensure aviation has a wide range of energy options for decades to come.

Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Develop aircraft and engine technologies, as well as sustainable aviation fuels for subsonic and supersonic aircraft through the CLEEN program that reduce noise and emissions while increasing fuel efficiency
- Evaluate innovative technological solutions to reduce noise, emissions, and fuel burn from subsonic and supersonic aircraft through ASCENT
- Support the approval of novel jet fuel pathways within the ASTM International certification process through testing and coordination to ensure these fuels are safe for use
- Support efforts to evaluate sustainable aviation fuels that can be used safely at greater than a 50% blend level, the current maximum allowable volume, with the goal of developing sustainable aviation fuels that can be used without any blending with conventional jet fuel
- Support the inclusion of sustainable aviation fuels created from waste and renewable feedstocks, and lower carbon aviation fuels created from fossil feedstocks, within the ICAO CORSIA framework
- Through ASCENT and CAAFI, identify barriers to the use of sustainable aviation fuels by the aviation industry and work across the U.S. government and with industry to overcome these barriers

Goals for FY 2022 Funding:

- Continue activities within the third phase of the CLEEN program to demonstrate technologies that can reduce energy use, emissions, and noise for subsonic and supersonic aircraft
- Conduct testing to support the approval of at least one alternative jet fuel type per year and streamline the ASTM certification process to reduce the time and cost of certification
- Identify sustainable aviation fuels that could be used at greater than a 50% blending level and develop ASTM certification processes to enable their use at these higher blending percentages
- Identify innovative solutions to reduce noise, emissions, and fuel burn through ASCENT
- Develop lifecycle greenhouse gas emissions values for alternative fuel pathways and sustainability criteria for use in CORSIA

What benefits will be provided to the American public through this request and why is this program necessary?

The CLEEN program aids industry in developing the analytical tools needed to design aircraft for lower noise, emissions, and fuel use. Cumulatively, CLEEN Phase I and II are estimated to save the aviation industry 36.4 billion gallons of fuel by 2050, reducing airline costs by 72.8 billion dollars and lowering CO2 emissions by 424 million metric tons. These CO_2 reductions are equivalent to removing 3.05 million cars from the road from 2020 to 2050. The technologies from the first phase of CLEEN are estimated to decrease land area exposed to noise by 14%. These technologies, as well as the use of sustainable aviation fuels, will also dramatically reduce nitrogen oxide and soot emissions from aircraft operations.

Deployment of sustainable aviation fuels will support the development of a new industry, and provide economic and environmental benefits. In addition to reducing the environmental impact of aviation, these fuels have the opportunity to provide considerable economic development across rural America where the feedstocks would be produced and where industrial infrastructure could be leveraged. The sustainable aviation fuels industry would use today's pipeline and airport infrastructure. It could also ensure that our existing fleet of ethanol facilities continues to be used as ground transportation electrifies. This is because an ethanol-to-jet fuel pathway has already been approved for commercial aviation by ASTM International. Further, today's refineries could also be retrofitted to produce sustainable aviation fuels using renewable fats, oils and greases as was done with the World Fuels Paramount facility in southern California.

Continued funding will also ensure U.S. global leadership on how sustainable aviation fuels are counted within CORSIA. With FAA's support, ASTM International has approved seven pathways for alternative fuels. Work is underway on evaluating additional fuel pathways and on streamlining the ASTM approval process.

The commercial airlines (https://www.airlines.org/news/major-u-s-airlines-commit-to-net-zero-carbon-emissions-by-2050/) and business jet community (https://www.futureofsustainablefuel.com/) have committed to advancing the commercialization

and deployment of sustainable aviation fuels to help industry meet its emissions reduction goals, diversify the fuel supply, and enhance energy security.

Reducing the environmental impact of aviation through new technologies and sustainable aviation fuels ensures the continued growth of aviation while decreasing noise and emissions thereby contributing to climate change mitigation federal policy objectives. The vast majority of noise reductions over the last four decades have come from enhancements in engine and airframe design that were implemented to improve fuel efficiency. Through these advancements, there has been a 95 percent reduction in the number of people exposed to significant noise and more than a 70 percent improvement in fuel efficiency. However, because of factors such as growth in the number of operations and implementation of new flight procedures, community concerns about noise remain a considerable challenge.

Detailed Justification for A11.w System Planning and Resource Management

FY 2022 – A11.w System Planning and Resource Management – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	1,578	1,605	1,637
Program Costs	10,557	11,417	2,504
Total	**12,135**	**13,022**	**4,141**
FTE (if applicable)	**7**	**6**	**6**

What is this program and what does this funding level support?

The System Planning and Resource Management program leads the planning, coordination, development, presentation, and review of the FAA's research and development (R&D) portfolio. The program facilitates and coordinates the FAA's R&D Executive Board (REB), a group of senior executives representing the major FAA R&D sponsors. The REB ensures research priorities meet the FAA's strategic goals and objectives while optimizing the overall R&D portfolio.

This process helps ensure the FAA's research meets national 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 Research, Engineering and Development Advisory Committee (REDAC), and DOT's Office of the Assistant Secretary for Research and Technology (OST-R).

Established pursuant to the Federal Advisory Committee Act, the REDAC reviews FAA research commitments annually and provides guidance for future research, engineering, and development (R,E&D) investments. Committee members 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.

The program also manages the FAA's national Technology Transfer R&D program through the William J. Hughes Technical Center's (WJHTC) Office of Research and Technology Applications (ORTA). The ORTA coordinates collaborative partnerships between the FAA WJHTC federal laboratories and private businesses, state and local governments, nonprofit entities, and academic institutions. The ORTA communicates and makes research results publically available, and maximizes the impact of federally funded R&D by accelerating the transfer of innovative technologies to the commercial marketplace.

Key outputs of this program include annual statutory deliverables to Congress — the National Aviation Research Plan (NARP) and the Annual Research and Development Review (Annual Review) — and administration of the congressionally mandated (P.L. 100-591 Section 6 Advisory Committee) REDAC and resultant reports.

The program ensures that departmental R&D program planning and performance reporting requirements are satisfied with a focus on understanding industry trends and technology advancements, and ensuring that research enables and safely advances aviation.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Completion of annual congressional deliverables (NARP and Annual Review)
- Coordination and completion of REDAC reports, guidance, and transmittals
- Development and dissemination of R&D program performance reports
- Development and submission of R&D investment portfolio
- Development and coordination of OST-R R&D management deliverables, including the Annual Modal Research Plan
- Enable the use of federal government labs, facilities, equipment, and personnel with public and private partners
- Facilitate government and private sector partnerships to help develop and commercialize aviation ideas, concepts, and products

Goals for FY 2022 Funding:

- Ensure departmental R&D program planning and performance reporting requirements are satisfied, as specified in the Fixing America's Surface Transportation Act (Pub. L. No. 114-94).

What benefits will be provided to the American public through this request and why is this program necessary?

This program provides the support for the FAA to formulate its annual RE&D portfolio and submit the mandatory R&D planning documents to Congress each year. Through the management of the REDAC, this program facilitates an independent, expert review of the FAA's R&D portfolio that provides meaningful recommendations for the agency to refine and improve research focus areas. This results in a more effective research program that will benefit the public by making aviation safer and smarter while enhancing U.S. global leadership in aviation.

Detailed Justification for A11.x Aviation Workforce Development

FY 2022 – A11.x Aviation Workforce Development – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	0	0	0
Program Costs	0	0	5,752
Total	**0**	**0**	**5,752**
FTE (if applicable)			

What is this program and what does this funding level support?

The Aviation Workforce Development grant program will provide support to administer grants for eligible projects that educate, develop, and recruit aircraft pilots and an aviation maintenance technical workforce, as directed by Congress in Section 625 of the FAA Reauthorization Act of 2018. Consistent with section 625, program eligibility and outreach will be aimed at communities underrepresented in the industry as well as economically disadvantaged geographic areas and thus support equity in transportation federal policy objectives.

Major Activities and Accomplishments Planned in FY 2022 Include:

Aircraft Pilots Grant Program

- Create and deliver curriculum designed to provide a meaningful aviation education to accredited institutions of higher education, high school or secondary schools, local government entities, flight schools, or aviation organizations to prepare students to become aircraft pilots, aerospace engineers, or unmanned aircraft systems operators
- Support the professional development of instructors or teachers using the above curriculum to teach students

Aviation Maintenance Technical Workers Grant Program

- Establish or improve educational programs that teach technical skills used in aviation maintenance, including how to purchase equipment
- Establish scholarships or apprenticeships for individuals pursuing employment in the aviation maintenance industry
- Support outreach about careers in the aviation maintenance industry to
    - primary, secondary, and post-secondary schools
    - communities underrepresented in the aviation industry
- Support educational opportunities related to aviation maintenance technicians in economically disadvantaged geographic areas
- Support transition to careers in aviation maintenance, including members of the U.S. Armed Forces

- Enhance aviation maintenance technical education and the aviation maintenance industry workforce

Goals for FY 2022 Funding:

- Provide grants to support education, recruitment, and development of aircraft pilots and aviation maintenance technicians

What benefits will be provided to the American public through this request and why is this program necessary?

In July 2018, Boeing released its Pilot and Technician Outlook — an industry forecast of personnel needed to fly and maintain the world's aviation fleet over the next 20 years. The company estimated more than 800,000 new pilots and 750,000 new aviation technicians will be needed worldwide in the coming decades. This includes a need for 200,000 pilots in the United States alone. The American flying public will benefit from having skilled aircraft pilots and maintenance technicians to maintain operations and ensure global aviation safety.

In response to projected shortages of aircraft pilots and aviation maintenance technical workers, Congress gave the FAA the authority to establish an Aviation Workforce Development grant program each year, during fiscal years 2020 through 2023. The goal of this program is to provide funding to support education, recruitment, and development of aircraft pilots and aviation maintenance technicians. By extending program eligibility and outreach to communities underrepresented in the industry and economically disadvantaged geographic areas the program will advance equity in transportation federal policy objectives.

Detailed Justification for A11.y WJHTC Laboratory Facilities

FY 2022 – A11.y WJHTC Laboratory Facilities – Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	2,448	2,545	2,596
Program Costs	1,052	376	2,884
Total	**3,500**	**2,921**	**5,481**
FTE (if applicable)	**12**	**12**	**12**

What is this program and what does this funding level support?

Research and development (R&D) programs require specialized facilities that provide flexible, high fidelity environments to perform Human-In-the-Loop simulations and evaluate advanced air traffic concepts. This program sustains the specialized research facilities located at the William J. Hughes Technical Center (WJHTC) used to support R&D program goals and objectives.

The R&D laboratories are fully integrated with other WJHTC capabilities, which provides researchers the ability to emulate and evaluate field conditions. The laboratories are comprised of the Cockpit Simulation and Target Generation facilities, Research Development and Human Factors Laboratory, and NextGen Prototyping Network.

These laboratories include integrated cockpits, simulated and real air traffic controller workstations, and specialized biometric data collection methods to evaluate system and human components that can only be studied in a full mission simulation environment. Numerous R&D programs use the laboratory facilities to conduct research activities that encompass current day capabilities and the ongoing transition to NextGen technologies.

Funding supports the existing laboratory infrastructure, as well as R&D facility modifications and improvements, equipment, software/hardware licenses, and other tools.

Major Activities and Accomplishments Planned in FY 2022 Include:

<u>Concepts and Systems Integration – Research Development and Human Factors Laboratory</u>

- Enhance the simulation infrastructure to evaluate human factors issues associated with introducing new consoles and advanced information displays to air traffic controllers

<u>Network Infrastructure – NextGen Prototyping Network</u>

- Support cybersecurity exercises including DoD's "Whole of Nation" simulation
- Integrate FAA and partner networks and facilities into the NextGen Prototyping Network baseline. This will expand collaborative capabilities and position the FAA to best support NextGen research across the agency, and with other government agencies, industry, and academia

- Support Cybersecurity Test Facility partner activities investigating national airspace system (NAS) cyber threats, which are expected to include joint FAA/DoD/DHS activities
- Target Generation Facility & Cockpit Simulation Facility (CSF)
- Enhance FAA simulators for support of NAS R&D requirements, specifically to address the need to simulate and test the total NAS in high fidelity for programs such as four-dimensional trajectory

Goals for FY 2022 Funding:

- The overall goal for the WJHTC Laboratory Facilities is to have the infrastructure in place and ready to support R&D program requirements when needed.
- The Concepts and Systems Integration – Research Development and Human Factors Laboratory will conduct proactive high-fidelity research on proposed changes to the air traffic controller displays to identify human performance issues by the end of FY 2022.
- The program will ensure all required partners supporting FAA research are integrated into the NextGen Prototyping Network baseline by the end of FY 2022 to maximize collaboration and best position the FAA to meet research goals.
  The CSF will merge two existing simulators together for a high-fidelity general aviation simulator. The avionics and visual systems will be upgraded to the current CSF standardized in-house platforms. Initial operating capability will be achieved by the end of FY 2022.

What benefits will be provided to the American public through this request and why is this program necessary?

This program is necessary to provide researchers with the specialized laboratories and infrastructure required to achieve R&D program goals and objectives. Having an efficient and flexible platform to evaluate current and future air transportation system concepts and technologies enhances the safety and efficiency of air travel for the American public.

Performing research in simulated environments rather than live aircraft is safer, generates cost savings, and allows researchers to study conditions that would not be possible during live flight. The implementation of new technologies, such as the intelligent agent-based capability, allow for a reduction in the number of test subjects needed for a given study while maximizing cost savings and efficiencies. Resolving human factors-related issues prior to implementing new technologies results in cost savings and ensures the FAA meets safety standards for air traffic control operations.

Detailed Justification for A11.z Aviation Climate Research

FY 2022 – A11.z Aviation Climate Research – Budget Request
($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses			
Program Costs			50,000
Total			**50,000**
FTE (if applicable)			

What is this program and what does this funding level support?

The Aviation Climate Research (ACR) program invests in high-risk, accelerated research that has transformative impact potential to reduce greenhouse gas emissions from aviation in support of the 2030 and 2050 U.S. climate change goals. This program will be executed in coordination with the new Advanced Research Projects Agency for Climate that will be located within the Department of Energy.

These investments will enhance and accelerate research in the areas of sustainable aviation fuels for jet engines, unleaded fuel alternatives for piston-engine aircraft, and alternate aircraft technologies including electric propulsion. More specifically, the program will support the development of sustainable aviation fuels that could be used in jet engines without blending with conventional petroleum-based jet fuel, evaluate aviation fuel supply chains to reduce the cost to produce sustainable aviation fuels and maximize their environmental benefits, and accelerate the identification of safe alternatives to leaded aviation fuel. Additionally, the program will support the accelerated development of fuel efficient, low-emissions aircraft technologies, including electric propulsion, and support collaborative research in the areas of climate adaptation and resilience.

To ensure the work can be done in an expedited manner, the work will enhance essential laboratory capabilities and build on existing research partnerships that the FAA has established with academia and industry such as the Aviation Sustainability Center of Excellence (ASCENT), the Commercial Aviation Alternative Fuels Initiative (CAAFI), the Piston Aviation Fuels Initiative (PAFI), and the Continuous Lower Energy Emissions and Noise (CLEEN) Program. The extended research enabled by this program will be coordinated with air transportation stakeholders in industry and academia and with partner federal agencies including the Department of Energy and U.S. Department of Agriculture.

Major Activities and Accomplishments Planned in FY 2022 Include:

- Develop ACR Program Management Plan to include how the program will build on other FAA environment and energy programs and federal interagency partner efforts
- Initiate program coordination outreach and review/select research initiatives for ACR funding
- Execute ACR-funded research initiatives

Goals for FY 2022 Funding:

- Establish a programmatic framework for increased investment in targeted high-risk, accelerated research to reduce greenhouse gas emissions from aviation.
- Establish interagency coordination and alignment
- Execute ACR-funded research initiatives

What benefits will be provided to the American public through this request and why is this program necessary?

Tackling climate change is a top national priority. In the April 2021 Global Climate Summit, the United States committed to working on a vision toward reducing the aviation sector's emissions in a manner consistent with the goal of net-zero emissions for our economy by 2050, as well as on robust standards that integrate climate protection and safety. The United States intends to advance the development and deployment of high integrity sustainable aviation fuels and other clean technologies that meet rigorous international standards and builds upon existing partnerships. Achieving such a goal requires focused federal investments on high value and high potential initiatives that will accelerate and enable progress in meeting this national objective.

This program's research efforts support FAA's timely and safe introduction of advanced technologies that mitigate climate change. It provides the framework for directing targeted investments toward acceleration of research initiatives with high potential to mitigate the impact of aviation operations on the environment. Furthermore, the program will coordinate high value research initiatives with federal partners to assure benefits are properly aligned and shared in support of national objectives.

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, $3,350,000,000, to be derived from the Airport and Airway Trust Fund and to remain available until expended: *Provided*, That none of the amounts made available 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 **[**2021**]** *2022*, notwithstanding section 47117(g) of title 49, United States Code: *Provided further*, That none of the amounts made available 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 section 47109(a) of title 49, United States Code, the Government's share of allowable project costs under paragraph (2) of such section for subgrants or paragraph (3) of such section shall be 95 percent for a project at other than a large or medium hub airport that is a successive phase of a multi-phased construction project for which the project sponsor received a grant in fiscal year 2011 for the construction project**]**: *Provided further*, That notwithstanding any other provision of law, of amounts limited under this heading, not more than **[**$119,402,000**]** *$127,165,000* shall be available for administration, not less than $15,000,000 shall be available for the Airport Cooperative Research Program, *and* not less than **[**$40,666,000**]** *$40,961,000* shall be available for Airport Technology Research**[**, and $10,000,000, to remain available until expended, shall be available and transferred to "Office of the Secretary, Salaries and Expenses" to carry out the Small Community Air Service Development Program: *Provided further*, That in addition to airports eligible under section 41743 of title 49, United States Code, such program may include the participation of an airport that serves a community or consortium that is not larger than a small hub airport, according to FAA hub classifications effective at the time the Office of the Secretary issues a request for proposals**]**.

GRANTS-IN-AID FOR AIRPORTS

[For an additional amount for "Grants-In-Aid for Airports", to enable the Secretary to make grants for projects as authorized by subchapter 1 of chapter 471 and subchapter 1 of chapter 475 of title 49, United States Code, $400,000,000, to remain available through September 30, 2023: *Provided*, That amounts made available under this heading shall be

derived from the general fund, and such funds shall not be subject to apportionment formulas, special apportionment categories, or minimum percentages under chapter 471: *Provided further*, That the Secretary shall distribute funds provided under this heading as discretionary grants to airports: *Provided further*, That the amount made available under this heading shall not be subject to any limitation on obligations for the Grants-in-Aid for Airports program set forth in any Act: *Provided further*, That the Administrator of the Federal Aviation Administration may retain up to 0.5 percent of the funds provided under this heading to fund the award and oversight by the Administrator of grants made under this heading.**]** *(Department of Transportation Appropriations Act, 2021.)*

(INCLUDING TRANSFER OF FUNDS)

[For an additional amount for "Grants-in-Aid for Airports" $2,000,000,000, to prevent, prepare for, and respond to coronavirus: *Provided*, That amounts made available under this heading in this Act shall be derived from the general fund of the Treasury: *Provided further*, That funds provided under this heading in this Act shall only be available to airports in categories defined in section 47102 of title 49, United States Code: *Provided further*, That funds provided under this heading in this Act shall not otherwise be subject to the requirements of chapter 471 of such title: *Provided further*, That notwithstanding the preceding proviso, except for project eligibility, the requirements of chapter 471 of such title shall apply to funds provided for any contract awarded (after the date of enactment of this Act) for airport development and funded under this heading: *Provided further*, That funds provided under this heading in this Act may not be used for any purpose not directly related to the airport: *Provided further*, That no additional funding shall be provided from funds made available under this heading to any airport that was allocated in excess of four years of operating funds under Public Law 116–136: *Provided further*, That the Federal share payable of the costs for which a grant is made under this heading in this Act shall be 100 percent: *Provided further*, That, notwithstanding any other provision of law, any funds appropriated under the heading "Grants-In-Aid for Airports" in Public Law 116–136 that are unallocated as of the date of enactment of this Act shall be added to and allocated under paragraph (1) of this heading in this Act: *Provided further*, That any funds obligated under Public Law 116–136 that are recovered by or returned to the FAA shall be allocated under paragraph (1) of this heading in this Act: *Provided further*, That of the amounts appropriated under this heading in this Act:**]**

[(1) Not less than $1,750,000,000 shall be available for primary airports as defined in section 47102(16) of title 49, United States Code, and certain cargo airports for costs related to operations, personnel, cleaning, sanitization, janitorial services, combating the spread of pathogens at the airport, and debt service payments: *Provided*, That such funds shall not be subject to the reduced apportionments of section 47114(f) of title 49, United States Code: *Provided further*, That such funds shall first be apportioned as set forth in sections 47114(c)(1)(A), 47114(c)(1)(C)(i), 47114(c)(1)(C)(ii), 47114(c)(2)(A), 47114(c)(2)(B), and 47114(c)(2)(E) of title 49, United States Code: *Provided further*, That there shall be no maximum apportionment limit: *Provided further*, That any remaining funds after such apportionment shall be distributed to all sponsors of primary airports (as defined in section 47102(16) of title 49, United States Code) based on each such

airport's passenger enplanements compared to total passenger enplanements of all airports defined in section 47102(16) of title 49, United States Code, for the most recent calendar year enplanements upon which the Secretary has apportioned funds pursuant to section 47114(c) of title 49, United States Code;**]**

[(2) Not less than $45,000,000 shall be for general aviation and commercial service airports that are not primary airports as defined in paragraphs (7), (8), and (16) of section 47102 of title 49, United States Code, for costs related to operations, personnel, cleaning, sanitization, janitorial services, combating the spread of pathogens at the airport, and debt service payments: *Provided*, That not less than $5,000,000 of such funds shall be available to sponsors of non-primary airports, divided equally, that participate in the FAA Contract Tower Program defined in section 47124 of title 49, United States Code, to cover lawful expenses to support FAA contract tower operations: *Provided further*, That the Secretary shall apportion the remaining funds to each non-primary airport based on the categories published in the most current National Plan of Integrated Airport Systems, reflecting the percentage of the aggregate published eligible development costs for each such category, and then dividing the allocated funds evenly among the eligible airports in each category, rounding up to the nearest thousand dollars: *Provided further*, That any remaining funds under this paragraph shall be distributed as described in paragraph (1) under this heading in this Act;**]**

[(3) Not less than $200,000,000 shall be available to sponsors of primary airports to provide relief from rent and minimum annual guarantees to on-airport car rental, on-airport parking, and in-terminal airport concessions (as defined in part 23 of title 49, Code of Federal Regulations) located at primary airports: *Provided*, That such funds shall be distributed to all sponsors of primary airports (as defined in section 47102(16) of title 49, United States Code) based on each such airport's passenger enplanements compared to total passenger enplanements of all airports defined in section 47102(16) of title 49, United States Code, for calendar year 2019: *Provided further*, That as a condition of approving a grant under this paragraph, the Secretary shall require the sponsor to provide such relief from the date of enactment of this Act until the sponsor has provided relief equaling the total grant amount, to the extent practicable and to the extent permissible under state laws, local laws, and applicable trust indentures: *Provided further*, That the sponsor shall provide relief from rent and minimum annual guarantee obligations to each eligible airport concession in an amount that reflects each eligible airport concession's proportional share of the total amount of the rent and minimum annual guarantees of all the eligible airport concessions at such airport: *Provided further*, That, to the extent permissible under this paragraph, airport sponsors shall prioritize relief from rent and minimum annual guarantee to minority-owned businesses: *Provided further*, That only airport concessions that have certified they have not received a second draw or assistance for a covered loan under section 7(a)(37) of the Small Business Act (15 U.S.C. 636(a)(37)) that has been applied toward rent or minimum annual guarantee costs shall be eligible for relief under this paragraph and such concessions are hereby prohibited from applying for a covered loan under such section for rent or minimum annual guarantee costs: *Provided further*, That sponsors of primary airports may

retain up to 2 percent of the funds provided under this paragraph to administer the relief required under this paragraph; and**]**

[(4) Up to $5,000,000 shall be available and transferred to "Office of the Secretary, Salaries and Expenses" to carry out the Small Community Air Service Development Program: *Provided*, That in allocating funding made available in this or any previous Acts for such program for fiscal years 2019, 2020, and 2021, the Secretary of Transportation shall give priority to communities or consortia of communities that have had air carrier service reduced or suspended as a result of the coronavirus pandemic: *Provided further*, That the Secretary shall publish streamlined and expedited procedures for the solicitation of applications for assistance under this paragraph not later than 60 days after the date of enactment of this Act and shall make awards as soon as practicable:**]**

[*Provided further*, That the Administrator of the Federal Aviation Administration may retain up to 0.1 percent of the funds provided under this heading in this Act to fund the award and oversight by the Administrator of grants made under this heading in this Act: *Provided further*, That obligations of funds under this heading in this Act shall not be subject to any limitations on obligations provided in any Act making annual appropriations: *Provided further*, That all airports receiving funds under this heading in this Act shall continue to employ, through February 15, 2021, at least 90 percent of the number of individuals employed (after making adjustments for retirements or voluntary employee separations) by the airport as of March 27, 2020: *Provided further*, That the Secretary may waive the workforce retention requirement in the preceding proviso, if the Secretary determines the airport is experiencing economic hardship as a direct result of the requirement, or the requirement reduces aviation safety or security: *Provided further*, That the workforce retention requirement shall not apply to nonhub airports or nonprimary airports receiving funds under this heading in this Act: *Provided further*, That the amounts repurposed under this heading in this Act that were previously designated by the Congress as an emergency requirement pursuant to the Balanced Budget and Emergency Deficit Control Act of 1985 are designated by the Congress as an emergency requirement pursuant to section 251(b)(2)(A)(i) of the Balanced Budget and Emergency Deficit Control Act of 1985: *Provided further*, That such amount is designated by the Congress as being for an emergency requirement pursuant to section 251(b)(2)(A)(i) of the Balanced Budget and Emergency Deficit Control Act of 1985.**]** *(Coronavirus Response and Relief Supplemental Appropriations Act, 2021.)*

Special and Trust Fund Receipts
(in millions of dollars)

Identification code: 69-8106-0-7-402	FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
0100 Balance, start of year	....	....	....
Receipts:			
Current Law:			
1140 General Fund Payment, Grants-in-Aid for Airports	....	2,000	....
1140 General Fund Payment, Grants-in-Aid for Airports	10,400	400	....
1199 Total current law receipts	10,400	2,400	....
1999 Total receipts	10,400	2,400	....
2000 Total: Balances and receipts	10,400	2,400	....
Appropriations:	971	398	....
Current law:	....	2	....
2101 Grants-in-Aid for Airports (Airport and Airway Trust Fund)	-10,400	-2,400	....
5099 Balance, end of year	....	....	....

Program and Financing
(in millions of dollars)

Identification code: 69-8106-0-7-402	FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
Obligations by program activity:			
0001 Grants-in-aid for airports	12,653	5,165	3,167
0002 Personnel and related expenses	116	119	127
0003 Airport technology research	39	41	41
0005 Small community air service	10	10	....
0006 Airport Cooperative Research	15	15	15
0007 Grants - General Fund Appropriation……..	971	398	....
0008 Administrative Expenses – General Fund Appropriation	....	2	....
0100 Total direct program	13,804	5,750	3,350
0799 Total direct obligations	13,804	5,750	3,350
0801 Grants-in-aid for Airports (Airport and Airway Trust Fund) Reimbursable	1	2	2
0900 Total new obligations, unexpired accounts	13,805	5,752	3,352
Budgetary Resources:			
Unobligated balance:			
1000 Unobligated balance carried forward, Oct 1	1,055	1,125	1,125
1001 Discretionary unobligated balance brought fwd, Oct 1	1,038	1,125	....
1021 Recoveries of prior year unpaid obligations	125	....	....
1050 Unobligated balance (total)	1,180	1,125	1,125

	Budget Authority:			
	Appropriations, discretionary:			
1101	Appropriation (special or trust fund)	3,000	3,350	3,350
1101	Appropriation (special or trust fund)	10,400	2,400	. . . .
1138	Appropriation applied to liquidate contract authority	-3,000	-3,350	-3,350
1160	Appropriation, discretionary (total)	10,400	2,400	. . . .
	Contract authority, mandatory:			
1600	Contract authority (Reauthorization)	3,350	3,350	3,350
	Spending authority from offsetting coll., Discretionary:			
1700	Collected	. . . .	2	2
1900	Budget authority (total)	13,750	5,752	3,352
1930	Total Budgetary Resources Available	14,903	6,877	4,477
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	1,125	1,125	1,125
	Change in obligated balances:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct 1	6,218	13,001	8,978
3010	New Obligations, unexpired accounts	13,805	5,752	3,352
3020	Outlays (gross)	-6,897	-9,775	-5886
3040	Recoveries of prior year unpaid obligations, unexpired	-125	. . . .	. . . .
3050	Unpaid obligations, end of year	13,001	8,978	6,444
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	6,218	13,001	8,978
3200	Obligated balance, end of year	13,001	8,978	6,444
	Budget authority and outlays, net:			
	Discretionary:			
4000	Budget authority, gross	10,400	2,402	2
	Outlays, gross:			
4010	Outlays from new discretionary authority	3,424	1,129	461
4011	Outlays from discretionary balances	3,473	8,646	5,425
4020	Outlays, gross (total)	6,897	9,775	5,886
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4033	Non-federal sources	. . . .	-2	-2
4040	Offsets against gross budget authority and outlays (total)	. . . .	-2	-2
	Mandatory:			
4090	Budget authority, gross	3,350	3,350	3,350
4180	Budget authority, net (total)	13,750	5,750	3,350
4190	Outlays, net (total)	6,897	9,773	5,884
	Memorandum (non-add) entries:			
5052	Obligated balance, SOY: Contract authority	3,814	4,164	4,164
5053	Obligated balance, EOY: Contract authority	4,164	4,164	4,164
5061	Limitation on obligations (Highway Trust Funds)	3,350	3,350	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 2019 Actual	FY 2020 Estimate	FY 2021 Estimate
	Direct obligations:			
	Personnel compensation			
11.1	Full-time permanent	72	78	82
11.3	Other than full-time permanent	1	2	1
11.5	Other personnel compensation	2	3	2
11.9	Total personnel compensation	75	83	85
12.1	Civilian personnel benefits	26	27	27
21.0	Travel and transportation of persons	1	3	3
23.2	Rental payments to others	1	1	1
25.1	Advisory and assistance services	33	33	32
25.2	Other services from non-Federal sources	1	1	1
25.3	Other services from Federal sources	17	22	24
25.7	Operation and maintenance of equipment	14	14	14
26.0	Supplies and materials	1	1	1
31.0	Equipment	1	1	1
32.0	Land and Structures	4	1	1
41.0	Grants, subsidies, and contributions	13,620	5,549	3,160
94.0	Financial Transfers	10	14	. . . .
99.0	Direct obligations	13,804	5,750	3,350
41.0	Reimbursable obligations	1	2	2
99.9	Total new obligations, unexpired accounts	13,805	5,752	3,352

Employment Summary

Identification code: 69-8106-0-7-402		FY 2019 Actual	FY 2020 Estimate	FY 2021 Estimate
1001	Direct: Civilian full-time equivalent employment	565	607	615
1001	Direct: Civilian full-time equivalent employment	. . . .	4	1
2001	Reimbursable: Civilian full-time equivalent employment	5	7	3

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EXHIBIT III-1

GRANTS-IN-AID FOR AIRPORTS
Summary by Program Activity
Appropriations, Obligation Limitations, and Exempt Obligations

($000)

	FY 2020 ACTUAL	FY 2020 CARES Act	FY 2021 ENACTED	FY 2021 CRRSA	FY 2021 American Rescue Plan	FY 2022 PRESIDENT'S BUDGET
Grants-in-Aid for Airports	3,569,276	10,000,000	3,564,932	2,000,000		3,166,874
Personnel & Related Expenses	116,500		119,402			127,165
Airport Technology Research	39,224		40,666			40,961
Airport Cooperative Research	15,000		15,000			15,000
Small Community Air Service	10,000		10,000			-
TOTAL	$ 3,750,000	$ 10,000,000	$ 3,750,000	$ 2,000,000	$ -	$ 3,350,000
FTEs						
Direct Funded	564		611			616
Reimbursable, allocated, other	5		7			3

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 2021 TO FY 2022
Appropriations, Obligation Limitations, and Exempt Obligations
($000)

	$000	FTE
FY 2021 ENACTED BUDGET	**5,750,000**	**611**
ADJUSTMENTS TO BASE:		
Annualization of FY 2021 FTE	850	5
Annualization of FY 2021 Pay Raise	269	
FY 2022 Pay Raise	2,179	
Adjustment in Working Capital Fund	33	
FERS Increase in FY 2022	807	
SUBTOTAL, ADJUSTMENTS TO BASE	**4,138**	**5**
PROGRAM REDUCTIONS		
Reductions to Grants program to offset uncontrollable increases and increases for Admin program	-8,058	
Reduction to Grants to take out supplemental funding	-390,000	
Reduction to ACRP to retain $15 million target amount.	-5	
Discontinue SCASDP program	-10,000	
Discontinue CRRSA Funding	-2,000,000	
Reduction to CARES Act FTE		-3
SUBTOTAL, PROGRAM REDUCTIONS	**-2,408,063**	**-3**
PROGRAM INCREASES		
Five new positions in Admin - three for airspace coordination with airports, and two for Puerto Rico field office.	425	3
Funding for SOAR upgrades	3,500	
SUBTOTAL PROGRAM INCREASES	**3,925**	**3**
FY 2022 REQUEST	**3,350,000**	**616**

Executive Summary

What Is the Request and What Funds are Currently Spent on the Program?

For FY 2022, the President's Budget requests $3.35 billion to fund the Grants-in-Aid for Airports program, also known as the Airport Improvement Program (AIP). The Budget request 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 impact 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, and efficiency of U.S. airports. Through the AIP, the agency funds a range of activities to assist in airport development, including preservation and development of critical transportation infrastructure.

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 for the NPIAS airports. The latest NPIAS report, which was published in September 2020, identified approximately $43.6 billion in capital needs over the 5-year period from 2019-2023.[1] The FAA will publish the next update in September 2022. 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

[1] Report to Congress National Plan of Integrated Airport Systems (NPIAS) 2019-2023. See https://www.faa.gov/airports/planning_capacity/npias/reports/

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 (including businesses that depend upon aviation for time-critical delivery of goods and communications). AIP also contributes in efforts to ensure access to basic community needs such as emergency medical services and disaster response, flight training, law enforcement support, agricultural activities, and business/corporate activities.

Detailed Justification for Grants-in-Aid for Airports

FY 2022 Grants-in-Aid for Airports Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses			
Program Costs	3,569,276	3,569,932	3,166,874
Total	**$ 3,569,276**	**$ 3,564,932**	**$ 3,166,874**
FTE	0	0	0

What is this program and what does this funding level support?

For FY 2022, the President's Budget requests $3.17 billion to fund the Grants-in-Aid for Airports program, known as the Airport Improvement Program (AIP).

Through AIP, the agency funds a broad range of capital projects at eligible U.S. airports. As required by statute (49 U.S.C. §47103) the FAA maintains the National Plan of Integrated Airport Systems (NPIAS), which identifies airports eligible for AIP funding as well as the kind and estimated costs of eligible airport development projects under the AIP. Currently, there are over 3,300 public use airports in the NPIAS, of which approximately 530 support scheduled air carrier service. In addition to the commercial service airports supporting scheduled passenger and cargo service, approximately 2,800 eligible airports in the NPIAS provide critical community access, support emergency medical services and disaster response, provide flight training, and support law enforcement, agricultural activities, and business/corporate activities.

With this funding request, the FAA will continue to award AIP grants for eligible, well-justified projects at NPIAS airports within four key focus areas:

Safety: Among the agency's long-term safety activities are to provide AIP funds to projects that eliminate outmoded airport conditions that contribute to accidents and to enhance the margin of operating safety by ensuring that airport safety standards projects receive the highest funding priorities. This includes projects that will help reduce the risk of runway incursions or wrong-surface landings or departures, eliminate or mitigate obstructions, reduce risks associated with wildlife hazards, and other categories of safety enhancements - all focused on reducing fatalities, injuries, and property damage.

Capacity and Efficiency: The FAA will continue its focus on improvements throughout the system that will enhance capacity and increase efficiency. 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 preservation or construction of runways, runway extensions, and airfield reconfigurations.

Environmental: The FAA will also continue to address environmental issues and community concerns to allow airport infrastructure improvements to proceed in a timely

manner, including grants to help airports complete environmental review and permitting processes as expeditiously as possible.

Security: Although not a primary FAA focus area, the AIP does provide funding for specific types of security projects required by statute or regulation. These projects 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. The FAA supports infrastructure and facility modifications that allow the Transportation Security Administration (TSA) to optimize the layout and functionality of public screening areas, and works with the TSA to determine AIP funding eligibility and priority for other capital needs.

What benefits will be provided to the American Public through this request and why is this program necessary?

The U.S. 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 January 2020.[2] It states that, in 2016, aviation accounted for 5.2 percent of our gross domestic product, contributed $1.8 trillion in total economic activity, and supported 10.9 million jobs.[3] Since 2000, the AIP has funded infrastructure projects at 23 major airports to accommodate more than 2 million additional annual operations each year.

AIP funding in FY 2022 will support the following key infrastructure projects:

- To mitigate safety risks, enhance capacity, and increase efficiency, AIP will fund reconstruction and rehabilitation of runways, taxiways, and aircraft parking areas (aprons) to preserve the nation's critical aviation infrastructure as well as mitigate the risk of foreign object debris damage to aircraft from cracked or broken pavement surfaces;

- To reduce the risk of runway incursions, AIP will fund projects to reconfigure taxiways, perimeter service roads and other airport facilities; and improve marking, lighting, and signage;

- To enhance safety, AIP will fund projects to conduct wildlife hazard assessments and develop wildlife hazard management plans;

[2] The Economic Impact of Civil Aviation on the U.S. Economy – January 2020. See https://www.faa.gov/about/plans_reports/media/2020_jan_economic_impact_report.pdf
[3] The Economic Impact of Civil Aviation on the U.S. Economy – January 2020. Page 5. See https://www.faa.gov/about/plans_reports/media/2020_jan_economic_impact_report.pdf

- To modernize and enhance efficiency and capacity at airports using a safety risk model, AIP will fund Safety Management Systems (SMS) manual and implementation plans to expand the use of voluntary SMS across the system; and

- To improve environmental reviews and mitigation activities, the AIP will fund projects required to achieve compliance with existing noise, air quality, and water quality laws and policies, with the goals of reducing impacts and streamlining processes.

The AIP is crucial to help support the FAA's mission to provide the safest and most efficient transportation system in the world. The AIP helps assure the American Public has a safe, reliable, and efficient system of airports to support and advance U.S. economic interests as well as technology, security, and safety at all levels of consumerism from next day air deliveries to emergency support services.

The AIP supports the FAA's safety focus by providing funding for safety-related development at airports that benefit U.S. aviation consumers at all levels, whether commercial service and general aviation operators and passengers, or recipients of goods transported via aircraft worldwide. 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 complex or confusing geometry intersections, most of which were developed before modern airport design standards were established.

The Runway Incursion Mitigation (RIM) Program is a key initiative that the Office of Airports (ARP) is managing to reduce incursions at runway/taxiway intersections where either at least three incursions have occurred in a year or that average at least one incursion a year at various airports throughout the country. The FAA has begun and completed mitigation at many RIM locations and is currently developing estimated schedule and cost estimates for FY 2022 through FY 2026. Additionally, ARP maintains an annual report on RIM projects to date.

The AIP also provides support to accelerate improvements to Runway Safety Areas (RSA) that do not meet current standards and other similarly high priority projects that support safety through efforts to reduce the risks of air transportation-related fatalities and injuries. RSA improvements include the installation of Engineered Materials Arresting Systems at some airports. Other projects include pavement rehabilitation and geometric improvements to avoid pilot confusion and enhance safety.

The AIP ensures maintenance of existing airport infrastructure as well as modernization of the national system of airports. The AIP also supports vital technical and financial assistance for planning, environmental analysis, engineering design, and the construction or rehabilitation of runways, taxiways, and aprons as well as other measures to expand capacity and make more efficient use of airports.

A significant part of the FAA's safety mission also supports capacity and efficiency. For example, the AIP helps ensure that the vast majority of paved runways at nearly 3,300

NPIAS airports are maintained in excellent, good, or fair condition. This reduces system delays by ensuring capacity is not compromised due to pavement safety issues.

Other AIP-funded safety projects serve to ensure system capacity and efficiency. For example, providing equipment to enable airports to keep runways and taxiways clear of snow, ice, and ponding water that can jeopardize aircraft directional control or braking action. Chemicals, plowing, and freeze-thaw cycles take a toll on runways, taxiways, and other paved areas, requiring careful environmental analysis and engineering planning to ensure adequate drainage. Additionally, AIP grants help fund professional planning, engineering, and environmental consulting services and pavement maintenance programs to ensure airports are maintained and operated in safe and serviceable conditions as required by statute (49 U.S.C. §47107).

Every other year, FAA is required to publish a five-year prospective analysis of AIP-eligible capital needs. The latest NPIAS, published in September 2020, identified $43.6 billion in estimated capital needs over the 5-year period from 2021 through 2025.[4] This funding request will contribute to the immediate airport safety, capacity, efficiency, and environmental projects identified by the FAA and airport sponsors to maintain our existing airport infrastructure as well as modernize it to support the air transportation needs of the American public.

[4] Report to Congress National Plan of Integrated Airport Systems (NPIAS) 2021-2025. See https://www.faa.gov/airports/planning_capacity/npias/reports/

GRANTS-IN-AID FOR AIRPORTS

Grants-in-Aid for Airports
($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2021 Enacted	**3,565,932**	**0**	**0**
Total Adjustments to Base	**0**	**0**	**0**
Discretionary Increases/ Decreases			
1. Discretionary decrease of offset uncontrollable adjustments, and discretionary increases in other programs, and to eliminate supplement funding	-398,058		
Total Discretionary Increases/Decreases	**-398,058**	**0**	**0**
FY 2022 Request	**3,167,874**	**0**	**0**

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Detailed Justification for Personnel and Related Expenses

FY 2022 Personnel and Related Expenses Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	100,624	103,432	107,741
Program Costs	15,876	15,970	19,424
Total	**$ 116,500**	**$ 119,402**	**$ 127,165**
FTE	574	580	588
CARES Act FTE	1	4	-3

What is this program and what does this funding level support?

For FY 2022, the President's Budget requests $127.8 million, 589 positions and 588 FTEs to cover the administrative expenses for the Office of Airports (ARP). The request supports ARP's legislatively directed mission of leadership to plan and develop 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. (See 49 U.S.C. §47103).

The requested funding level will support five additional positions in FY 2022—three airspace positions, two positions in Puerto Rico, and a one-time increase to support the continuing enhancements and contract transition for the System of Airports Reporting (SOAR).

The three new airport airspace positions will increase safety of the national airspace by providing national experts to address all actions submitted in accordance with 14 CFR Part 157. With one position for each FAA Service Center (Eastern, Central and Western), the FAA can enhance safety and improve customer service and response times to privately owned, Non-NPIAS airports.

Nearly all medical use airports/heliports are privately owned. Many solicit and/or need FAA assistance in the design and development of their facility. There are over 5,800 heliports in addition to the 2,500 hospital heliports. The FAA is experiencing an increase in the number of medical/hospital facilities seeking to be properly registered and compliant with Part 157. Per section 314, these private, nonregulated facilities comprise a large percentage of where for-hire commercial passenger and/or patient transport operations occur. These new positions will help the FAA address the current increase in demand and the potential for even more private airports to support urban vertiports for urban air mobility or other similar activities.

The request includes two positions in the FAA Airports District Office in San Juan, Puerto Rico. This established field office provides planning, environmental, engineering, and compliance services to support improvements to infrastructure at the 12 NPIAS airports in Puerto Rico and the U.S. Virgin Islands. This office ensures the successful

initiation and completion of critical airport infrastructure projects. These positions are critical to providing advice, guidance, and support to Puerto Rico Ports Authority.

The $3.5 million increase requested to support SOAR will ensure a successful transition between contracts supporting the Office of Airports' national data system. SOAR is a highly complex, multi-faceted data management system supporting multiple planning and financial functions, and it depends heavily upon critical operations and maintenance support, including frequent changes in order to support evolving statutory requirements and stakeholder needs, as well as cybersecurity protection.

FY 2022 is the year when the current SOAR Development and Operations & Maintenance Support contract ends, and will need to transition to a new contract structure (and potentially to a new contractor or multiple contractors). Our current budget projection/five-year work plan would provide for only about 4-6 months of overlap to support that transition, and no overlap beyond the end of FY 2022. In addition, we have had to increase the rate of investment in structural changes and enhanced functionality due to the 2018 FAA Reauthorization Act (e.g., Passenger Facility Charge streamlining including the associated analytical and reporting capabilities), and it is crucial to complete those functional changes under the current contract, which further depletes the resources otherwise needed to support the transition.

What benefits will be provided to the American Public through this request and why is this program necessary?

Congress statutorily directed the FAA to plan and develop a safe and efficient national airport system to satisfy the needs of the aviation interests of the United States, with consideration for economics, environmental permitting, local proprietary rights, and safeguarding the public investment.

The FAA's Office of Airports has responsibility for maintaining this plan to include establishing standards for the safe planning, design, construction, operation, and maintenance of the nation's airports. This is critical because the safe operation of air transportation requires nationwide and (in certain cases) international consistency in design standards, construction standards, signage, marking, lighting, and emergency response.

ARP personnel possess expertise in many professional and technical areas, as they regularly engage in opportunities to work collaboratively across government agencies, with industry, and with affected stakeholders. It is important to have the appropriate amount and technically competent staff to perform work on behalf of the American public to maintain the existing national airport system. These staff members must also work to modernize airports and meet specific requirements to fulfill the goals of ensuring our system of airports supports the safest, most efficient aerospace system in the world.

Airports and their tenants and customers are rapidly attempting to integrate Unmanned Aircraft Systems (UAS) into the airport environment. Airport operators are also looking

for FAA guidance on how to detect and mitigate UAS operating near airports that could become hazards to air navigation. This has created challenges for both the airport's operations and the FAA's oversight. UAS research can expand on ways to identify and evaluate the issues and requirements for using UAS for airport-centric operations, such as wildlife monitoring, aircraft rescue and firefighting operations, and pavement and infrastructure inspection. This research can lead to efficiencies and cost savings for airports. All these factors are accelerating to a level beyond current resources.

The three new airport airspace positions will increase safety of the National Airspace System by providing national experts to address all actions submitted in accordance with 14 CFR Part 157. Part 157 actions are currently assigned to various ARP frontline personnel that handle a variety of tasks, including but not limited to, implementation and oversight of the AIP. With an increasing number of aeronautical studies, including an increase in the number of medical facility establishments, providing three new airport airspace positions to focus on 14 CFR Part 157 submittals will improve stakeholder support, enhance safety, improve data integrity and provide a major relief to ARP frontline staff. In addition, the newly created positions will establish consistency across the nation, improve FAA partnership with the industry and improve the accuracy of the airport and runway database on aeronautical data, and reduce a growing backlog of aeronautical studies.

GRANTS-IN-AID FOR AIRPORTS

Personnel and Related Expenses
($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2021 Enacted	**119,402**	**584.0**	**0**
Adjustments to Base			
1. Annualization of FY 2021 FTE	680		5.0
2. Annualization of FY 2021 Pay Raise	259		
3. FY 2022 Pay Raise	2093		
4. FERS Increase	773		
5. Increase to Working Capital Fund	33		
6. CARES Act FTE			4.0
Total Adjustments to Base	**3,838**	**584.0**	**9.0**
Other Adjustments			
1. Reduction of 3 FTE for CARES Act			-3.0
Other Adjustments			
Total Other Adjustments	**0**	**0**	**-3.0**
New or Expanded Programs			
1. 5 new positions(3 FTE) to support air traffic coordination with airports and Puerto Rico field office	425	5.0	2.5
2. Funding for System of Airports Reporting (SOAR) Upgrades	3,500		
Total Discretionary Increases	**3,925**	**5**	**3**
FY 2022 Request	**127,165**	**589.0**	**588.5**

Detailed Justification for Airport Technology Research

FY 2022 Airport Technology Research Budget Request ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	3,805	4,047	4,342
Program Costs	35,419	36,619	36,619
Total	**$ 39,224**	**$ 40,666**	**$ 40,961**
FTE	**24**	**25**	**26**

What is this program and what does this funding level support?

For FY 2022, the President's Budget requests $40.9 million to fund the Airport Technology Research (ATR) program. This is required to support the execution and management of a program that has 20 research program areas and more than 125 on-going complex projects. Overall, this research program focuses on continually improving safety at airports in various ways that support strong economic growth. There are a number of research projects related to climate and resilience. For instance, in FY 2022 research will continue in the appropriate use of solar technology and in the safe applications of LED lighting at airports. On the infrastructure side, research is ongoing on the use of more environmentally friendly pavement materials that can perform under extreme weather conditions.

The ATR program activities will continue to support research in airport planning and design, runway incursion reduction, 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 materials, wet runway aircraft braking tests, airport pavement long-term performance, UAS integration at airports, and development of infrastructure standards for electric vertical take-off vehicles (eVTOL).

The program will also include funding for the innovative Airport Pavement Technology Program to perform short-term applied research in collaboration with the Concrete Pavement and Asphalt Pavement industries, as authorized by Section 744 of the 2018 FAA Authorization Act.

ATR findings are used in updating Advisory Circulars, manuals, and technical specifications that airports heavily rely on to maintain and expand their infrastructure in the safest and most efficient manner. This includes all engineering standards for airport construction projects as well as specific safety guidance and requirements to assure safe aircraft and airport operations on the ground. For example, current research projects will advance ARP's ability to maintain the highest safety standards in areas with rapidly evolving technologies such as visual guidance, airport surveillance systems, pavement testing and materials research, and airport geometry enhancements to name a few. All

ATR activities are conducted to support ARP's mission to ensure the safest and most efficient airports network achievable.

The success of the research is reflected in our ability to issue updated and new program guidance. For example, based on research and evaluation, in 2019 ARP issued a Certification Alert on the use of aqueous film-forming foams foam proportioning systems that have since permitted airports to test their firefighting equipment with minimal environmental impacts. Each research project is sponsored by a FAA Headquarters engineer, or other specialist, that prepares the research requirements, reviews the research plan, and approves the completed deliverable. Some research that requires large scale testing is conducted in-house using unique and one-of-kind facilities located at the FAA Technical Center, and some research is conducted with specialized research private industry partners. When appropriate, research is also conducted at selected academic institutions.

What benefits will be provided to the American Public through this request and why is this program necessary?

The ATR program provides extensive tangible and intangible benefits to the American Public in terms of safety, environmental concerns, and forward thinking technological solutions.

Safety–related ATR programs provide fact-based assessments and complex analyses of safety and operational data to help the FAA and airport operators institute and maintain standard and proven practices at all NPIAS airports. To do so, the ATR program manages a number of research databases. In FY 2022, integration and support of the databases (bird strike, foreign object debris detection, airport pavement management systems) into one location will continue. This will ensure compliance with FAA standards, improve the overall functionality of the databases, and promote public access and sharing of the data as well as enhancements to programs to advance public safety.

A key safety project with an environmental benefit is ATR's work investigating ways to reduce or eliminate chemicals that may pose either health or environmental hazards. Specifically, there has been a growing concern about the potential health and environmental impacts that perfluoroalkyl or polyfluoroalkyl substances (PFAS) may cause. PFAS can be found in a broad range of products, materials, and systems, ranging from consumer and healthcare products to building materials and many other products. This includes aqueous film-forming foams used in aircraft rescue and firefighting.

This research will continue with testing the effectiveness of new firefighting extinguishing agents that do not contain PFAS. In FY 2022, ATR will continue the multi-year research effort at ATR's new Aircraft Rescue and Fire Fighting Research Facility, which was completed in late 2019. In FY 2022, ATR will continue testing, that started in FY 2020, of numerous and selected fluorine-free foams and determine if any can provide the same (or better) levels of fire extinguishment. In addition, ATR will continue to

develop new firefighting performance requirements for the use of compressed air foam system technology in aircraft rescue and firefighting.

In FY 2022 ATR will continue the evaluation of solar lighting systems for airports. Historically there have been challenges to using photovoltaic (PV) technology to power lighting systems in airfield environments. Recent developments relating to light emitting diode (LED) lighting and solar technology have made solar powered lighting systems a practical alternative in certain airfield environments. Solar technology advancements present an opportunity for airports to produce on-site electricity and reduce long-term energy costs. In FY 2022, ATR will perform analysis of ongoing testing of prototype PV technologies at multiple airports across the United States as part of a program that will include testing at five airports in total. Each of the five airports are in areas of the country that experience different levels of 'solar irradiance' (output of light energy from the sun), temperature, and snow conditions. Researchers will analyze data from the three-year plus long effort, with the goal of developing standards and performance specifications for PV systems on airports.

In FY 2022, ATR will continue a research effort with vertical takeoff and landing aircraft/vehicle manufacturers to develop new vertiport design standards to support the unique operational characteristics of these electric vertical take-off (eVTOL) vehicles) . ATR plans to initiate testing of actual prototype vertiport designs with various eVTOL vehicles at the FAA Technical Center.

Also in FY 2022, ATR will complete analysis of field testing of visual aids to reduce wrong surface landings, including the evaluation of proposed changes to lighted runway closure markers including a new LED lighted "X". The results of this research will support revisions to existing FAA Advisory Circulars.

For FY 2022 airport safety and design research, ATR will complete the annual Runway Incursion Mitigation update to include an airfield geometry assessment of all towered airports that may have airport design features that are considered at risk for incursions. ATR will geo-reference all runway incursions that occurred in FY 2021 as well as mitigated incursion locations. Based on the addition of this data, ATR will conduct an analysis on the program's progress. ATR will enhance for public use the previously completed development of "AppMap", which is a scalable, centralized, geospatial tool that will expedite and improve FAA's planning and environmental reviews. In the area of safety data analysis, ATR will conduct an analysis of all available safety data to identify top occurrences at airports and associated causal factors for the period of FY 2017 through FY 2021.

In FY 2022, ATR will continue to research how UAS technologies can be utilized in five airport application areas: obstruction analysis, airfield pavement inspections, wildlife hazard management, perimeter security, and aircraft rescue and firefighting. ATR created five unique research and development teams that focuses on each unique application area. The teams consist of researchers and subject matter experts who work together to develop concept of operations and performance specifications for the UAS sensors and UAS

technologies, as well as develop FAA guidance documents that will be available to airport operators with a desire to conduct those types of UAS operations. In FY 2022, ATR will begin disseminating the results of this research to industry and airport operators. ATR will also continue to collaborate with industry to identify new and innovative UAS airport applications that will help improve airport safety, security, and efficiency.

In FY 2022, ATR will continue supporting the FAA Office of Security and Hazardous Materials (ASH) with the execution of the UAS Detection and Mitigation Airport Pilot Program, as required by Section 383 of the FAA Reauthorization Act of 2018. As part of this support, ATR will continue working with the Department of Homeland Security and other relevant federal departments and agencies to ensure proper coordination. This effort involves the test and evaluation of numerous UAS detection and mitigation technologies/systems at five airports in the United States, with the goal of developing performance standards for these types of technologies/systems.

In FY 2022, ATR will continue to use its full-scale accelerated pavement test facilities National Airport Pavement Test Facility (NAPTF) and National Airport Pavement and Materials Research Center (NAPMRC) to test and conduct research on advancing pavement design and developing specifications for new sustainable pavement material technologies, which will provide longer life to the airport pavements. In FY 2022, ATR will use a state-of-the-art materials testing laboratory to research new longer-lasting pavement materials and research the use of emerging and innovative pavement materials, used in various fields, for airports.

Also in FY 2022, research will continue in the use of additives and nanoparticles to improve pavement materials themselves. This research will result in increased use of locally available materials (materials modified with admixtures), quantifying material properties, improved/optimized pavement thickness designs, and more durable long-life airport pavements.

Full-scale testing at NAPTF & NAPMRC, which are indoor facilities, has concentrated on load-related effects on pavement failure. However, environmental factors, coupled with traffic loads, play a significant role on pavement performance. In FY 2022 ATR will continue to collect data at various airport-instrumented sites, and will analyze performance data from across the country.

In FY 2022, ATR will continue to use testing data from NAPTF and NAPMRC along with field data to improve the FAA Airport Pavement Design Software, namely "FAARFIELD". The improvements will be focused on climatic effects on pavement behavior.

The ATR program enhances the consistency of pavement design and construction standards around the country, optimizing construction costs by enhancing competition for airport construction bids. These increases in safety and cost efficiency provide positive benefits to the American public.

Aircraft noise continues to be a principal obstacle to expanding and modernizing airport infrastructure due to community concerns about increases in aircraft operations and noise exposure. In FY 2022, the ATR program will continue to research ways to reduce community noise impacts. Data collection will continue that will help the FAA better understand the relationship of aircraft noise exposure and residential sleep disturbance. Research will also continue in support of the residential sound insulation program by investigating innovative noise level reduction testing methods to enhance testing effectiveness and efficiency. Noise abatement charting will also continue to be improved and standardized to aid pilots in effectively flying the preferred procedures to route aircraft away from noise sensitive areas. ATR projects in these areas will provide distinct benefits to the American public, on the ground and in the air, with more efficient routes, quieter communities, and enhanced capacity.

The research initiatives supported by this funding are crucial to continued maintenance and enhancement of safety for the traveling public. Communities of every size throughout the nation benefit from increased accessibility and competitive access. Environmental quality benefits both the traveling public and neighboring communities by enabling airports to be well positioned to support critical infrastructure projects and by helping airports minimize their environmental effects on surrounding areas.

ATR's research portfolio for FY 2022 has been briefed to the FAA's Research, Engineering and Development Advisory Committee's Subcommittee on Airports (REDAC). The REDAC reviews the ATR Program every six months. The Subcommittee has members from airports, aircraft manufacturers, Air Line Pilots Association, 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.

GRANTS-IN-AID FOR AIRPORTS

Airport Technology Research
($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2021 Enacted	**40,666**	**24**	**24.0**
Adjustments to Base			
1. Annualization of FY 2021 FTE	170	1	1.0
2. Annualization of FY 2021 Pay Raise	10		
3. FY 2022 Pay Raise	82		
4. FERS Increase	33		
Total Adjustments to Base	**295**	**25**	**25**
Total Discretionary Increases	**0**	**0**	**0**
FY 2022 Request	**40,961**	**25**	**25**

Detailed Justification for Airport Cooperative Research Program

FY 2022 Airport Cooperative Research Program ($000)

Program Activity	FY 2020 Actual	FY 2021 Enacted	FY 2022 Request
Salaries and Expenses	176	178	183
Program Costs	14,824	14,822	14,817
Total	**$ 15,000**	**$ 15,000**	**$ 15,000**
FTE	**2**	**2**	**2**

What is this program and what does this funding level support?

The Airport Cooperative Research Program (ACRP) is an industry driven research program managed by the Transportation Research Board (TRB) of the National Academies of Sciences, Engineering, and Medicine. It was authorized by section 712 of Vision 100 – Century of Aviation Reauthorization Act. The Secretary of Transportation maintains a Memorandum of Agreement among Department of Transportation, FAA, and National Academy of Sciences to implement the ACRP. The Secretary also appoints the 13 members of the ACRP Oversight Committee.

The ACRP's mission is to develop near-term, practical solutions to problems faced by airport operators. ACRP uses contractors, selected in a competitive process, to conduct the research which is overseen by industry experts and a designated FAA subject matter expert. The results of the research are published in the form of handbooks and best practices. To date, the vast library of publications includes areas of safety, airport management, airport financing, airport environmental quality, airport compliance, and airport planning. These publications are available to the general public on the ACRP website and for purchase in hard copy.

For FY 2022, the President's Budget requests $15 million for the program. Pay inflation will be absorbed within the requested level. Approximately 19 research topics will be funded under this request in FY 2022. ACRP is designed to address needs that are not being addressed by other federal research programs and that cannot be undertaken cost-effectively by individual airports.

What benefits will be provided to the American Public through this request and why is this program necessary?

ACRP is a national resource for the airport industry, providing valuable information, guidance, and practical tools to airport owners and operators (as well as consultants and contractors) by providing industry-driven research identified as critical or crucial by airport operators, industry, and users. This community has continually submitted over 100 topics for research each year. ACRP has engaged thousands of public and private

sector airport practitioners, academia, consultants, advocates, and students to address the airport industry's most pressing challenges.

The 13-member ACRP Oversight Committee reviews the topics selected each year. This Committee, appointed by the Secretary of Transportation, meets every six months to review progress and select additional topics to fund. This assures tax dollars are utilized in the most efficient and beneficial manner, mitigating wasteful delays, unreasonable contract terms, and unneeded proposals. The ACRP Oversight Committee selects the highest rated topics and ensures that proposed studies will not duplicate other federal research. 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'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, executive directors to mid-level managers, nonsupervisory technical and professional staff, trainees, students, and interns. These professionals represent airports, suppliers, public safety agencies, airlines, airport tenants, local and regional government authorities, industry associations, and many other stakeholders in the airport community. Each of these practitioners has different interests and responsibilities, and each is an integral part of this cooperative research effort.

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. The benefits to the American public are a more cohesive and educated cadre of airport sponsors, armed with the knowledge and tools through ACRP's efforts, to implement the AIP more consistently and compliantly, which results in a safer and more efficient National system of airports.

GRANTS-IN-AID FOR AIRPORTS

Airport Cooperative Research
($ in Thousands)

Item Title	Dollars	FTP	FTE
FY 2021 Enacted	**15,000**	**2**	**2.0**
Adjustments to Base			
1. FY 2022 Pay Raise	4		
2. FERS Increase	1		
Total Adjustments to Base	**5**	**0**	**0**
Discretionary Increases/ Decreases			
1. Discretionary decrease of offset uncontrollable adjustments	-5		
Total Discretionary Increases/Decreases	**-5**	**0**	**0**
FY 2022 Request	**15,000**	**2**	**2.0**

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AIRPORT IMPROVEMENT PROGRAM
Grants-In-Aid to Airports Planned Distribution
$000

	FY 2020 Enacted	FY 2021 Enacted	FY 2022 Request
Formula Grants			
Primary Airports	909,220	926,686	926,686 **3/**
Cargo Service Airports	110,925	110,773	110,841
Alaska	21,345	21,345	21,345
States (General Aviation)	633,855	632,986	633,375
Carryover (from Formula Grants)	718,988	640,477	715,908 **4/**
Subtotal, Formula Grants	2,394,333	2,332,268	2,408,155
Discretionary Grants			
Discretionary Set-Aside: Noise Compatibility	73,380	91,877	65,996
Discretionary Set-Aside: Reliever	1,384	1,733	1,244
Discretionary Set-Aside: Military Airport Program	8,386	10,500	7,542
C/S/S/N (Capacity/Safety/Security/Noise)	94,880	118,797	85,333
Discretionary -- AATF	31,627	39,599	28,444
Discretionary -- General Fund	398,000 **1/**	398,000 **2/**	0
Subtotal, Discretionary Grants	607,656	660,506	188,559
Small Airport Fund	565,287	570,159	570,159
Total Grants	**3,567,276**	**3,562,932**	**3,166,873**

1/ FY-2020 Funding provided by the Consolidated Appropriations Act, 2020. This act provides Supplemental Discretionary funding of $398 million to Grants-in Aid for Airports and $2 million is retained for Airport Administration.

2/ FY-2021 Funding provided by the Consolidated Appropriations Act, 2021. This act provides Supplemental Discretionary funding of $398 million to Grants-in Aid for Airports and $2 million is retained for Airport Administration.

3/ FY-2022 Primary Entitlements reflect the same forecast activity levels for FY-2021, because we do not yet have sufficient updated information to warrant any significant change.

4/ FY 2022 carryover figures are estimated based on a five-year rolling average.

The FY 2022 Budget request assumes the Passenger Facility Charge (PFC) at current maximum allowable level of $4.50 per ticket sold, under Public Law 106-181, enacted in 2000.

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Passenger Facility Charge (PFC) Approved Locations
As of December 31, 2019
(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 International	ANC	M	$3.00	10/1/2000	12/1/2026	106,043,173
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	N	$3.00	10/1/1998	2/1/2001	
Juneau	AK	Juneau International	JNU	N	$4.50	8/1/2001	7/1/2026	26,084,549
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	6/1/2018	
Ketchikan	AK	Ketchikan International	KTN	N	$4.50	4/1/2019	8/1/2028	10,587,010
Sitka	AK	Sitka Rocky Gutierrez	SIT	N	$4.50	7/1/2007	9/1/2013	
Sitka	AK	Sitka Rocky Gutierrez	SIT	N	$4.50	5/1/2018	5/1/2038	8,073,347
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	12/1/2025	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	1/1/2028	69,352,514
Mobile	AL	Mobile Downtown	BFM	N	$4.50	1/1/2020	11/1/2026	988,418
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	10/1/2017	
Mobile	AL	Mobile Regional	MOB	N	$4.50	10/1/2017	2/1/2022	18,591,922

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
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	CS	$3.00	6/1/1992	10/1/2003	
Muscle Shoals	AL	Northwest Alabama Regional	MSL	CS	$3.00	12/1/2004	4/1/2009	
Muscle Shoals	AL	Northwest Alabama Regional	MSL	CS	$4.50	4/1/2009	7/1/2027	583,538
Fayetteville/Springdale/Rogers	AR	Northwest Arkansas Regional	XNA	S	$3.00	12/1/1998	4/1/2001	
Fayetteville/Springdale/Rogers	AR	Northwest Arkansas Regional	XNA	S	$4.50	4/1/2001	9/1/2047	119,872,895
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	6/1/2022	8,605,594
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	3/1/2025	137,118,003
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	
Texarkana	AR	Texarkana Regional-Webb Field	TXK	N	$4.50	10/1/2019	9/1/2025	3,018,493
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	2/1/2026	7,563,954
Bullhead City	AZ	Laughlin/Bullhead International	IFP	N	$2.00	5/1/2008	10/1/2012	
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	

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
Flagstaff	AZ	Flagstaff Pulliam	FLG	N	$4.50	9/1/2012	8/1/2021	4,319,005
Phoenix	AZ	Phoenix-Mesa Gateway	IWA	S	$4.50	11/1/2008	4/1/2026	36,874,959
Peach Springs	AZ	Grand Canyon West	1G4	GA	$3.00	9/1/2004	9/1/2006	
Peach Springs	AZ	Grand Canyon West	1G4	GA	$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	1/1/2037	3,022,194,014
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	2/1/2027	179,290,015
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	3/1/2023	6,159,399
Arcata/Eureka	CA	California Redwood Coast-Humboldt County	ACV	N	$3.00	2/1/1993	3/1/1994	
Arcata/Eureka	CA	California Redwood Coast-Humboldt County	ACV	N	$3.00	11/1/1994	11/1/1997	
Arcata/Eureka	CA	California Redwood Coast-Humboldt County	ACV	N	$3.00	4/1/1998	6/1/2003	
Arcata/Eureka	CA	California Redwood Coast-Humboldt County	ACV	N	$4.50	6/1/2003	3/1/2005	
Arcata/Eureka	CA	California Redwood Coast-Humboldt County	ACV	N	$4.50	7/1/2005	10/1/2005	
Arcata/Eureka	CA	California Redwood Coast-Humboldt County	ACV	N	$4.50	12/1/2005	8/1/2011	
Arcata/Eureka	CA	California Redwood Coast-Humboldt County	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	2/1/2024	13,781,709
Burbank	CA	Bob Hope	BUR	M	$3.00	9/1/1994	4/1/2003	
Burbank	CA	Bob Hope	BUR	M	$4.50	4/1/2003	8/1/2017	

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
Burbank	CA	Bob Hope	BUR	M	$3.00	8/1/2017	12/1/2017	
Burbank	CA	Bob Hope	BUR	M	$4.50	12/1/2017	10/1/2021	242,991,361
Carlsbad	CA	McClellan-Palomar	CRQ	GA	$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	2/1/2025	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	5/1/2022	67,102,125
Imperial	CA	Imperial County	IPL	CS	$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	675,899
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	7/1/2043	238,353,747
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	1/1/2038	6,032,775,392
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	9/1/2019	1,017,131
Modesto	CA	Modesto City County-Harry Sham Field	MOD	GA	$3.00	8/1/1994	3/1/2005	

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
Modesto	CA	Modesto City County-Harry Sham Field	MOD	GA	$4.50	8/1/2008	12/1/2015	1,031,955
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	9/1/2024	23,547,453
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	12/1/2035	892,892,621
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	10/1/2028	333,596,343
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	10/1/2037	140,310,796
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	1/1/2024	4,559,200
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	5/1/2040	1,600,393,933
San Francisco	CA	San Francisco International	SFO	L	$4.50	10/1/2001	3/1/2029	2,111,686,690
San Jose	CA	Norman Y Mineta San Jose International	SJC	M	$3.00	9/1/1992	4/1/2001	

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San Jose	CA	Norman Y Mineta San Jose International	SJC	M	$4.50	4/1/2001	1/1/2030	1,023,860,590
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	12/1/2022	16,710,065
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	S	$3.00	1/1/1998	11/1/2003	
Santa Barbara	CA	Santa Barbara Municipal	SBA	S	$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 Schulz - Sonoma County	STS	N	$3.00	5/1/1993	4/1/2005	
Santa Rosa	CA	Charles M Schulz - Sonoma County	STS	N	$4.50	5/1/2008	4/1/2013	
Santa Rosa	CA	Charles M Schulz - Sonoma County	STS	N	$4.50	7/1/2013	4/1/2049	21,925,017
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	9/1/2025	7,293,646
Alamosa	CO	San Luis Valley Regional/Bergman Field	ALS	N	$3.00	3/1/1997	7/1/2016	
Alamosa	CO	San Luis Valley Regional/Bergman Field	ALS	N	$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	6/1/2021	18,027,332

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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	6/1/2029	114,856,431
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	6/1/2030	701,694
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	10/1/2030	3,461,934,131
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	2/1/2028	15,861,866
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	5/1/2036	22,869,216
Fort Collins/Loveland	CO	Northern Colorado Regional	FNL	CS	$3.00	10/1/1993	5/1/1999	
Fort Collins/Loveland	CO	Northern Colorado Regional	FNL	CS	$4.50	8/1/2004	12/1/2011	
Fort Collins/Loveland	CO	Northern Colorado Regional	FNL	CS	$4.50	2/1/2012	3/1/2015	1,593,522
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	10/1/2036	32,267,359
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	9/1/2039	16,063,641
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	10/1/2022	7,573,116
Pueblo	CO	Pueblo Memorial	PUB	N	$3.00	11/1/1993	12/1/2014	
Pueblo	CO	Pueblo Memorial	PUB	N	$4.50	3/1/2015	4/1/2036	1,229,111

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Steamboat Springs	CO	Steamboat Springs/Bob Adams Field	SBS	G A	$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	
Telluride	CO	Telluride Regional	TEX	CS	$4.50	2/1/2020	3/1/2030	7,547,037
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	1/1/2025	4,957,187
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	3/1/2022	
Windsor Locks	CT	Bradley International	BDL	M	$3.00	3/1/2022	3/1/2032	
Windsor Locks	CT	Bradley International	BDL	M	$4.50	3/1/2032	4/1/2035	415,649,482
Wilmington	DE	New Castle	ILG	R	$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	5/1/2030	44,248,626
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	2/1/2035	2,023,359,886
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	11/1/2039	908,293,745
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	13,645,529
Jacksonville	FL	Jacksonville International	JAX	M	$3.00	4/1/1994	5/1/2003	

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Jacksonville	FL	Jacksonville International	JAX	M	$4.50	5/1/2003	3/1/2026	363,462,178
Key West	FL	Key West International	EYW	S	$3.00	3/1/1993	8/1/1996	
Key West	FL	Key West International	EYW	S	$3.00	12/1/1997	6/1/2003	
Key West	FL	Key West International	EYW	S	$4.50	6/1/2003	7/1/2005	
Key West	FL	Key West International	EYW	S	$4.50	10/1/2005	3/1/2027	35,269,557
Marathon	FL	The Florida Keys Marathon International	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	5/1/2018	
Melbourne	FL	Melbourne International	MLB	N	$4.50	7/1/2018	4/1/2030	25,913,291
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	1/1/2046	5,030,693,530
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	10/1/2024	76,336,385
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	Pensacola International	PNS	S	$3.00	2/1/1993	12/1/2002	
Pensacola	FL	Pensacola International	PNS	S	$4.50	12/1/2002	10/1/2031	144,489,392
Punta Gorda	FL	Punta Gorda	PGD	S	$2.00	8/1/2017	1/1/2019	
Punta Gorda	FL	Punta Gorda	PGD	S	$4.50	1/1/2019	6/1/2023	12,103,198
Sarasota/Bradenton	FL	Sarasota/Bradenton International	SRQ	S	$3.00	9/1/1992	5/1/2002	

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Sarasota/Bradenton	FL	Sarasota/Bradenton International	SRQ	S	$4.50	5/1/2002	1/1/2025	83,313,937
St Petersburg-Clearwater	FL	St Pete-Clearwater International	PIE	S	$3.00	5/1/2005	11/1/2006	
St Petersburg-Clearwater	FL	St Pete-Clearwater International	PIE	S	$4.50	11/1/2006	6/1/2023	44,012,547
Tallahassee	FL	Tallahassee International	TLH	N	$3.00	2/1/1993	10/1/2002	
Tallahassee	FL	Tallahassee International	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	10/1/2037	1,687,138,071
Valparaiso/Destin-Ft Walton Beach	FL	Eglin AFB/Destin-Ft Walton Beach	VPS	S	$3.00	1/1/2001	6/1/2002	
Valparaiso/Destin-Ft Walton Beach	FL	Eglin AFB/Destin-Ft Walton Beach	VPS	S	$4.50	6/1/2002	2/1/2023	44,211,218
West Palm Beach	FL	Palm Beach International	PBI	M	$3.00	4/1/1994	7/1/2008	
West Palm Beach	FL	Palm Beach International	PBI	M	$4.50	7/1/2008	8/1/2022	311,206,576
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	
Albany	GA	Southwest Georgia Regional	ABY	N	$4.50	10/1/2017	3/1/2020	2,856,060
Athens	GA	Athens/Ben Epps	AHN	GA	$3.00	8/1/1997	1/1/2002	165,615
Atlanta	GA	Hartsfield - Jackson Atlanta International	ATL	L	$3.00	5/1/1997	4/1/2001	
Atlanta	GA	Hartsfield - Jackson Atlanta International	ATL	L	$4.50	4/1/2001	5/1/2032	6,140,626,559
Augusta	GA	Augusta Regional at Bush Field	AGS	N	$3.00	9/1/1999	7/1/2001	
Augusta	GA	Augusta Regional at Bush Field	AGS	N	$4.50	7/1/2001	12/1/2028	32,923,863
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	
Brunswick	GA	Brunswick Golden Isles	BQK	N	$4.50	4/1/2018	11/1/2026	3,068,946
Columbus	GA	Columbus	CSG	N	$3.00	12/1/1993	9/1/1995	

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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	6/1/2018	
Columbus	GA	Columbus	CSG	N	$4.50	2/1/2020	4/1/2029	5,286,485
Macon	GA	Middle Georgia Regional	MCN	N	$4.50	3/1/2002	5/1/2011	561,716
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	11/1/2028	148,358,515
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	1,906,275
Guam	GU	Guam International	GUM	S	$3.00	2/1/1993	11/1/2002	
Guam	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	7/1/2029	5,458,541
Honolulu	HI	Daniel K Inouye International	HNL	L	$3.00	10/1/2004	11/1/2008	
Honolulu	HI	Daniel K Inouye International	HNL	L	$4.50	11/1/2008	7/1/2029	609,268,277
Kahului	HI	Kahului	OGG	M	$3.00	10/1/2004	11/1/2008	
Kahului	HI	Kahului	OGG	M	$4.50	11/1/2008	7/1/2029	162,934,821
Kailua/Kona	HI	Ellison Onizuka Kona International at Keahole	KOA	S	$3.00	10/1/2004	11/1/2008	
Kailua/Kona	HI	Ellison Onizuka Kona International at Keahole	KOA	S	$4.50	11/1/2008	7/1/2029	54,788,824
Lihue	HI	Lihue	LIH	S	$3.00	10/1/2004	11/1/2008	
Lihue	HI	Lihue	LIH	S	$4.50	11/1/2008	7/1/2029	44,993,449
Burlington	IA	Southeast Iowa Regional	BRL	CS	$3.00	7/1/1997	9/1/2001	

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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
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	10/1/2037	161,663,019
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	414,736
Mason City	IA	Mason City Municipal	MCW	CS	$3.00	2/1/1996	10/1/2001	
Mason City	IA	Mason City Municipal	MCW	CS	$4.50	10/1/2001	4/1/2003	
Mason City	IA	Mason City Municipal	MCW	CS	$4.50	8/1/2003	12/1/2022	1,310,907
Sioux City	IA	Sioux Gateway/Brig Gen Bud Day Field	SUX	N	$3.00	6/1/1993	6/1/1994	
Sioux City	IA	Sioux Gateway/Brig Gen Bud Day Field	SUX	N	$3.00	2/1/1995	3/1/2002	
Sioux City	IA	Sioux Gateway/Brig Gen Bud Day Field	SUX	N	$4.50	3/1/2002	1/1/2004	
Sioux City	IA	Sioux Gateway/Brig Gen Bud Day Field	SUX	N	$4.50	11/1/2004	10/1/2044	8,385,459
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	3/1/2021	3,298,315
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	
Boise	ID	Boise Air Terminal/Gowen Field	BOI	S	$4.50	5/1/2020	10/1/2021	117,275,450
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	

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
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	4/1/2001	
Idaho Falls	ID	Idaho Falls Regional	IDA	N	$4.50	4/1/2001	1/1/2022	13,388,132
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	11/1/2018	
Lewiston	ID	Lewiston-Nez Perce County	LWS	N	$4.50	2/1/2019	4/1/2022	5,828,269
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	5/1/2023	3,764,353
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/Normal	IL	Central IL Regional Airport at Bloomington-Normal	BMI	N	$3.00	11/1/1994	4/1/2001	
Bloomington/Normal	IL	Central IL Regional Airport at Bloomington-Normal	BMI	N	$4.50	4/1/2001	11/1/2030	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	5/1/2025	10,386,451
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	5/1/2056	2,477,196,685
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	5/1/2030	732,628
Marion	IL	Veterans Airport of Southern Illinois	MWA	N	$4.50	9/1/2005	4/1/2019	
Marion	IL	Veterans Airport of Southern Illinois	MWA	N	$4.50	9/1/2019	9/1/2026	804,602

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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
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	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	N	$3.00	10/1/1994	7/1/1997	
Quincy	IL	Quincy Regional-Baldwin Field	UIN	N	$3.00	11/1/1997	6/1/2005	
Quincy	IL	Quincy Regional-Baldwin Field	UIN	N	$3.00	11/1/2005	1/1/2008	
Quincy	IL	Quincy Regional-Baldwin Field	UIN	N	$4.50	1/1/2008	12/1/2021	902,993
Chicago/Rockford	IL	Chicago/Rockford International	RFD	N	$3.00	10/1/1992	10/1/1996	
Chicago/Rockford	IL	Chicago/Rockford International	RFD	N	$3.00	5/1/1997	6/1/2007	
Chicago/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	9/1/2034	13,808,301
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	4/1/2026	13,705,101
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	9/1/2022	31,650,981
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 International	SBN	N	$3.00	11/1/1994	7/1/2011	
South Bend	IN	South Bend International	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	2/1/2026	1,336,914
Hays	KS	Hays Regional	HYS	N	$4.50	4/1/2015	5/1/2024	483,302

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
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	N	$4.50	8/1/2007	3/1/2023	823,720
Wichita	KS	Wichita Dwight D Eisenhower National	ICT	S	$3.00	12/1/1994	5/1/2005	
Wichita	KS	Wichita Dwight D Eisenhower National	ICT	S	$4.50	5/1/2005	6/1/2007	
Wichita	KS	Wichita Dwight D Eisenhower National	ICT	S	$4.50	7/1/2007	9/1/2009	
Wichita	KS	Wichita Dwight D Eisenhower National	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	4/1/2022	610,023,268
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	8/1/2042	114,892,322
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$3.00	5/1/1997	3/1/2006	
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$4.50	3/1/2006	10/1/2006	
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$3.00	10/1/2006	9/1/2008	
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$4.50	9/1/2008	10/1/2008	
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$3.00	10/1/2008	12/1/2010	

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$4.50	12/1/2010	8/1/2015	
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$3.00	8/1/2015	10/1/2016	
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$1.00	10/1/2016	10/1/2017	
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$3.00	10/1/2017	5/1/2019	
Louisville	KY	Louisville Muhammad Ali International	SDF	S	$4.50	5/1/2019	2/1/2024	147,558,198
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	2,107,439
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/Paul Fournet Field	LFT	N	$3.00	9/1/1995	9/1/1998	
Lafayette	LA	Lafayette Regional/Paul Fournet Field	LFT	N	$3.00	4/1/2001	4/1/2002	
Lafayette	LA	Lafayette Regional/Paul Fournet Field	LFT	N	$4.50	4/1/2002	1/1/2005	
Lafayette	LA	Lafayette Regional/Paul Fournet Field	LFT	N	$4.50	5/1/2005	4/1/2008	
Lafayette	LA	Lafayette Regional/Paul Fournet Field	LFT	N	$4.50	8/1/2008	12/1/2014	
Lafayette	LA	Lafayette Regional/Paul Fournet Field	LFT	N	$4.50	10/1/2017	1/1/2041	33,371,033
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	
Lake Charles	LA	Lake Charles Regional	LCH	N	$4.50	2/1/2018	12/1/2022	4,557,531
Monroe	LA	Monroe Regional	MLU	N	$4.50	4/1/2003	9/1/2007	

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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	8/1/2034	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	4/1/2021	31,389,543
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	12/1/2027	1,808,470,847
Hyannis	MA	Barnstable Municipal-Boardman/Polando Field	HYA	N	$2.00	3/1/2011	10/1/2024	2,573,600
Vineyard Haven	MA	Martha's Vineyard	MVY	N	$3.00	1/1/1998	2/1/1998	
Vineyard Haven	MA	Martha's Vineyard	MVY	N	$4.50	10/1/2017	7/1/2021	820,069
Nantucket	MA	Nantucket Memorial	ACK	N	$4.50	7/1/2014	6/1/2029	8,040,374
Worcester	MA	Worcester Regional	ORH	N	$3.00	10/1/1992	10/1/1997	
Worcester	MA	Worcester Regional	ORH	N	$3.00	9/1/1999	12/1/2011	1,782,161
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	5/1/2037	1,631,402,615
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	8/1/2007	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	9/1/2026	5,477,714
Cumberland Heights	MD	Greater Cumberland Regional	CBE	GA	$3.00	7/1/1994	7/1/1999	

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Cumberland Heights	MD	Greater Cumberland Regional	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	15,084,254
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	Presque Isle International	PQI	N	$4.50	9/1/2004	6/1/2009	
Presque Isle	ME	Presque Isle International	PQI	N	$4.50	8/1/2010	6/1/2018	
Presque Isle	ME	Presque Isle International	PQI	N	$4.50	2/1/2019	8/1/2029	1,053,437
Rockland	ME	Knox County Regional	RKD	N	$4.50	1/1/2012	8/1/2022	329,549
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	Coleman A Young Municipal	DET	GA	$3.00	1/1/2000	3/1/2004	240,053
Detroit	MI	Detroit Metropolitan Wayne County	DTW	L	$3.00	1/1/1993	10/1/2001	
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	
Escanaba	MI	Delta County	ESC	N	$4.50	6/1/2018	10/1/2020	1,076,832
Flint	MI	Bishop International	FNT	N	$3.00	9/1/1993	10/1/2001	
Flint	MI	Bishop International	FNT	N	$4.50	10/1/2001	10/1/2021	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	1/1/2026	120,165,695
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	

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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	
Hancock	MI	Houghton County Memorial	CMX	N	$4.50	11/1/2018	8/1/2024	2,006,856
Iron Mountain Kingsford	MI	Ford	IMT	N	$3.00	9/1/1995	6/1/2004	
Iron Mountain Kingsford	MI	Ford	IMT	N	$4.50	5/1/2019	3/1/2023	475,705
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	6/1/2025	385,248
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$3.00	4/1/1997	6/1/2000	
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$3.00	1/1/2001	1/1/2005	
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$4.50	1/1/2005	8/1/2006	
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$4.50	10/1/2006	4/1/2008	
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$4.50	9/1/2008	3/1/2019	
Kalamazoo	MI	Kalamazoo/Battle Creek International	AZO	N	$4.50	9/1/2019	5/1/2022	14,029,687
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 Co-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	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	
Marquette	MI	Sawyer International	SAW	N	$4.50	5/1/2019	1/1/2022	4,450,601
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	11/1/2021	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	7/1/2021	2,454,181
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	11/1/2029	16,480,946
Sault Ste. Marie	MI	Chippewa County International	CIU	N	$4.50	11/1/2005	1/1/2028	1,819,032
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	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	6/1/2026	20,527,383
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	6/1/2022	13,384,602
Grand Rapids	MN	Grand Rapids/Itasca County Airport-Gordon Newstrom Field	GPZ	GA	$3.00	12/1/1997	10/1/2001	
Grand Rapids	MN	Grand Rapids/Itasca County Airport-Gordon Newstrom Field	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	2/1/2029	1,322,734
International Falls	MN	Falls International-Einarson Field	INL	N	$3.00	12/1/1994	6/1/2002	
International Falls	MN	Falls International-Einarson Field	INL	N	$4.50	6/1/2002	6/1/2005	
International Falls	MN	Falls International-Einarson Field	INL	N	$4.50	11/1/2005	4/1/2048	3,111,127
Minneapolis	MN	Minneapolis-St Paul	MSP	L	$3.00	6/1/1992	4/1/2001	

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		International/Wold -Chamberlain						
Minneapolis	MN	Minneapolis-St Paul International/Wold -Chamberlain	MSP	L	$4.50	4/1/2001	6/1/2026	2,075,669,615
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	5/1/2025	14,191,835
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	CS	$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	1/1/2034	11,606,981
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	12/1/2022	537,867,362
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	St Louis Lambert International	STL	M	$3.00	12/1/1992	12/1/2001	
St. Louis	MO	St Louis Lambert International	STL	M	$4.50	12/1/2001	5/1/2025	
St. Louis	MO	St Louis Lambert International	STL	M	$3.00	5/1/2025	1/1/2026	
St. Louis	MO	St Louis Lambert International	STL	M	$4.50	1/1/2026	9/1/2026	1,122,324,124
Rota Island	MP	Benjamin Taisacan Manglona International	GRO	N	$4.50	1/1/2005	5/1/2021	1,934,363
Saipan Island	MP	Francisco C Ada/Saipan International	GSN	S	$4.50	1/1/2005	5/1/2021	33,063,493
Tinian Island	MP	Tinian International	TNI	N	$4.50	1/1/2005	5/1/2021	2,039,660

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Columbus/W Point/Starkville	MS	Golden Triangle Regional	GTR	N	$3.00	8/1/1992	4/1/2001	
Columbus/W Point/Starkville	MS	Golden Triangle Regional	GTR	N	$4.50	4/1/2001	10/1/2023	4,912,599
Greenville	MS	Greenville Mid-Delta	GLH	CS	$3.00	10/1/1998	2/1/2003	
Greenville	MS	Greenville Mid-Delta	GLH	CS	$3.00	4/1/2003	4/1/2005	
Greenville	MS	Greenville Mid-Delta	GLH	CS	$4.50	4/1/2005	8/1/2011	
Greenville	MS	Greenville Mid-Delta	GLH	CS	$4.50	9/1/2012	7/1/2018	
Greenville	MS	Greenville Mid-Delta	GLH	CS	$4.50	7/1/2020	7/1/2030	646,503
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	5/1/2003	
Gulfport	MS	Gulfport-Biloxi International	GPT	N	$4.50	5/1/2003	1/1/2028	66,424,061
Hattiesburg-Laurel	MS	Hattiesburg-Laurel Regional	PIB	N	$3.00	7/1/1992	6/1/2001	
Hattiesburg-Laurel	MS	Hattiesburg-Laurel Regional	PIB	N	$4.50	6/1/2001	12/1/2024	1,363,015
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	7/1/2021	60,505,466
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	2/1/2032	2,855,496
Tupelo	MS	Tupelo Regional	TUP	N	$3.00	11/1/1994	4/1/2003	
Tupelo	MS	Tupelo Regional	TUP	N	$4.50	4/1/2003	11/1/2019	1,416,175
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	10/1/2019	
Billings	MT	Billings Logan International	BIL	S	$4.50	10/1/2019	3/1/2042	61,248,003
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	1/1/2033	72,452,519
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	

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Butte	MT	Bert Mooney	BTM	N	$4.50	3/1/2010	3/1/2036	4,358,765
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	10/1/2027	12,269,525
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	9/1/2048	67,371,078
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	5/1/2038	59,763,526
West Yellowstone	MT	Yellowstone	WYS	N	$4.50	6/1/2011	5/1/2032	550,862
Asheville	NC	Asheville Regional	AVL	S	$3.00	12/1/1994	10/1/2002	
Asheville	NC	Asheville Regional	AVL	S	$4.50	10/1/2002	11/1/2006	
Asheville	NC	Asheville Regional	AVL	S	$4.50	4/1/2007	9/1/2007	
Asheville	NC	Asheville Regional	AVL	S	$4.50	10/1/2007	4/1/2024	29,552,251
Charlotte	NC	Charlotte/Douglas International	CLT	L	$3.00	11/1/2004	1/1/2046	3,163,232,548
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	3/1/2019	
Fayetteville	NC	Fayetteville Regional/Grannis Field	FAY	N	$4.50	3/1/2019	7/1/2025	10,888,149
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	4/1/2022	4,922,840
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	2/1/2012	
Jacksonville	NC	Albert J Ellis	OAJ	N	$4.50	2/1/2012	9/1/2032	16,302,907
New Bern	NC	Coastal Carolina Regional	EWN	N	$3.00	2/1/1997	11/1/2003	

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New Bern	NC	Coastal Carolina Regional	EWN	N	$4.50	11/1/2003	10/1/2025	11,200,275
Raleigh/Durham	NC	Raleigh-Durham International	RDU	M	$3.00	4/1/2003	10/1/2004	
Raleigh/Durham	NC	Raleigh-Durham International	RDU	M	$4.50	10/1/2004	9/1/2032	772,690,405
Wilmington	NC	Wilmington International	ILM	S	$3.00	2/1/1994	9/1/1996	
Wilmington	NC	Wilmington International	ILM	S	$3.00	6/1/1998	5/1/2003	
Wilmington	NC	Wilmington International	ILM	S	$4.50	5/1/2003	8/1/2028	50,197,145
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	6/1/2042	46,068,291
Dickinson	ND	Dickinson - Theodore Roosevelt Regional	DIK	N	$4.50	4/1/2014	1/1/2028	1,382,746
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	12/1/2026	38,512,966
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	8/1/2022	10,202,624
Jamestown	ND	Jamestown Regional	JMS	N	$4.50	8/1/2018	5/1/2034	830,000
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	4/1/2022	16,405,153
Williston	ND	Williston Basin International	XWA	N	$4.50	4/1/2013	12/1/2034	8,874,709
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	

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Kearney	NE	Kearney Regional	EAR	N	$4.50	10/1/2011	11/1/2037	1,749,744
Lincoln	NE	Lincoln	LNK	N	$4.50	11/1/2016	11/1/2025	5,411,638
Omaha	NE	Eppley Airfield	OMA	M	$4.50	2/1/2018	9/1/2023	43,013,145
Scottsbluff	NE	Western Nebraska Regional/William B Heilig Field	BFF	N	$3.00	3/1/2000	3/1/2003	
Scottsbluff	NE	Western Nebraska Regional/William B Heilig Field	BFF	N	$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	10/1/2023	1,186,558
Manchester	NH	Manchester	MHT	S	$3.00	1/1/1993	1/1/2008	
Manchester	NH	Manchester	MHT	S	$4.50	1/1/2008	1/1/2023	198,491,244
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	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	6/1/2025	1,892,806,803
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	11/1/2021	12,977,901
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	3/1/2023	238,123,525
Farmington	NM	Four Corners Regional	FMN	GA	$3.00	6/1/2003	5/1/2023	661,102
Roswell	NM	Roswell Air Center	ROW	N	$3.00	4/1/1999	2/1/2004	
Roswell	NM	Roswell Air Center	ROW	N	$4.50	2/1/2004	6/1/2004	
Roswell	NM	Roswell Air Center	ROW	N	$3.00	6/1/2004	6/1/2005	
Roswell	NM	Roswell Air Center	ROW	N	$4.50	6/1/2005	2/1/2008	
Roswell	NM	Roswell Air Center	ROW	N	$4.50	3/1/2008	9/1/2027	3,637,712
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	

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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	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	11/1/2021	215,863,110
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	3/1/2023	124,883,075
Binghamton	NY	Greater Binghamton/Edwi n A Link Field	BGM	N	$3.00	11/1/1993	9/1/2002	
Binghamton	NY	Greater Binghamton/Edwi n A Link Field	BGM	N	$4.50	9/1/2002	2/1/2008	
Binghamton	NY	Greater Binghamton/Edwi n A Link Field	BGM	N	$4.50	5/1/2008	11/1/2023	10,143,595
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	4/1/2026	278,650,745
Elmira/Corning	NY	Elmira/Corning Regional	ELM	N	$3.00	12/1/2004	1/1/2008	
Elmira/Corning	NY	Elmira/Corning Regional	ELM	N	$4.50	5/1/2008	8/1/2035	15,413,811
New York	NY	Long Island MacArthur	ISP	S	$3.00	12/1/1994	9/1/2005	
New York	NY	Long Island MacArthur	ISP	S	$4.50	9/1/2005	12/1/2025	97,672,628
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	7/1/2022	8,990,405
Jamestown	NY	Chautauqua County/Jamestown	JHW	GA	$3.00	6/1/1993	8/1/2002	

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Jamestown	NY	Chautauqua County/Jamestown	JHW	GA	$4.50	9/1/2004	3/1/2018	781,130
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	7/1/2025	2,590,259,697
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	7/1/2025	1,511,384,650
New York	NY	New York Stewart International	SWF	N	$3.00	11/1/1995	3/1/2002	
New York	NY	New York Stewart International	SWF	N	$4.50	3/1/2002	11/1/2005	
New York	NY	New York Stewart International	SWF	N	$4.50	5/1/2007	9/1/2007	
New York	NY	New York Stewart International	SWF	N	$4.50	7/1/2010	8/1/2026	22,250,900
Niagara Falls	NY	Niagara Falls International	IAG	N	$4.50	11/1/2017	7/1/2024	3,662,905
Ogdensburg	NY	Ogdensburg International	OGS	N	$3.00	4/1/1996	7/1/2016	
Ogdensburg	NY	Ogdensburg International	OGS	N	$4.50	7/1/2016	4/1/2022	865,512
Plattsburgh	NY	Plattsburgh International	PBG	N	$3.00	7/1/1993	3/1/2001	
Plattsburgh	NY	Plattsburgh International	PBG	N	$3.00	6/1/2001	4/1/2003	
Plattsburgh	NY	Plattsburgh International	PBG	N	$4.50	1/1/2009	12/1/2043	39,561,720
Rochester	NY	Frederick Douglass - Greater Rochester International	ROC	S	$3.00	12/1/1997	9/1/2004	
Rochester	NY	Frederick Douglass - Greater Rochester International	ROC	S	$4.50	9/1/2004	5/1/2033	159,989,895
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

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Utica	NY	Oneida County	UCA	GA	$3.00	8/1/1997	6/1/2010	119,867
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	3/1/2023	72,338,257
Akron	OH	Akron-Canton Regional	CAK	N	$3.00	9/1/1992	9/1/2002	
Akron	OH	Akron-Canton Regional	CAK	N	$4.50	9/1/2002	8/1/2035	88,874,705
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	1/1/2024	587,493,770
Columbus	OH	John Glenn Columbus International	CMH	M	$3.00	10/1/1992	4/1/2002	
Columbus	OH	John Glenn Columbus International	CMH	M	$4.50	4/1/2002	12/1/2024	435,066,193
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	2/1/2027	139,057,961
Toledo	OH	Eugene F Kranz Toledo Express	TOL	N	$3.00	9/1/1993	9/1/1996	
Toledo	OH	Eugene F Kranz Toledo Express	TOL	N	$3.00	7/1/1997	7/1/2001	
Toledo	OH	Eugene F Kranz Toledo Express	TOL	N	$4.50	7/1/2001	8/1/2023	18,846,604
Youngstown/Warren	OH	Youngstown-Warren Regional	YNG	GA	$3.00	5/1/1994	7/1/1996	
Youngstown/Warren	OH	Youngstown-Warren Regional	YNG	GA	$3.00	8/1/1997	2/1/2002	
Youngstown/Warren	OH	Youngstown-Warren Regional	YNG	GA	$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	

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Lawton	OK	Lawton-Fort Sill Regional	LAW	N	$4.50	11/1/2007	9/1/2038	8,133,616
Stillwater	OK	Stillwater Regional	SWO	N	$4.50	10/1/2020	8/1/2026	751,098
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	10/1/2035	262,452,615
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	12/1/2010	
Tulsa	OK	Tulsa International	TUL	S	$4.50	12/1/2010	4/1/2034	202,173,707
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	2/1/2024	49,276,564
Klamath Falls	OR	Crater Lake-Klamath Regional	LMT	GA	$3.00	3/1/2000	4/1/2001	
Klamath Falls	OR	Crater Lake-Klamath Regional	LMT	GA	$4.50	4/1/2001	12/1/2011	
Klamath Falls	OR	Crater Lake-Klamath Regional	LMT	GA	$4.50	4/1/2012	10/1/2023	2,132,265
Medford	OR	Rogue Valley International - Medford	MFR	S	$3.00	7/1/1993	4/1/2001	
Medford	OR	Rogue Valley International - Medford	MFR	S	$4.50	4/1/2001	8/1/2025	39,592,547
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	4/1/2038	2,900,608
Pendleton	OR	Eastern Oregon Regional at Pendleton	PDT	CS	$3.00	12/1/1995	10/1/2009	
Pendleton	OR	Eastern Oregon Regional at Pendleton	PDT	CS	$4.50	10/1/2009	5/1/2018	
Pendleton	OR	Eastern Oregon Regional at Pendleton	PDT	CS	$4.50	12/1/2018	2/1/2033	902,869
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	7/1/2036	1,200,914,626
Redmond	OR	Roberts Field	RDM	S	$3.00	10/1/1993	11/1/2001	
Redmond	OR	Roberts Field	RDM	S	$4.50	11/1/2001	12/1/2006	
Redmond	OR	Roberts Field	RDM	S	$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	

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Allentown	PA	Lehigh Valley International	ABE	N	$4.50	9/1/2003	6/1/2033	61,856,718
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	4/1/2021	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	548,588
DuBois	PA	Dubois Regional	DUJ	CS	$3.00	6/1/1995	4/1/2001	
DuBois	PA	Dubois Regional	DUJ	CS	$4.50	4/1/2001	11/1/2003	
DuBois	PA	Dubois Regional	DUJ	CS	$4.50	4/1/2004	12/1/2030	988,067
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	1,083,114
Lancaster	PA	Lancaster	LNS	CS	$3.00	2/1/1995	2/1/2009	
Lancaster	PA	Lancaster	LNS	CS	$4.50	7/1/2013	6/1/2024	695,464
Latrobe	PA	Arnold Palmer Regional	LBE	N	$3.00	3/1/1996	8/1/2012	
Latrobe	PA	Arnold Palmer Regional	LBE	N	$4.50	8/1/2012	2/1/2022	6,515,818
Philadelphia	PA	Philadelphia International	PHL	L	$3.00	9/1/1992	4/1/2001	

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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	6/1/2023	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	1/1/2034	565,792,196
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	10/1/2036	19,765,587
Wilkes-Barre/Scranton	PA	Wilkes-Barre/Scranton International	AVP	N	$3.00	12/1/1993	6/1/1997	
Wilkes-Barre/Scranton	PA	Wilkes-Barre/Scranton International	AVP	N	$3.00	12/1/1997	5/1/2001	
Wilkes-Barre/Scranton	PA	Wilkes-Barre/Scranton International	AVP	N	$4.50	5/1/2001	8/1/2025	25,986,567
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	
Aguadilla	PR	Rafael Hernandez	BQN	N	$4.50	10/1/2020	12/1/2021	5,402,507
Ponce	PR	Mercedita	PSE	N	$3.00	3/1/1993	9/1/1998	
Ponce	PR	Mercedita	PSE	N	$4.50	9/1/2020	9/1/2024	2,476,641
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	1/1/2030	292,278,967
Charleston	SC	Charleston AFB/International	CHS	M	$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	6/1/2020	1,777,480

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Greer	SC	Greenville Spartanburg International	GSP	S	$4.50	5/1/2020	7/1/2023	16,505,571
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	4/1/2022	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	11/1/2029	132,029,369
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	10/1/2023	2,282,913
Pierre	SD	Pierre Regional	PIR	N	$4.50	2/1/2003	7/1/2009	
Pierre	SD	Pierre Regional	PIR	N	$4.50	9/1/2009	4/1/2042	2,070,789
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	6/1/2033	34,628,990
Sioux Falls	SD	Joe Foss Field	FSD	S	$4.50	1/1/2017	4/1/2025	17,612,920
Watertown	SD	Watertown Regional	ATY	N	$4.50	10/1/2019	4/1/2031	688,896
Bristol/Johnson/ Kingsport	TN	Tri-Cities	TRI	N	$3.00	2/1/1997	7/1/2007	
Bristol/Johnson/ Kingsport	TN	Tri-Cities	TRI	N	$4.50	7/1/2007	10/1/2023	18,839,520
Chattanooga	TN	Lovell Field	CHA	S	$3.00	7/1/1994	4/1/2001	
Chattanooga	TN	Lovell Field	CHA	S	$4.50	4/1/2001	11/1/2004	
Chattanooga	TN	Lovell Field	CHA	S	$3.00	11/1/2004	2/1/2005	
Chattanooga	TN	Lovell Field	CHA	S	$4.50	2/1/2005	10/1/2022	35,073,749
Jackson	TN	McKellar-Sipes Regional	MKL	CS	$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	S	$3.00	8/1/1992	1/1/1997	
Memphis	TN	Memphis International	MEM	S	$4.50	9/1/2018	5/1/2029	152,778,627
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	

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Nashville	TN	Nashville International	BNA	M	$4.50	5/1/2015	3/1/2036	943,703,242
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	1/1/2009	8/1/2023	19,200,000
Austin	TX	Austin-Bergstrom International	AUS	M	$2.00	11/1/1993	2/1/1994	
Austin	TX	Austin-Bergstrom International	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	11/1/2034	831,089,379
Beaumont/Port Arthur	TX	Jack Brooks Regional	BPT	N	$3.00	9/1/1994	3/1/2002	
Beaumont/Port Arthur	TX	Jack Brooks Regional	BPT	N	$4.50	3/1/2002	3/1/2029	4,901,113
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	1/1/2048	16,015,956
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	12/1/2028	8,067,085
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	4/1/2027	507,477,926
Dallas-Fort Worth	TX	Dallas-Fort Worth International	DFW	L	$3.00	5/1/1994	6/1/1996	
Dallas-Fort Worth	TX	Dallas-Fort Worth International	DFW	L	$3.00	2/1/1997	7/1/2002	
Dallas-Fort Worth	TX	Dallas-Fort Worth International	DFW	L	$4.50	7/1/2002	10/1/2038	5,655,256,130
Del Rio	TX	Del Rio International	DRT	N	$4.50	2/1/2010	6/1/2022	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	12/1/2024	147,935,120
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	

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Harlingen	TX	Valley International	HRL	N	$4.50	8/1/2009	11/1/2024	31,083,290
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	4/1/2039	2,809,691,307
Fort Hood/Killeen	TX	Robert Gray AAF	GRK	N	$3.00	1/1/1993	11/1/1994	
Fort Hood/Killeen	TX	Robert Gray AAF	GRK	N	$3.00	4/1/1995	5/1/2001	
Fort Hood/Killeen	TX	Robert Gray AAF	GRK	N	$4.50	5/1/2001	8/1/2003	
Fort Hood/Killeen	TX	Robert Gray AAF	GRK	N	$4.50	12/1/2003	1/1/2006	
Fort Hood/Killeen	TX	Robert Gray AAF	GRK	N	$4.50	6/1/2006	5/1/2024	13,952,776
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	12/1/2032	71,845,049
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	8/1/2025	34,100,716
Midland	TX	Midland International Air And Space Port	MAF	S	$3.00	1/1/1993	9/1/2004	
Midland	TX	Midland International Air And Space Port	MAF	S	$4.50	9/1/2004	1/1/2014	
Midland	TX	Midland International Air And Space Port	MAF	S	$3.00	1/1/2014	11/1/2014	

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Midland	TX	Midland International Air And Space Port	MAF	S	$4.50	11/1/2014	12/1/2024	62,300,477
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	1/1/2030	8,489,950
San Antonio	TX	San Antonio International	SAT	M	$3.00	11/1/2001	10/1/2007	
San Antonio	TX	San Antonio International	SAT	M	$4.50	10/1/2007	8/1/2032	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	CS	$3.00	12/1/1994	8/1/1998	
Victoria	TX	Victoria Regional	VCT	CS	$3.00	1/1/1999	1/1/2002	
Victoria	TX	Victoria Regional	VCT	CS	$4.50	1/1/2002	8/1/2016	828,792
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	1/1/2023	6,373,838
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	8/1/2043	1,883,165
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	4/1/2037	2,139,961,896
St. George	UT	St George Regional	SGU	N	$3.00	5/1/1998	9/1/2002	
St. George	UT	St George Regional	SGU	N	$4.50	6/1/2003	1/1/2048	11,693,919
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	7/1/2034	1,678,944,298
Dulles	VA	Washington Dulles International	IAD	L	$3.00	1/1/1994	5/1/2001	
Dulles	VA	Washington Dulles International	IAD	L	$4.50	5/1/2001	12/1/2038	2,442,302,508
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$2.00	9/1/1992	10/1/1993	

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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	1/1/2010	
Charlottesville	VA	Charlottesville-Albemarle	CHO	N	$4.50	8/1/2010	9/1/2021	21,881,327
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	5/1/2031	12,351,209
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	1/1/2023	150,029,994
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	3/1/2031	224,133,065
Roanoke	VA	Roanoke-Blacksburg Regional/Woodrum Field	ROA	N	$3.00	9/1/1998	12/1/2001	
Roanoke	VA	Roanoke-Blacksburg Regional/Woodrum Field	ROA	N	$4.50	12/1/2001	6/1/2021	27,451,220
Staunton/Waynesboro/Harrisonburg	VA	Shenandoah Valley Regional	SHD	N	$3.00	12/1/2001	12/1/2006	
Staunton/Waynesboro/Harrisonburg	VA	Shenandoah Valley Regional	SHD	N	$4.50	6/1/2007	10/1/2025	1,039,952
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	
Charlotte Amalie	VI	Cyril E King	STT	S	$4.50	4/1/2012	3/1/2021	43,297,862
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	

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
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	4/1/2023	56,354,764
Bellingham	WA	Bellingham International	BLI	N	$3.00	7/1/1993	8/1/1998	
Bellingham	WA	Bellingham International	BLI	N	$3.00	3/1/1999	7/1/2002	
Bellingham	WA	Bellingham International	BLI	N	$4.50	7/1/2002	7/1/2010	
Bellingham	WA	Bellingham International	BLI	N	$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	
Friday Harbor	WA	Friday Harbor	FHR	N	$4.50	4/1/2018	6/1/2029	1,060,107
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	6/1/2038	55,309,026
Port Angeles	WA	William R Fairchild International	CLM	GA	$3.00	8/1/1993	5/1/1995	
Port Angeles	WA	William R Fairchild International	CLM	GA	$3.00	9/1/1996	10/1/2011	
Port Angeles	WA	William R Fairchild International	CLM	GA	$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	9/1/2013	
Pullman	WA	Pullman/Moscow Regional	PUW	N	$4.50	11/1/2013	3/1/2067	11,133,088
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	1/1/2043	3,841,864,375
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	9/1/2021	164,224,198
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	11/1/2024	3,745,775
Wenatchee	WA	Pangborn Memorial	EAT	N	$3.00	8/1/1993	10/1/1995	

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
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	4/1/2023	5,099,700
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	4/1/2011	
Yakima	WA	Yakima Air Terminal/McAllister Field	YKM	N	$4.50	4/1/2011	9/1/2021	6,341,181
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	8/1/2036	41,406,402
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	
Green Bay	WI	Green Bay-Austin Straubel International	GRB	N	$4.50	3/1/2002	12/1/2028	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	6/1/2026	383,421,695
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	10/1/2025	15,547,303

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
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	3/1/2022	2,750,883
Beckley	WV	Raleigh County Memorial	BKW	GA	$4.50	8/1/2017	8/1/2039	285,965
Charleston	WV	Yeager	CRW	N	$3.00	8/1/1993	11/1/2001	
Charleston	WV	Yeager	CRW	N	$4.50	11/1/2001	12/1/2050	43,402,395
Clarksburg	WV	North Central West Virginia	CKB	N	$3.00	4/1/1994	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	7/1/2021	6,972,999
Lewisburg	WV	Greenbrier Valley	LWB	N	$4.50	4/1/2011	1/1/2025	1,104,958
Morgantown	WV	Morgantown Municipal-Walter L Bill Hart Field	MGW	CS	$2.00	12/1/1992	1/1/1994	
Morgantown	WV	Morgantown Municipal-Walter L Bill Hart Field	MGW	CS	$2.00	12/1/1994	1/1/2002	
Morgantown	WV	Morgantown Municipal-Walter L Bill Hart Field	MGW	CS	$4.50	1/1/2002	3/1/2008	
Morgantown	WV	Morgantown Municipal-Walter L Bill Hart Field	MGW	CS	$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	3/1/2012	
Casper	WY	Casper/Natrona County International	CPR	N	$3.00	3/1/2012	10/1/2019	
Casper	WY	Casper/Natrona County International	CPR	N	$4.50	10/1/2019	7/1/2031	10,100,378

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	N	$3.00	11/1/1993	4/1/2001	
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	N	$4.50	4/1/2001	9/1/2012	
Cheyenne	WY	Cheyenne Regional/Jerry Olson Field	CYS	N	$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	4/1/2005	
Cody	WY	Yellowstone Regional	COD	N	$4.50	9/1/2005	6/1/2018	
Cody	WY	Yellowstone Regional	COD	N	$4.50	7/1/2018	2/1/2020	
Cody	WY	Yellowstone Regional	COD	N	$4.50	12/1/2020	1/1/2023	2,669,852
Everett	WA	Snohomish County (Paine Field)	PAE	N	$4.50	11/1/2020	2/1/2024	7,434,100
Gillette	WY	Northeast Wyoming Regional	GCC	N	$3.00	9/1/1993	12/1/2001	
Gillette	WY	Northeast Wyoming Regional	GCC	N	$4.50	12/1/2001	6/1/2004	
Gillette	WY	Northeast Wyoming Regional	GCC	N	$4.50	1/1/2005	1/1/2023	2,516,993
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	39,383,556
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	847,142
Riverton	WY	Central Wyoming Regional	RIW	CS	$3.00	5/1/1995	4/1/2001	
Riverton	WY	Central Wyoming Regional	RIW	CS	$4.50	4/1/2001	11/1/2036	1,180,133
Rock Springs	WY	Southwest Wyoming Regional	RKS	N	$3.00	4/1/1995	4/1/2006	
Rock Springs	WY	Southwest Wyoming Regional	RKS	N	$4.50	4/1/2006	11/1/2023	2,009,268
Sheridan	WY	Sheridan County	SHR	N	$3.00	3/1/1996	12/1/2001	
Sheridan	WY	Sheridan County	SHR	N	$4.50	12/1/2001	9/1/2008	
Sheridan	WY	Sheridan County	SHR	N	$4.50	10/1/2008	8/1/2035	1,388,712

Associated City	State	Airport Name	LOC ID	Hub size	Level	Start Date	Expiration Date	Total PFC Approved
Worland	WY	Worland Municipal	WRL	GA	$4.50	1/1/2003	3/1/2008	
Worland	WY	Worland Municipal	WRL	GA	$4.50	8/1/2008	7/1/2022	265,060
								$115,362,898,201

unique locations approved 404

NOTES: Total PFC approved includes all the collections at the location

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Letter of Intent (LOI) Commitments by Fiscal Year

State	City	Airport Name	Discretionary 2021	Entitlement 2021	Discretionary 2022	Entitlement 2022
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	20,000,000	0	10,000,000	0
IL	Chicago	Chicago O'Hare International	25,000,000	0	30,000,000	0
OH	Cleveland	Cleveland-Hopkins International	0	2,074,885	0	400,248
TX	Dallas-Fort Worth	Dallas-Fort Worth International	15,000,000	9,000,000	25,000,000	9,000,000
		Total	60,000,000	11,074,885	65,000,000	9,400,248

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2023	Entitlement 2023	Discretionary 2024	Entitlement 2024
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	0	0	0	0
IL	Chicago	Chicago O'Hare International	30,000,000	0	30,000,000	0
OH	Cleveland	Cleveland-Hopkins International	0	0	0	0
TX	Dallas-Fort Worth	Dallas-Fort Worth International	25,000,000	9,000,000.00	25,000,000	9,000,000
		Total	55,000,000	9,000,000	55,000,000	9,000,000

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2025	Entitlement 2025	Discretionary 2026	Entitlement 2026
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	0	0	0	0
IL	Chicago	Chicago O'Hare International	30,000,000	0	20,000,000	0
OH	Cleveland	Cleveland-Hopkins International	0	0	0	0
TX	Dallas-Fort Worth	Dallas-Fort Worth International	0	0	0	0
		Total	30,000,000	0	20,000,000	0

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2027	Entitlement 2027	Discretionary 2028	Entitlement 2028
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	0	0	0	0
IL	Chicago	Chicago O'Hare International	0	0	0	0
OH	Cleveland	Cleveland-Hopkins International	0	0	0	0
TX	Dallas-Fort Worth	Dallas-Fort Worth International	0	0	0	0
		Total	0	0	0	0

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary 2029	Entitlement 2029	Discretionary Beyond	Entitlement Beyond
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	0	0	0	0
IL	Chicago	Chicago O'Hare International	0	0	0	0
OH	Cleveland	Cleveland-Hopkins International	0	0	0	0
TX	Dallas-Fort Worth	Dallas-Fort Worth International	0	0	0	0
		Total	0	0	0	0

Letter of Intent (LOI) Commitments by Fiscal Year (Cont'd)

State	City	Airport Name	Discretionary Totals	Entitlement Totals
FL	Fort Lauderdale	Fort Lauderdale/Hollywood International	30,000,000	0
IL	Chicago	Chicago O'Hare International	165,000,000	0
OH	Cleveland	Cleveland-Hopkins International	0	2,475,133
TX	Dallas-Fort Worth	Dallas-Fort Worth International	90,000,000	36,000,000
		Total	285,000,000	38,475,133

3E. Other Information

EMERGENCY FAA EMPLOYEE FUND

Program and Financing
(in millions of dollars)

Identification code: 069-2816-0-1-402		FY2020 Actual	FY 2021 Estimate	FY 2022 Request
	Obligations by program activity:			
0001	Emergency FAA Employee Fund	……	9	……
0900	Total new obligations, unexpired accounts (object class 12.1)	……	9	……
	Budgetary resources:			
	Budget Authority:			
	Appropriations, mandatory:			
1200	Appropriation	……	9	……
1930	Total budgetary resources available	……	9	……
	Change in obligated balance:			
	Unpaid obligations:			
3010	New Obligations, unexpired accounts	……	9	……
3020	Outlays (gross)	……	-9	……
	Budget authority and outlays, net:			
	Mandatory:			
4090	Budget authority, gross	……	9	……
	Outlay, gross:			
4100	Outlays from new mandatory authority	……	9	……
4180	Budget authority, new (total)	……	9	……
4190	Outlays, net (total)	……	9	……

The American Rescue Plan Act of 2021 (P.L. 117–2) established the Emergency FAA Employee Leave Fund and appropriated $9 million, which shall be deposited into the Fund and remain available through September 30, 2022. The Fund is for the use of paid leave for FAA employees who are unable to work due to reasons related to the COVID-19 pandemic.

RELIEF FOR AIRPORTS

Program and Financing
(in millions of dollars)

Identification code: 069-2815-0-1-402		FY2020 Actual	FY 2021 Estimate	FY 2022 Request
	Obligations by program activity:			
0001	Direct Program Activity	……	8,000	……
0900	Total new obligations, unexpired accounts (object class 41.0)	……	8,000	……
	Budgetary resources:			
	Budget Authority:			
	Appropriations, mandatory:			
1200	Appropriation	……	8,000	……
1930	Total budgetary resources available	……	8,000	……
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct 1	……	……	5,520
3010	New Obligations, unexpired accounts	……	8,000	……
3020	Outlays (gross)	……	-2,480	-4,400
3050	Unpaid obligations, end of year	……	5,520	1,120
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	……	……	5,520
3200	Obligated balance, end of year	……	5,520	1,120
	Budget authority and outlays, net:			
	Mandatory:			
4090	Budget authority, gross	……	8,000	……
	Outlay, gross:			
4100	Outlays from new mandatory authority	……	2,480	……
4101	Outlays from mandatory balances	……	……	4,400
4110	Outlays, gross (total)	……	2,480	4,400
4180	Budget authority, new (total)	……	8,000	……
4190	Outlays, net (total)	……	2,480	4,400

The American Rescue Plan Act of 2021 (P.L. 117–2) appropriated $8 billion, to remain available until September 30, 2024, for assistance to sponsors of airports, to be made available to prevent, prepare for, and respond to coronavirus.

PAYMENT TO GRANTS-IN-AID FOR AIRPORTS

Program and Financing
(in millions of dollars)

Identification code: 069-2813-0-1-402		FY2020 Actual	FY 2021 Estimate	FY 2022 Request
	Obligations by program activity:			
0001	Direct Program Activity	10,400	2,400	……
0900	Total new obligations, unexpired accounts (object class 94.0)	10,400	2,400	……
	Budgetary resources:			
	Budget Authority:			
	Appropriations, discretionary:			
1100	Appropriation	10,400	2,400	……
1930	Total budgetary resources available	10,400	2,400	……
	Change in obligated balance:			
	Unpaid obligations:			
3010	New Obligations, unexpired accounts	10,400	2,400	……
3020	Outlays (gross)	-10,400	-2,400	……
	Budget authority and outlays, net:			
	Discretionary:			
4000	Budget authority, gross	10,400	2,400	……
	Outlay, gross:			
4010	Outlays from new discretionary authority	10,400	2,400	……
4180	Budget authority, net (total)	10,400	2,400	……
4190	Outlays, net (total)	10,400	2,400	……

The regular appropriations acts for 2020 and 2021 each provided $400 million of supplemental funding for Grants-in-Aid for Airports. Funds are appropriated from the General Fund of the U.S. Treasury. Discretionary grants are being awarded to qualified airports, with up to 0.5 percent of the funds provided applied to the administrative costs of awarding grants under the program. In addition, the CARES Act provided $10 billion in 2020 and the Coronavirus Response and Relief Supplemental Appropriations Act of 2021 provided $2 billion, both from the General Fund of the U.S. Treasury, to help airports prevent, prepare for, and respond to coronavirus.

PAYMENT TO THE AIRPORT AND AIRWAY TRUST FUND

Program and Financing
(in millions of dollars)

Identification code: 069-0250-0-1-402		FY2020 Actual	FY 2021 Estimate	FY 2022 Request
	Obligations by program activity:			
0001	Direct Program Activity	……	14,000	……
0900	Total new obligations, unexpired accounts (object class 94.0)	……	14,000	……
	Budgetary resources:			
	Budget Authority:			
	Appropriations, mandatory:			
1200	Appropriation	……	14,000	……
1930	Total budgetary resources available	……	14,000	……
	Change in obligated balance:			
	Unpaid obligations:			
3010	New Obligations, unexpired accounts	……	14,000	……
3020	Outlays (gross)	……	-14,000	……
	Budget authority and outlays, net:			
	Mandatory:			
4090	Budget authority, gross	……	14,000	……
	Outlay, gross:			
4100	Outlays from new mandatory authority	……	14,000	……
4180	Budget authority, new (total)	……	14,000	……
4190	Outlays, net (total)	……	14,000	……

AVIATION USER FEES

Special and Trust Fund Receipts
(in millions of dollars)

Identification code: 69-5422-0-2-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
0100	Balance, start of year……	13	7	8
0198	Reconciliation Adjustment ……..	1	……	……
0199	Balance, start of year ……	14	7	8
	Receipts:			
	Current Law:			
1110	Aviation User Fees, Overflight Fees …….	109	81	118
1130	Property Disposal or Lease Proceeds, Aviation User Fee ……..	1	……	……
1199	Total Current Law Receipts ……	110	81	118
1999	Total Receipts ….……	110	81	118
2000	Total: Balances and Receipts ……..……	124	88	126
	Appropriations:			
	Current Law:			
2101	Essential Air Service and Rural Airport Improvement Fund ….……	-10	-4	-5
2101	Aviation User Fee ……..	-114	-81	-118
2132	Essential Air Service and Rural Airport Improvement Fund …….	7	5	7
2199	Total current law appropriations ……	-117	-80	-116
2999	Total appropriations ……...……	-117	-80	-116
5099	Balance, end of year ……..……	7	8	10

Program and Financing
(in millions of dollars)

Identification code: 69-5422-0-2-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Obligations by program activity:			
0001	Land Proceeds …….…….	1	……	……
0100	Direct program activities, subtotal ……..….	1	……	……
0900	Total new obligations, unexpired accounts……	1	……	……
	Budgetary resources:			
	Unobligated balance:			
1000	Unobligated balance brought forward, Oct 1…	21	22	22
1201	Appropriations (special or trust fund)……	114	81	118
1220	Appropriations Transferred to other accounts [069-5423] …….	-112	-81	-118

1260	Appropriations, mandatory (total)……	2	……	……
1900	Budget authority (total)……..	2	……	……
1930	Total budgetary resources available …..……	23	22	22
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year……	22	22	22
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid Obligations, brought forward, Oct 1 …….	2	1	1
3010	New Obligations, unexpired accounts ……...	1	……	……
3020	Outlays (gross) ……	-2	……	……
3050	Unpaid Obligations, end of the year ……	1	1	1
	Memorandum (non-add) entries:			
3100	Obligated balance, start of the year ……	2	1	1
3200	Obligated balance, end of the year …..……	1	1	1
	Budget authority and outlays, net:			
	Mandatory:			
4090	Budget authority, gross ……	2	……	……
	Outlays, gross:			
4101	Outlays from mandatory balances …..……	2	……	……
4180	Budget authority, net (total) ……	2	……	……
4190	Outlays, net (total) ……	2	……	……

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 $118 million in overflight fees will be collected in 2022.

AVIATION INSURANCE REVOLVING FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4120-0-3-402		FY2020 Actual	FY 2021 Estimate	FY 2022 Request
	Obligations by program activity:			
0801	Program administration	1	1	1
0802	Insurance Claims	2	2	2
0900	Total new obligations, unexpired accounts	3	3	3
	Budget resources:			
	Unobligated balance:			
1000	Unobligated balance brought forward, Oct. 1	2,271	2,300	2,332
	Budget authority:			
	Spending authority form offsetting collections, mandatory:			
1800	Collected	32	35	12
1930	Total budgetary resources available	2,303	2,335	2,344
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	2,300	2,332	2,341
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct. 1	1	2	3
3010	New Obligations, unexpired accounts	3	3	3
3020	Outlays (gross)	-2	-2	-2
3050	Unpaid obligations, end of year	2	3	4
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	1	2	3
3200	Obligated balance, end of year	2	3	4
	Budget authority and outlays net:			
	Mandatory:			
4090	Budget authority, gross	32	35	12
	Outlay, gross:			
4100	Outlays from new mandatory authority	2	2	2
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4120	Federal Sources	-1	-2	-2
4121	Interest on Federal securities	-31	-33	-10
4130	Offsets against gross budget authority and outlays (total)	-32	-35	-12
4170	Outlays, net (mandatory)	-30	-33	-10
4190	Outlays, net (total)	-30	-33	-10

	Memorandum (non-add) entries:			
5000	Total investments, SOY: Federal securities: Par value	2,293	2,302	2,337
5001	Total investments, EOY: Federal securities: Par value	2,302	2,337	2,348

The fund provides direct support for the aviation insurance program (chapter 443 of title 49, U.S. Code). In December 2014, Congress sunset part of the aviation insurance program. Specifically, Congress returned U.S. air carriers to the commercial aviation market for all of their war risk insurance coverage by ending the FAA's authority to provide war risk insurance for a premium. Pursuant to 49 USC 44305, the FAA may provide insurance without premium at the request of the Secretary of Defense, or the head of a department, agency, or instrumentality designated by the President when the Secretary of Defense or the designated agency head agrees to indemnify the Secretary of Transportation against all losses covered by the insurance. The "non-premium" aviation insurance program is authorized through September 30, 2023 in the National Defense Authorizations Act for 2020.

Object Classification
(in millions of dollars)

Identification code: 69-4120-0-3-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Reimbursable obligations:			
25.2	Other services from non-Federal sources.....	1	1	1
42.0	Projected insurance claims and indemnities ……	2	2	2
99.9	Total new obligations, unexpired accounts ……	3	3	3

Employment Summary

Identification code: 69-4120-0-3-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Request
2001	Reimbursable Civilian full-time equivalent employment	2	4	4

ADMINISTRATIVE SERVICES FRANCHISE FUND

Program and Financing
(in millions of dollars)

Identification code: 69-4562-0-4-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Obligations by program activity:			
0801	Accounting Services	40	51	50
0804	Information Services	116	157	143
0806	Multi Media	7	3	3
0807	FLLI (formerly CMEL/Training)	7	9	9
0808	International Training	2	2	2
0810	Logistics	301	274	292
0811	Aircraft Maintenance	55	53	57
0812	Acquisition	5	5	5
0900	Total new obligations, unexpired accounts	533	554	561
	Budgetary Resources:			
	Unobligated balance:			
1000	Unobligated balance brought forward, Oct 1	246	230	274
1021	Recoveries of prior year unpaid obligations	27	36	36
1050	Unobligated balance (total)	273	266	310
	Budget authority:			
	Spending authority from offsetting collections, discretionary:			
1700	Collected	490	562	573
1930	Total budgetary resources available	763	828	883
	Memorandum (non-add) entries:			
1941	Unexpired unobligated balance, end of year	230	274	322
	Change in obligated balances:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct 1	162	170	123
3010	New obligations, unexpired accounts	533	554	561
3020	Outlays (gross)	-498	-565	-648
3040	Recoveries of prior year unpaid obligations unexpired	-27	-36	-36
3050	Unpaid obligations, end of year	170	123	0
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	162	170	123
3200	Obligated balance, end of year	170	123	0
	Budget authority and Outlays, net:			
	Discretionary:			
4000	Budget authority, gross	490	562	573
	Outlays gross:			
4010	Outlays from new discretionary authority	395	382	390

4011	Outlays from discretionary balances	103	183	258
4020	Outlays, gross (total)	498	565	648
	Offsets against gross budget authority and outlays:			
	Offsetting collections (collected) from:			
4030	Federal sources	-490	-560	-571
4033	Non-Federal sources	0	-2	-2
4040	Offsets against gross budget authority and outlays (total) ….	-490	-562	-573
4080	Outlays, net (discretionary)	8	3	75
4190	Outlays, net (total)	8	3	75

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 as follows: 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 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Reimbursable obligations:			
11.1	Personnel compensation: Full-time permanent	121	134	132
11.3	Other than full-time permanent……	1	1	1
11.5	Other personnel compensation……	5	5	5
12.1	Civilian personnel benefits	48	49	52
21.0	Travel and transportation of persons	3	5	8
22.0	Transportation of things	7	6	6
23.3	Communications, utilities, and miscellaneous charges	12	13	14
25.1	Advisory and assistance services……..	68	72	71
25.2	Other services from non-Federal sources	70	75	73
25.3	Other goods and services from Federal sources…..	16	20	17
25.4	Operation and maintenance of facilities……..	5	8	5
25.7	Operation and maintenance of equipment……	57	60	59
26.0	Supplies and materials	94	97	108
31.0	Equipment	5	5	6
42.0	Insurance claims and indemnities	21	4	4
99.9	Total new obligations, unexpired accounts	533	554	561

Employment Summary

Identification code: 69-4562-0-4-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
2001	Reimbursable civilian full-time equivalent employment	1,401	1,437	1,472

AIRPORT AND AIRWAY TRUST FUND

Program and Financing
(in millions of dollars)

Identification code: 69-8103-0-7-402		FY 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Memorandum (non-add) entries:			
5000	Total investments, start of year: Federal securities: Par value	15,018	7,900	13,635
5001	Total investments, end of year: Federal securities: Par value	7,900	13,635	12,983

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 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Unexpended balance, start of year:			
0100	Balance, start of year	17,916	8,971	15,305
0298	Adjustments	-1,402		
0999	Total balance, start of year	16,514	8,971	15,305
	Cash Income during the year:			
	Current law:			
	Receipts			
1110	Excise Taxes, Airport and Airway Trust Fund	9,016	9,348	15,293
1130	Grants-in-aid for Airports (Airport and Airway Trust Fund)	0	2	2
1130	Facilities and Equipment (Airport and Airway and Airport Trust Fund)	55	61	50
1130	Research, Engineering and Development (Airport and Airway Trust Fund)	2	0	0
1150	Interest, Airport and Airway Trust Fund	387	191	230
1160	General Fund Payment, Airport and Airways Trust Fund	0	14,000	0

1160	Facilities and Equipment (Airport and Airway Trust Fund)….....	44	40	39
1160	Research, Engineering and Development (Airport and Airway Trust Fund) ……	14	9	9
1199	Income under present law …….	9,518	23,651	15,623
1999	Total cash income ……..	9,518	23,651	15,623
	Cash outgo during year:			
	Current law:			
2100	Payments to Air Carriers (021-04-8304-0)	-176	-105	-206
2100	Trust Fund Share of FAA Activities (Airport and Airway Trust Fund) (021-12-8104-0) ……	-10,363	-10,557	-9,170
2100	Grants-in-aid for Airports (Airport and Airway Trust Fund) (021-12-8106-0)	-6,897	-9,775	-5,886
2100	Facilities and Equipment (Airport and Airway Trust Fund) (021-12-8107-0)	-2,907	-2,802	-3,269
2100	Research, Engineering and Development (Airport and Airway Trust Fund) (021-12-8108-0).....	-169	-236	-295
2198	Adjustments……...	3,450	6,158	2,352
2199	Outgo under current law (-).....	-17,062	-17,317	-16,474
2999	Total Cash outgo (-)	-17,062	-17,317	-16,474
	Surplus or Deficit:			
3110	Excluding interest …….	-7,931	6,143	-1,081
3120	Interest …….	387	191	230
3199	Subtotal, surplus or deficit ……...	-7,544	6,334	-851
3298	Rounding adjustment.....	1		
3299	Total adjustments	1		
3999	Total change in fund balance……..	-7,543	6,334	-851
	Unexpended balance, end of year:			
4100	Un-invested balance (net), end of year.....	1,071	1,670	1,471
4200	Airport and Airway Trust Fund.....	7,900	13,635	12,983
4999	Total balance, end of year	8,971	15,305	14,454

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 2020 Actual	FY 2021 Estimate	FY 2022 Estimate
	Obligations by program activity:			
0001	Payment to Operations	10,519	10,519	8,434
0900	Total new obligations, unexpired accounts (object class 94.0)	10,519	10,519	8,434
	Budgetary resources:			
	Appropriations, discretionary:			
	Budge authority:			
1101	Appropriations (special or trust)	10,519	10,519	8,434
1930	Total budgetary resources available	10,519	10,519	8,434
	Change in obligated balance:			
	Unpaid obligations:			
3000	Unpaid obligations, brought forward, Oct 1	618	774	736
3010	New obligations, unexpired accounts	10,519	10,519	8,434
3020	Outlays (gross)	-10,363	-10,557	-9,170
3050	Unpaid obligations, end of year	774	736	……
	Memorandum (non-add) entries:			
3100	Obligated balance, start of year	618	774	736
3200	Obligated balance, end of year	774	736	……
	Budget authority and outlays, net:			
	Discretionary:			
4000	Budget authority, gross	10,519	10,519	8,434
	Outlays, gross:			
4010	Outlays from new discretionary authority	9,750	10,519	8,434
4011	Outlays from discretionary balances	613	38	736
4020	Outlays, gross (total)	10,363	10,557	9,170
4180	Budget authority, net (total)	10,519	10,519	8,434
4190	Outlays, net (total)	10,363	10,557	9,170

The 2022 Budget proposes $11.434 billion for Federal Aviation Administration Operations, of which $8.434 billion would be provided from the Airport and Airway Trust Fund.

FAA ADMINISTRATIVE PROVISIONS - REQUESTED

Sec. 111. The Administrator of the Federal Aviation Administration may reimburse amounts made available to satisfy section 41742(a)(1) of title 49, United States Code, from fees credited under section 45303 of title 49, United States Code, and any amount remaining in such account at the close of any fiscal year may be made available to satisfy section 41742(a)(1) of title 49, United States Code, 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 2022.

Sec. 112. 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. 113. None of the funds made available by 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 2022 in order to minimize potential payroll liability.

Sec. 114. None of the funds in this Act may be obligated or expended for an employee of the Federal Aviation Administration to purchase a store gift card or gift certificate through use of a Government-issued credit card.

- This provision prohibits FAA employees from using a government-issued credit card to purchase a store gift card or gift certificate. FAA recommends retaining this provision as a GP that would apply to all FAA accounts.

Sec. 116. 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 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 2022 budget requests additional budget flexibility. While the FAA has long benefited from the ability to seek congressional approval to reprogram limited amounts within budget accounts, there has traditionally been no flexibility at the account level. This new authority 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.

Sec. 117. The Federal Aviation Administration Administrative Services Franchise Fund may be reimbursed after performance or paid in advance from funds available to the Federal Aviation Administration and other Federal agencies for which the Fund performs services.

- The 1997 Department of Transportation and Related Agencies Appropriations Act (P.L. 104-205) created the FAA's Administrative Services Franchise Fund and outlined its basic rules for operation. One of the provisions in that law stipulated that the Fund "…shall be paid in advance from funds available to the FAA and other Federal agencies for which such centralized services are performed…" This requirement for advances without exception creates inefficiencies in operations as service providers spend resources to ensure timely advances on approximately 1,500 active agreements annually, regardless of amount. While this original language requires strict compliance for collection of funds in advance of performance services, the requested provision provides flexibility in the collection of advances. The flexibility allowed by this provision will not change the requirement for service providers to ensure timely advances, but will allow service providers to prioritize efforts and gain efficiencies. Through financial oversight and the use of operating reserve, the FAA Franchise Fund maintains sufficient funds available to continue operations. The flexibility of the payment timing allowed under this provision does not jeopardize operations or solvency of the Fund. This flexibility is also in accordance with how similar funds in other Federal agencies (such as the Department of Interior, authorized in P.L. 108-7) are allowed to operate.

Section 4. Research
Development & Technology

EXHIBIT IV-1
RESEARCH, DEVELOPMENT & TECHNOLOGY
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
BUDGET AUTHORITY
(In Thousands of dollars)

Department of Transportation
FY 2022 Budget
Federal Aviation Administration
Research, Development, & Technology Budget Narrative
(Budget Authority in Thousands)

Budget Account	FY 2020 Actual	FY 2021 Enacted	FY 2022 President's Budget	Applied	Tech Transfer	Facilities	Experimental Development	Major Equipment, R&D Equipment
Research, Engineering & Development	**192,665**	**198,000**	**258,500**	**258,500**				
Fire Research and Safety	7,200	7,136	7,576	7,576				
Propulsion and Fuel Systems	2,100	4,215	3,121	3,121				
Advanced Materials /Structural Safety	14,720	14,720	1,678	1,678				
Aircraft Icing	9,000	6,426	2,472	2,472				
Digital System Safety	-	-	3,689	3,689				
Continued Air Worthiness	10,269	11,269	8,829	8,829				
Aircraft Catastrophic Failure Prevention Research	1,565	1,565	-	-				
Flight deck/Maintenance/System Integration Human Factors	7,300	7,469	14,301	14,301				
System Safety Management/Terminal Area Safety	4,500	5,485	7,898	7,898				
Air Traffic Control/Technical Operations Human Factors	5,800	5,685	5,911	5,911				
Aeromedical Research	7,919	10,235	13,257	13,257				
Weather Program	12,911	6,236	13,786	13,786				
Unmanned Aircraft Systems Research	24,035	24,035	22,077	22,077				
Alternative Fuels for General Aviation	1,900	2,524	4,986	4,986				
Innovation & Emerging Technologies	-	-	8,500	8,500				
Commercial Space Transportation Safety	2,500	5,840	5,708	5,708				
Wake Turbulence	5,000	3,698	3,728	3,728				
NextGen - Air Ground Integration Human Factors	5,300	6,000	3,000	3,000				
NextGen - Weather Technology in the Cockpit	3,144	1,982	3,028	3,028				
NextGen - Flight Data Exchange	1,005	1,000	1,000	1,000				
Information/Cyber Security	2,675	4,769	4,769	4,769				
Environment & Energy	18,013	20,303	20,336	20,336				
NextGen – Environmental Research – Aircraft Technologies and Fuels	29,174	31,465	33,476	33,476				
Airliner Cabin Environment Research	1,000	-	-	-				
System Planning and Resource Management	12,135	13,022	4,141	4,141				
Aviation Workforce Development - Section 625	-	-	5,752	5,752				
William J. Hughes Technical Center Laboratory Facilities	3,500	2,921	5,481	5,481				
Aviation Climate Research	-	-	50,000	50,000				
Facilities & Equipment	**275,100**	**214,600**	**216,500**			**32,900**	**183,600**	
Advanced Technology Development and Prototyping	40,900	26,600	29,000				29,000	
Plant	35,000	26,900	32,900			32,900		
NextGen Research & Development	142,200	104,100	97,600				97,600	
Center for Advanced Aviation System Development (CAASD)	57,000	57,000	57,000				57,000	
Grants-In-Aid for Airports	**54,224**	**55,666**	**55,961**	**55,961**				
Airport Technology Research	39,224	40,666	40,961	40,961				
Airport Cooperative Research	15,000	15,000	15,000	15,000				
Administrative - Ops	**11,738**	**10,293**	**16,423**				**16,423**	
Total	**533,727**	**478,559**	**547,384**	**314,461**	**-**	**32,900**	**200,023**	**-**

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Section 5.
Information Technology

INFORMATION TECHNOLOGY
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
BUDGET AUTHORITY

($000)

Budget Account	FY 2020 Actual	FY 2021 Enacted	FY 2022 President's Budget
Operations	**$1,418,228**	**$1,497,074**	**$1,580,793**
Commodity IT SS WCF	*$9,173*	*$9,325*	*$9,407*
Modal IT	*$1,409,055*	*$1,487,749*	*$1,571,386*
Facilities & Equipment (F&E)	**$1,669,322**	**$1,517,272**	**$1,586,319**
Commodity IT SS WCF	*$0*	*$0*	*$0*
Modal IT	*$1,669,322*	*$1,517,272*	*$1,586,319*
Total	**$3,087,550**	**$3,014,346**	**$3,167,112**

The Federal Aviation Administration requests $3.2 billion in FY 2022 for information technologies (IT) that support the full spectrum of FAA programs as well as the Department's initiative to transform and consolidate the management of certain IT solutions centrally by the Office of the Chief Information Officer (OCIO).

Commodity IT Shared Services (SS) through the Working Capital Fund

OCIO will continue to provide all modes Commodity IT Shared Services in FY 2022 to achieve economies of scale and increase consistency of cybersecurity protections across the Department. Commodity IT Shared Services include IT functions and activities dedicated to basic support services, including network operations, end-user computing, telecommunications services, and server operations.

- The budget requests **$9.4 million** in the Operations account for Commodity IT Shared Services. FAA's share was based on actual commodity IT consumption in prior years as well as planned future consumption. OCIO, in collaboration with FAA, assumed a one-to-one cost estimate to transition all commodity IT to OCIO. FAA will only be charged for services rendered.

Modal IT

The following major mission-critical IT systems will be maintained by FAA in FY 2022. This list is only a subset of all IT systems that support FAA and are reported in the Office of Management and Budget's Corporate Investment Management System.

- **Automatic Dependent Surveillance – Broadcast (ADS-B) National Airspace System (NAS) Wide Implementation –** The budget requests **$157.6 million** in the Facilities and Equipment (F&E) account to support the sustainment of ADS-B services. ADS-B reduces delays and enhances safety by using an aircraft's broadcasted position instead of position information from traditional radar. It benefits the American public by providing more efficient use of airspace capacity, fewer flight delays, and more optimal routing for aircraft.

- **En Route Automation Modernization (ERAM) System Enhancements and Technology Refresh -** The budget requests **$104.5 million** in the F&E account to replace equipment that is approaching the end-of-life and hardware being discontinued by the manufacturer, which will sustain the safety critical Air Traffic operations as well as lower system life cycle cost. The ERAM System is the main tool used by air traffic controllers to separate aircraft in the En Route sector and it improves the efficiency and effectiveness of En Route section operations.

- **Data Communications (Data Comm) in Support of NextGen** – The budget requests **$110.3 million** in the F&E account for the payment of network services to support the existing Data Comm infrastructure. Data Comm improves air traffic controller efficiency and 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.

- **Wide Area Wide Area Augmentation System (WAAS) for Global Positioning System (GPS) –** The budget requests **$97.6 million** in the F&E account for the continuation of correction calculations 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. Aircraft receivers apply corrections and from the WAAS satellite network, to obtain a precise three dimensional navigation position. The WAAS program directly supports NAS modernization by replacing ground based navigation aids with satellite navigation technology and reduces the impact of constrained aircraft navigation due to the location of ground-based Navigation Aids. WAAS allows aircraft the flexibility of point-to-point flight operations.

- **Terminal and En Route Voice Switch and Recorder Portfolio –** The budget requests **$57.5 million** in the F&E account for the implementation of voice switches and recorders that support FAA's air traffic control system. Direct voice communication between the air traffic controllers and pilots is critical to safe operations throughout the NAS. The programs in this portfolio ensure existing and future voice communication systems continue to provide safe and reliable voice communication services. This portfolio will enable the FAA to transition to internet protocol based voice communication services.

Information Technology System Support – The budget requests **$2.66 billion** for maintenance of nearly 324 Federal Information Security Management Act reportable systems, which include 64 mission critical systems. Funding will also be used to migrate and modernize legacy systems to provide risk management, security, and common information management capabilities and services across the FAA; to include the airspace, navigation facilities and airports of the United States along with their associated information, services, rules, regulations, policies, procedures, personnel and equipment.

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Section 6. Ten-Year Table

FEDERAL AVIATION ADMINISTRATION

OPERATIONS

ESTIMATES	APPROPRIATIONS
2012.....[1]9,823,000,000	2012 .....[2]9,653,395,000
2013.....[3]9,517,948,000	2013 .....[4]9,653,395,000
	2013 Sequester (P.L.112-240) ..... [5]-485,623,489
	2013 Rescission (P.L. 113-6)..... [6]-19,307,790
2014.....[7]9,707,000,000	2014 .....[8]9,651,422,000
2015.....[9]9,750,000,000	2015 ..... [10]9,740,700,000
2016.....[11]9,915,000,000	2016 ..... [12]9,909,724,000
2017.....[13]9,994,352,000	2017 ..... [14]10,025,852,000
2018.....[15]9,890,886,000	2018 ..... [16]10,211,754,000
	2018 Supplemental (P.L. 115-123)... [17]35,000,000
2019.....[18]9,931,312,000	2019 ..... [19]10,410,758,000
2020.....[20]10,340,000,000	2020……[21]10,630,000,000
2021.....[22]11,001,500,000	2021…….[23]11,001,500,000
2022.....[24]11,434,100,000	

[1] Includes $4,958,000,000 from the Airport and Airway Trust Fund.
[2] Includes $5,060,694,000 from the Airport and Airway Trust Fund.
[3] Includes $6,721,000,000 from the Airport and Airway Trust Fund.
[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] Includes $6,484,000,000 from the Airport and Airway Trust Fund.
[8] Includes $6,495,208,000 from the Airport and Airway Trust Fund.
[9] Includes $9,040,850,000 from the Airport and Airway Trust Fund.
[10] Includes $8,595,000,000 from the Airport and Airway Trust Fund.
[11] Includes $8,547,000,000 from the Airport and Airway Trust Fund.
[12] Includes $7,922,000,000 from the Airport and Airway Trust Fund.
[13] Includes $7,608,000,000 from the Airport and Airway Trust Fund.
[14] Includes $9,173,000,000 from the Airport and Airway Trust Fund.
[15] Includes $8,100,000,000 from the Airport and Airway Trust Fund.
[16] Includes $8,886,000,000 from the Airport and Airway Trust Fund.
[17] Supplemental funding from the Further Additional Supplemental Appropriations for Disaster Relief Requirements Act, 2018 (P.L. 115-123)
[18]Includes $8,632,721,000 from the Airport and Airway Trust Fund.
[19]Includes $9,833,400,000 from the Airport and Airway Trust Fund.
[20] Includes $9,364,085,000 from the Airport and Airway Trust Fund.
[21] Includes $10,519,000,000 from the Airport and Airway Trust Fund.
[22] Includes $11,001,500,000 from the Airport and Airway Trust Fund.
[23] Includes $10,519,000,000 from the Airport and Airway Trust Fund.
[24] Includes $8,434,000,000 from the Airport and Airway Trust Fund.

FEDERAL AVIATION ADMINISTRATION

FACILITIES AND EQUIPMENT (AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
2012	[1]3,120,000,000	2012	2,730,731,074
2013	2,850,000,000	2013	[2]2,730,731,074
		2013 Supplemental (P.L. 113-2)	[3]30,000,000
		2013 Sequester (P.L.11-240)	[4]-141,642,505
		2013 Rescission (P.L. 113-6)	[5]-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	2018	3,250,000,000
		2018 Supplemental (P.L. 115-123)	[6]79,600,000
2019	2,766,572,000	2019	3,000,000,000
2020	3,295,000,000	2020	3,045,000,000
2021	3,000,000,000	2021	3,015,000,000
2022	3,410,000,000		

[1] Includes $250,000,000 of mandatory General Fund from the Administration's Infrastructure proposal.
[2] Reflects funding at the FY 2012 funding level pursuant to P.L. 113-6, Consolidated and Further Continuing Appropriations Act, 2013.
[3] Hurricane Sandy Emergency Supplemental, P.L. 113-2
[4] 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.
[5] Reflects a 0.20 percent across-the-board rescission per P.L. 113-6.
[6] Supplemental funding from the Further Additional Supplemental Appropriations for Disaster Relief Requirements Act, 2018 (P.L. 115-123)

FEDERAL AVIATION ADMINISTRATION

RESEARCH, ENGINEERING, AND DEVELOPMENT (AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES	APPROPRIATIONS
2012 190,000,000	2012 167,556,000
2013 180,000,000	2013 ..... [1]167,556,000
	2013 Sequester (P.L.112-240) ..... [2]-8,429,072
	2013 Rescission (P.L. 113-6)..... [3] -335,112
2014 166,000,000	2014 158,792,000
	2014 Rescission ..... [4]-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	2018 188,926,000
2019 74,406,000	2019 191,100,000
2020 120,000,000	2020……..……..192,665,000
2021 170,000,000	2021……..…198,000,000
2022 258,500,000	

[1] Reflects funding at the FY 2012 funding level pursuant to P.L. 113-6, Consolidated and Further Continuing Appropriations Act, 2013.
[2] 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).
[3] Reflects a 0.20 percent across-the-board rescission per P.L. 113-6.
[4] 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	
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	2018	3,350,000,000
		2018 Supplemental	[1]1,000,000,000
2019	3,000,000,000	2019	3,350,000,000
		2019 Supplemental	[2]500,000,000
2020	3,000,000,000	2020	3,350,000,000
		2020 Supplemental	[3]400,000,000
		CARES Act	[4]10,000,000,000
2021	3,350,000,000	2021	3,350,000,000
		2021 Supplemental	[5]400,000,000
		CRRSA Act	[6]2,000,000,000
2022	3,350,000,000		

[1] FY 2018 Consolidated Appropriations Act (P.L. 115-141) from the General Fund.
[2] FY 2019 Consolidated Appropriations Act (P.L. 116-6) from the General Fund.
[3] FY 2020 Consolidated Appropriations Act (P.L. 116-94) from the General Fund.
[4] CARES Act (P.L. 116-136) from the General Fund.
[5] FY 2021 Consolidated Appropriations Act (P.L. 116-260) from the General Fund.
[6] Coronavirus Response and Relief Supplemental Appropriations Act (P.L. 116-260) from the General Fund.

FEDERAL AVIATION ADMINISTRATION

GRANTS-IN-AID FOR AIRPORTS
LIMITATION ON OBLIGATIONS
(AIRPORT AND AIRWAY TRUST FUND)

ESTIMATES		APPROPRIATIONS	
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)	2018	(3,350,000,000)
2019	(3,350,000,000)	2019	(3,350,000,000)
2020	(3,350,000,000)	2020	(3,350,000,000)
2021	(3,350,000,000)	2021	(3,350,000,000)
2022	(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.

FEDERAL AVIATION ADMINISTRATION

RELIEF FOR AIRPORTS

ESTIMATES		APPROPRIATIONS	
2021	0	2021	[1]8,000,000,000
2022	0		

[1] American Rescue Plan (P.L. 117-2) from the General Fund.

FEDERAL AVIATION ADMINISTRATION

FAA EMPLOYEE LEAVE FUND

ESTIMATES		APPROPRIATIONS	
2021	0	2021	[1]9,000,000
2022	0		

[1] American Rescue Plan (P.L. 117-2) from the General Fund.

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Section 7.
Capital Investment Plan

Federal Aviation Administration
Abbreviated National Airspace System Capital Investment Plan
Fiscal Years 2022–2026

Background

The Further Consolidated Appropriations Act, 2020 became Public Law 116-94 on December 20, 2019 and provided the appropriation amounts and other direction for the Federal Aviation Administration within DIVISION H — TRANSPORTATION, HOUSING AND URBAN DEVELOPMENT, AND RELATED AGENCIES APPROPRIATIONS ACT, 2020 under Title I—Department of Transportation. For FAA's Facilities and Equipment (F&E) appropriation, the following direction was provided regarding the Five-Year Capital Investment Plan for the National Airspace System:

Provided further, That no later than 60 days after the submission of the 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 2021 through 2025, 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.

To comply with the Congressional direction above, this Abbreviated National Airspace System (NAS) Capital Investment Plan (CIP) for Fiscal Years (FY) 2022-2026 has been included within the FAA's FY 2022 President's Budget.

Highlights

The Abbreviated five-year NAS CIP fulfills the Secretary's commitment; complies with the language in the Further Consolidated Appropriations Act, 2020; and, addresses the following topics:

- Important Factors Affecting Planning for the Future and Key Considerations in Capital Planning
- Next Generation Air Transportation System (NextGen), NAS Modernization, and Sustaining Systems and Infrastructure
- Five-year F&E funding table by budget line item for FY 2022 through FY 2026
- Information for Major Capital Programs

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 the most recent available study on *The Economic Impact of Civil Aviation*

on the U.S. Economy[1], economic activity attributed to civil aviation-related goods and services during 2016 totaled $1.8 trillion, generated 11 million jobs, and $488 billion in earnings. In total, U.S. aviation contributed 5.2 percent to the U.S. Gross Domestic Product. Other aviation related economic activity highlighted in the January 2020 report included:

- Air carriers operating in U.S. airspace transported 946.4 million passengers with over 1,377.1 billion revenue passenger miles
- U.S. airports accommodated more than 66.8 billion revenue ton-miles of freight in support of commercial activities
- Commercial airline operations enabled $357.8 billion of visitor expenditures on goods and services
- Civil aircraft manufacturing, a top U.S. net exporter, had a positive trade balance of $70.9 billion

Key Considerations in Capital Planning

The development of the CIP requires significant time to plan, define, and prioritize expected program outcomes for review and approval by decision makers. Maintaining a balanced portfolio of FAA's capital investments is critical to the long-term sustainment and modernization of the NAS to meet projected demand, deliver new services and capabilities, and improve system safety and efficiency. Program offices and sponsors must develop business cases to justify the need for programs, define the technical approach and requirements, develop lifecycle cost and schedule estimates, and identify interdependencies among programs.

In accordance with FAA's Acquisition Management System, proposed capital investments are presented to the Joint Resources Council for review and approval to initiate these programs. Once approved, programs enter the investment analysis process, are added to the Enterprise Architecture and the CIP, and are included in the President's Budget to request funds from Congress. Once funds are appropriated, program offices must then manage risk during program execution to deliver planned outcomes on schedule and on budget. In addition, new systems or capabilities must demonstrate compliance with all applicable FAA reliability and safety standards before receiving final approval to operate in the NAS.

Addressing real-time changes in air traffic demand and anticipated future growth may require increases in NAS safety, capacity, efficiency, reliability, and system flexibility. Other variables affecting capital planning include periodic changes in economic conditions, scheduled expansion projects at major airports, and ongoing sustainment needs for mission critical Air Traffic Control (ATC) systems, facilities, and other NAS infrastructure. By statute, each year of the CIP estimates must balance to the most recent F&E funding target for that year, as issued to FAA by

[1] Source: Federal Aviation Administration, "The Economic Impact of Civil Aviation on the U.S. Economy," January 2020 (https://www.faa.gov/about/plans_reports/media/2020_jan_economic_impact_report.pdf).

the Office of Management and Budget. In the CIP development process, the FAA allocates funding to capital programs to support the implementation of operational changes for NextGen, programs sustaining and modernizing current NAS systems and infrastructure, and mission support. This approach to planning ensures that current NAS performance and safety standards are maintained or improved.

NextGen, NAS Modernization, and Sustaining Systems and Infrastructure

The air traffic control infrastructure is a complex system made up of several thousand components that control air traffic approaching, landing, and departing from airports. ATC infrastructure includes 21 Air Route Traffic Control Centers housing the automation equipment used by air traffic controllers to control en route air traffic, over 500 Air Traffic Control Towers, and over 150 Terminal Radar Approach Control facilities. This daily flow of air traffic is dependent upon several hundred surveillance and weather radars, navigation systems for en route and airport approach guidance, and thousands of radios that allow pilots and air traffic controllers to stay in contact during all phases of an aircraft's flight.

The air traffic control system requires automation, communication, navigation, surveillance, and weather systems to maintain safe separation of aircraft operating in controlled airspace and on the airport surface. Each of these systems has a high degree of redundancy to support system reliability and availability to minimize the risk of service disruptions. Before these systems reach the end of their service lives, planning for their replacement must be well underway to reduce the risk of performance degradation or outages in the event that replacement parts become obsolete or are otherwise difficult to obtain.

NextGen is implementing operational improvements to ensure the NAS is prepared to meet future capacity, safety, and environmental requirements and is supported by many capital programs. Operationalizing NextGen will provide greater access and flexibility for users to choose route options that best meet their needs. By combining new technologies for surveillance, navigation, weather, and communications with automation system enhancements, workforce training, procedural changes, and airfield development, NextGen is fundamentally changing the way air traffic is managed.

Key investments, identified by budget line item numbers (BLI), include:

- **En Route Automation** – The En Route Automation Modernization (ERAM) Enhancements include improvements to trajectory modeling, increased conflict detection and resolution capabilities to support separation management, and expanding the automated coordination of flight data and aircraft control with the Canadian Air Navigation Service Provider (BLI 2A01)

- **System Wide Information Management (SWIM)** – SWIM Segment 2B completes the implementation of the SWIM Terminal Data Distribution System (STDDS) that provides access to terminal-related data. STDDS implements track and flight plan data, real-time status/alerts from tower and airport systems, and other system enhancements in standard formats utilizing the SWIM infrastructure (BLI 2A09)

- **Automatic Dependent Surveillance – Broadcast (ADS-B) NAS Wide Implementation (ADS-B)** – The program will sustain baseline services and applications, including continuing leased ADS-B services, and implement mitigations for spectrum congestion (BLI 2A10)

- **Air Traffic Management Implementation Portfolio** – Traffic Flow Management System (TFMS) Enhancement 4 will implement Improved Demand Prediction, which is a set of enhancements aimed at improving the TFMS demand predictions of NAS resources. The program will also implement Integrated Departure Route Planning (IDRP), which is a tool that provides strategic/tactical forecasts of departure route and fix status due to convective weather and traffic volume for specific terminals. IDRP also provides traffic managers with a semi-automated resolution algorithm to "solve" departure constraints (BLI 2A12)

- **Time Based Flow Management (TBFM)** – TBFM Enhancement 1 will implement Terminal Sequencing and Spacing to provide efficient sequencing and runway assignment by making the metering plan visible to terminal Air Traffic Control and extending time-based metering to the runway (BLI 2A13)

- **NextGen Weather Processor (NWP)** – NWP will establish a common weather processing platform which use sophisticated algorithms to create high-quality, aviation-specific current, and predicted weather information (BLI 2A14);

- **Data Communications in support of NextGen** – Data Comm provides data link communications services between the controller and pilot. Data Comm Initial En Route Services includes transfer of communication/initial check-in, airborne reroutes, altimeter settings and altitudes, initial controller initiated reroutes, initial speeds, initial direct-to-fix messages, and initial crossing restrictions. Data Comm Full En Route Services includes full controller initiated reroutes, full crossing restrictions, full direct-to-fix, full speeds, advisory messages, and holding instructions (BLI 2A16)

- **Commercial Space Integration** – The Space Data Integrator program will deploy an operational prototype, known as the Minimal Viable Product (MVP), to ingest real-time space vehicle information from Launch/Reentry Operators and display it for operational use. The MVP will move the FAA from manual to automatic data exchange to produce hazard areas for the Office of Commercial Space Transportation. (BLI 2A19)

- **Terminal Automation** – Older Standard Terminal Automation Replacement Systems have reached their end-of-life and key components must be replaced to maintain the operation of the systems (BLI 2B01)

- **Terminal Flight Data Manager (TFDM)** – This program will automate manual flight data processes to enable enhanced data sharing between the Tower, En Route, Approach Control, Traffic Flow Management, and Flight/Airline Operations Centers. TFDM will

implement Electronic Flight Data exchange and Electronic Flight Strips in the tower to replace printed flight strips. The program will also implement enhanced traffic flow management data integration with Time Based Flow Management and Traffic Flow Management System to enable airlines, controllers, and airports to share and exchange real-time data (BLI 2B07)

- **Unmanned Aircraft Systems (UAS)** – The FAA DroneZone is a cloud-based Information Technology platform which hosts several Beta applications that provide the supporting infrastructure to improve the user experience of public interactions, and increase the efficiency of internal business processes required for the operation of sUAS. Under the Small UAS Implementation program, the Low Altitude Authorization and Notification Capability supports collaboration between the FAA and private UAS Service Suppliers to automate the FAA's ability to grant authorizations to Title 14 CFR Part 107 operators, and allows Recreational Flyers to obtain authorization to fly in controlled airspace (BLI 2B09)

- **Terminal and En Route Surveillance Portfolio** – Sustainment of en route and terminal radars will require upgrade or replacement of older unsupportable components and systems (BLI 2B11)

- **Terminal and En Route Voice Switch and Recorder Portfolio** – The Terminal Voice Switch Sustainment 2 program replaces and sustains obsolete voice switches in Tower and Terminal Radar Approach Control facilities. The Voice Switching and Control System Sustainment 4 program will design and install replacement components to ensure continued operation of aging en route voice switching equipment. The NAS Voice Recorder program will replace the aging digital voice recorders and provide improved digital voice recording functionality to meet new validated safety and audit requirements (BLI 2B12)

- **Navigation/Landing** – The Wide Area Augmentation System program will design and develop enhancements to support the implementation of Dual Frequency Operations and continue to develop Localizer Performance with Vertical guidance/Localizer Performance approach procedures for all remaining qualified runways. Aging Instrument Landing Systems, Navaids, and visual Navaids will be replaced if systems become unsupportable due to parts obsolescence (BLI 2D02 and 2D04)

- **Aeronautical Information Management (AIM) Programs** – AIM provides digital aeronautical information to NAS users. Future AIM Enhancements will incorporate additional types of aeronautical information in a digital format for machine-to-machine exchange with NAS automation systems (BLI 4A09)

The FAA's FY 2022-2026 CIP provides a balanced portfolio of capital programs for the modernization and sustainment of systems and critical NAS infrastructure, integration of UAS operations into the NAS, and the operationalization of NextGen.

Estimated Funding by Budget Line Item (dollars in Millions)

The following table (displayed on multiple pages) shows funding by BLI with dollars in millions for the capital programs in the FY 2022 to FY 2026 time frame. The FY 2022 funding amounts in this table are consistent with this budget submission. The FY 2022 through FY 2026 total year funds are constrained to the F&E targets issued by the Office of Management and Budget.

FY22 BLI Number	Capital Budget Line Item (BLI) Program	FY 2022 Budget	FY 2023 Est.	FY 2024 Est.	FY 2025 Est.	FY 2026 Est.
	Activity 1: Engineering, Development, Test and Evaluation	**$159.50**	**$171.20**	**$165.06**	**$168.63**	**$184.42**
1A01	Advanced Technology Development and Prototyping (ATDP)	$29.00	$39.80	$36.56	$41.23	$36.52
1A02	William J. Hughes Technical Center Laboratory Sustainment	$16.90	$16.90	$16.90	$16.90	$16.90
1A03	William J. Hughes Technical Center Infrastructure Sustainment	$16.00	$10.00	$10.00	$10.00	$10.00
1A04	NextGen - Separation Management Portfolio	$23.50	$26.50	$21.70	$21.00	$24.00
1A05	NextGen - Traffic Flow Management (TFM) Portfolio	$13.00	$10.00	$10.00	$11.00	$14.00
1A06	NextGen - On Demand NAS Portfolio	$9.00	$8.50	$9.50	$10.50	$15.00
1A07	NextGen - NAS Infrastructure Portfolio	$10.50	$14.50	$14.40	$14.50	$17.00
1A07	NextGen - Support Portfolio	$7.00	$8.00	$8.00	$8.00	$8.00
1A09	NextGen - Unmanned Aircraft Systems (UAS)	$24.00	$26.00	$27.00	$24.00	$31.00
1A10	NextGen - Enterprise, Concept Development, Human Factors, and Demonstrations Portfolio	$10.60	$11.00	$11.00	$11.50	$12.00
	Activity 2: Procurement and Modernization of the Air Traffic Control Facilities and Equipment	**$2,231.87**	**$2,296.80**	**$2,364.11**	**$2,439.54**	**$2,501.09**
	A. En Route Programs	**$730.43**	**$746.65**	**$696.33**	**$683.37**	**$628.70**
2A01	NextGen - En Route Automation Modernization (ERAM) - System Enhancemetns and Technology Refresh	$104.45	$108.15	$70.01	$75.11	$65.94
2A02	Next Generation Weather Radar (NEXRAD)	$3.90	$4.50	$7.50	$6.60	$6.00
2A03	Air Route Traffic Control Center (ARTCC) and Combined Control Facility (CCF) Building Sustainment	$134.60	$136.60	$134.60	$142.60	$132.60
2A04	Air/Ground Communications Infrastructure	$7.82	$7.85	$6.85	$6.85	$6.85
2A05	Air Traffic Control En Route Radar Facilities Improvements	$15.91	$7.60	$7.60	$7.60	$7.60
2A06	Oceanic Automation System	$10.40	$24.90	$15.00	$9.24	$4.89
2A07	Next Generation Very High Frequency Air/Ground Communications System	$51.00	$53.00	$48.00	$43.20	$29.90
2A08	NextGen - System-Wide Information Management (SWIM)	$33.97	$15.30	$23.50	$15.00	$22.30
2A09	NextGen - Automatic Dependent Surveillance - Broadcast (ADS-B) NAS Wide Implementation	$157.63	$165.20	$165.40	$165.70	$162.20
2A10	Wind Shear Detection Service (WSDS)	$3.00	$2.00	$4.50	$6.00	$6.00
2A11	NextGen - Air Traffic Management Implementation Portfolio	$10.00	$36.80	$47.90	$45.80	$52.00
2A12	NextGen - Time Based Flow Management (TBFM) Portfolio	$13.30	$13.20	$5.46	$13.86	$18.27
2A13	NextGen - Next Generation Weather Processor (NWP)	$48.20	$27.80	$18.91	$21.91	$15.94
2A14	Airborne Collision Avoidance System X (ACAS X)	$0.50	$0.00	$0.00	$1.70	$1.70
2A15	NextGen - Data Communication in support of NextGen	$110.25	$89.75	$74.10	$79.20	$80.51
2A16	Offshore Automation	$10.00	$35.00	$48.00	$26.00	$6.00
2A17	NextGen - Reduced Oceanic Separation	$7.00	$7.00	$7.00	$5.00	$0.00
2A18	En Route Improvements	$2.00	$2.00	$2.00	$2.00	$0.00
2A19	Commercial Space Integration	$6.50	$10.00	$10.00	$10.00	$10.00

FY22 BLI Number	Capital Budget Line Item (BLI) Program	FY 2022 Budget	FY 2023 Est.	FY 2024 Est.	FY 2025 Est.	FY 2026 Est.
	B. Terminal Programs	**$835.31**	**$854.70**	**$955.33**	**$1,031.02**	**$1,111.34**
2B01	Terminal Doppler Weather Radar (TDWR)	$1.00	$0.00	$0.00	$0.00	$0.00
2B02	Standard Terminal Automation Replacemetn System (STARS)	$63.70	$62.00	$84.00	$116.00	$103.20
2B03	Terminal Automation Program	$4.00	$4.00	$4.10	$4.10	$4.00
2B04	Terminal Air Traffic Control Facilities - Replace	$331.17	$340.00	$335.00	$388.00	$449.00
2B05	Air Traffic Control Tower (ATCT)/Terminal Radar Approach Control (TRACON) Facilities - Improve	$92.98	$97.60	$107.20	$102.29	$100.06
2B06	NAS Facilities Occupational Safety and Health Administration (OSHA) and Environmental Standards Compliance	$24.00	$34.00	$40.00	$40.00	$40.00
2B07	Integrated Display System (IDS)	$30.00	$45.00	$55.00	$53.50	$51.30
2B08	NextGen - Terminal Flight Data Manager (TFDM)	$85.40	$41.90	$39.37	$42.17	$31.71
2B09	NextGen - Performance Based Navigation (PBN) Support Portfolio	$8.00	$8.00	$9.70	$9.50	$10.30
2B10	NextGen - Unmanned Aircraft Systems (UAS) Implementation	$31.30	$25.00	$10.00	$10.00	$9.00
2B11	Surface Surveillance Portfolio Sustain 1	$28.40	$28.40	$30.86	$31.96	$30.57
2B12	Terminal and En Route Surveillance Portfolio	$55.37	$80.50	$121.90	$118.10	$129.70
2B13	Terminal and En Route Voice Switch and Recorder Portfolio	$57.50	$75.30	$90.80	$96.90	$130.50
2B14	NextGen - Enterprise Information Platform	$17.60	$13.00	$27.40	$18.50	$22.00
2B15	Remote Towers	$4.90	$0.00	$0.00	$0.00	$0.00
	C. Flight Service Programs	**$19.70**	**$13.25**	**$15.05**	**$19.25**	**$22.35**
2C01	Aviation Surface Weather Observation System	$8.00	$10.00	$10.00	$15.00	$15.00
2C02	Future Flight Services Program (FFSP)	$3.00	$0.00	$0.00	$0.00	$0.00
2C03	Alaska Flight Service Facility Modernization (AFSFM)	$2.70	$2.75	$2.75	$2.75	$2.75
2C04	Juneau Airport Wind System (JAWS) - Technology Refresh	$4.00	$0.50	$2.30	$1.50	$4.60
2C05	Weather Camera Program	$2.00	$0.00	$0.00	$0.00	$0.00
	D. Landing and Navigation Aids Programs	**$178.26**	**$179.95**	**$173.45**	**$190.85**	**$214.55**
2D01	VHF Omnidirectional Radio Range (VOR) Minimum Operating Network (MON)	$5.90	$19.40	$16.00	$14.30	$11.80
2D02	Wide Area Augmentation System (WAAS) for GPS	$97.14	$91.80	$92.10	$92.30	$92.00
2D03	Instrument Flight Procedures Automation (IFPA)	$1.00	$1.00	$2.00	$2.00	$2.00
2D04	Runway Safety Areas (RSA) - Navigational Mitigation	$0.80	$0.00	$0.00	$0.00	$0.00
2D05	Landing and Lighting Portfolio	$63.42	$57.75	$53.35	$72.25	$98.75
2D06	Distance Measuring Equipment (DME), VHF Omni-Directional Range (VOR), Tactical Air Navigation (TACAN) (DVT) Portfolio	$10.00	$10.00	$10.00	$10.00	$10.00

FY22 BLI Number	Capital Budget Line Item (BLI) Program	FY 2022 Budget	FY 2023 Est.	FY 2024 Est.	FY 2025 Est.	FY 2026 Est.
	E. Other ATC Facilities Programs	**$468.17**	**$502.25**	**$523.95**	**$515.05**	**$524.15**
2E01	Fuel Storage Tank Replacement and Management	$38.90	$28.00	$32.00	$32.00	$26.00
2E02	Unstaffed Infrastructure Sustainment (UIS)	$116.00	$82.65	$82.65	$82.65	$82.65
2E03	Aircraft Replacement and Related Equipment Program	$35.00	$32.00	$39.00	$38.50	$38.50
2E04	Airport Cable Loop Systems - Sustained Support	$10.00	$10.00	$10.00	$10.00	$10.00
2E05	Real Property Disposition / Facilities Decommissioning	$9.90	$10.00	$10.00	$10.00	$10.00
2E07	Electrical Power Systems - Sustain/Support	$175.07	$205.00	$205.00	$210.00	$215.00
2E06	Energy Management and Compliance (EMC)	$2.60	$5.00	$5.00	$4.00	$4.00
2E08	Child Care Center Sustainment	$1.00	$1.00	$1.00	$1.00	$1.00
2E09	FAA Telecommunications Infrastructure	$64.20	$111.50	$128.80	$115.90	$126.00
2E10	Operational Analysis and Reporting Systems	$15.50	$17.10	$10.50	$11.00	$11.00
	Activity 3: Non-Air Traffic Control Facilities and Equipment	**$269.13**	**$214.80**	**$205.20**	**$187.70**	**$161.20**
	A. Support Programs	**$246.63**	**$193.80**	**$184.20**	**$166.70**	**$141.20**
3A01	Hazardous Materials Management	$30.80	$31.00	$31.00	$31.00	$31.00
3A02	Aviation Safety Analysis System (ASAS)	$30.50	$19.10	$20.00	$20.00	$20.00
3A03	National Airspace System Recovery Communications (RCOM)	$12.34	$12.00	$12.00	$12.00	$12.00
3A04	Facility Security Risk Management	$26.01	$15.00	$15.00	$15.00	$15.00
3A05	Information Security	$22.59	$17.00	$17.00	$12.00	$12.00
3A06	System Approach for Safety Oversight (SASO)	$35.40	$35.00	$35.00	$28.00	$16.60
3A07	Aviation Safety Knowledge Management Environment (ASKME)	$9.80	$12.00	$0.00	$0.00	$0.00
3A08	Aerospace Medical Equipment Needs (AMEN)	$6.90	$2.20	$0.10	$0.00	$0.00
3A09	NextGen - System Safety Management Portfolio	$18.29	$16.00	$16.00	$16.00	$16.00
3A10	National Test Equipment Program	$3.00	$3.00	$3.00	$3.00	$3.00
3A11	Mobile Assets Management Program	$2.50	$2.00	$2.00	$0.00	$0.00
3A12	Aerospace Medicine Safety Information System (AMSIS)	$25.00	$15.00	$10.00	$10.00	$10.00
3A13	Configuration, Logistics, and Maintenance Resource Solutions (CLMRS)	$23.50	$14.50	$23.10	$19.70	$5.60
	B. Training, Equipment and Facilities	**$22.50**	**$21.00**	**$21.00**	**$21.00**	**$20.00**
3B01	Aeronautical Center Infrastructure Modernization	$21.50	$20.00	$20.00	$20.00	$20.00
3B02	Distance Learning	$1.00	$1.00	$1.00	$1.00	$0.00

FY22 BLI Number	Capital Budget Line Item (BLI) Program	FY 2022 Budget	FY 2023 Est.	FY 2024 Est.	FY 2025 Est.	FY 2026 Est.
	Activity 4: Facilities and Equipment Mission Support	**$199.50**	**$228.20**	**$233.63**	**$234.13**	**$243.29**
4A01	System Engineering and Development Support	$37.00	$38.00	$38.00	$38.00	$39.00
4A02	Program Support Leases	$15.00	$45.00	$45.00	$45.00	$45.00
4A03	Logistics and Acquisition Support Services	$12.00	$12.00	$12.00	$12.00	$12.00
4A04	Mike Monroney Aeronautical Center Lease	$14.60	$16.00	$16.40	$16.90	$16.00
4A05	Transition Engineering Support	$19.00	$19.00	$19.00	$19.00	$19.00
4A06	Technical Support Services Contract (TSSC)	$28.00	$28.00	$28.00	$28.00	$28.00
4A07	Resource Tracking Program (RTP)	$8.00	$8.00	$8.00	$8.00	$8.00
4A08	Center for Advanced Aviation System Development (CAASD)	$57.00	$57.00	$57.00	$57.00	$57.00
4A09	NextGen - Aeronautical Information Management Program	$8.90	$5.20	$10.23	$10.23	$19.29
	Activity 5: Personnel Compensation, Benefits and	**$550.00**	**$570.00**	**$590.00**	**$606.00**	**$626.00**
5A01	Personnel and Related Expenses	$550.00	$570.00	$590.00	$606.00	$626.00
	Total Year Funding	**$3,410.00**	**$3,481.00**	**$3,558.00**	**$3,636.00**	**$3,716.00**

Information for Major Capital Programs

Due to the criticality of on-budget and on-time acquisitions to support the efficient transition to NextGen, Congress directed the Government Accountability Office (GAO) to determine the status of Air Traffic Organization's performance in acquiring ATC systems. In addition, a prior GAO recommendation suggested that the FAA regularly report to Congress and the public on its overall performance in acquiring ATC systems.

Major Capital Programs are typically classified in Acquisition Categories that have an aggregate rating of medium or high in the following areas: complexity, risk, political sensitivity, safety, security or cost; requirement of special management attention because of its importance to the mission of the FAA; significance of program or policy implications; executive visibility; or, high developmental costs. For more information on Acquisition Categories see: http://fast.faa.gov/NFFCA_Acquisition_Categories.cfm

The FAA has experienced an unprecedented influx of uncertainty due to the extended duration of the COVID-19 pandemic, and program managers face a number of re-planning issues. While addressing the increased uncertainty, there is no clear forecast on when or how restrictions will dissipate. COVID-19 has presented several barriers to deployment, testing, and training for programs. Many program schedules have been compromised as onsite activities were suspended. Local conditions dictated travel restrictions, subject matter expert availability, and facility access across the system. Performance limitations include schedule delays, cost overruns, and limited vendor support. Other physical limitations, such as mandatory quarantines and social distancing have also hindered progress.

The table below shows the most recent information on FAA's Major Capital Programs. Completed or Cancelled Major Capital Programs for this fiscal year appear on the final page of the report.

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	
Aerospace Medicine Safety Information System (AMSIS) ACAT 4	Sep-17	Jan-22	$85.3				Jan-23	$127.2	**Current Estimate vs. Original Baseline:** The program office has completed an alternatives analysis and is planning for a Joint Resources Council (JRC) Direction request in Apr-21 to obtain concurrence and proceed with the preferred alternative. The program will return to the JRC with a Baseline Change Decision (BCD) planned later this year. The cost and schedule estimates are preliminary and will be finalized with the BCD. The estimated schedule delay of 12 months (-23.1% schedule variance) and estimated cost increase of $41.9M (-49.1% cost variance) is attributed to software development delays, emerging complexity in requirements, vendor hiring delays, and delays in provisioning government furnished equipment and information. In addition, the program was impacted by the break in non-essential operations that occurred December 22, 2018 through January 25, 2019.
Automatic Dependent Surveillance Broadcast (ADS-B) – Baseline Services Future Segments ACAT 1 NI	May-19	Jan-26	$718.3				Jan-26	$732.3	**Current Estimate vs Original Baseline:** The cost increase of $14.0M (-1.9% variance) is due to the addition of the Joint Base Andrews Airport Surface Surveillance Capability (ASSC) project to the program scope.
Advanced Technologies and Oceanic Procedures (ATOP) Enhancement 1 ACAT 3 NI	Apr-19	May-25	$81.7				May-25	$81.7	

*Impacts related to the work restrictions implemented due to the COVID-19 pandemic, which include travel restrictions, limitiations on facility access to support the operation, subject matter expert availability, are still emerging. The current estimates are as of February 2021.

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	
En Route Automation Modernization (ERAM) Enhancement 2 ACAT 1	Dec-16	Dec-23	$253.6	Dec-18	Dec-24	$192.9	Dec-24	$192.9	**Rebaseline vs. Original Baseline:** The schedule delay of 12 months (-14.3% variance) is associated with budget uncertainty and reductions, technical changes, and adjusting priorities. The cost under run of $60.7M (23.9% variance) is due to reduced scope as a result of a reprioritization of enhancements to include only mature capabilities validated through engineering and development activities.
ERAM Sustainment 2 ACAT 4 TR	Dec-16	Sep-20	$279.2				Jun-22	$279.2	**Current Estimate vs Original Baseline:** The schedule delay of 21 months (-46.7% variance) is associated with the break in non-essential operations that occurred December 22, 2018 through January 25, 2019; display monitor and trackball issues; and the work restrictions implemented due to the COVID-19 pandemic.
ERAM Sustainment 3 ACAT 4 TR	Dec-19	Sep-26	$332.9				Sep-26	$332.9	
Logistics Center Support System (LCSS) ACAT 2	Apr-10	Apr-14	$67.4	Apr-14	Apr-16	$79.4	Jan-22	$132.0	**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 schedule delay of 69 months (-95.8% variance) and cost increase of $52.6M (-66.2% variance) are associated with: 1) user and system requirements that were identified after the Initial Operational Capability (IOC) remain to be developed; 2) workarounds as a result of unmet requirements that did not have documentation to support the remaining development; 3) related work processes and system interfaces that were not fully defined or documented that resulted in additional requirements to be developed to meet user needs; and 4) efforts to stabilize defects found during initial production.

*Impacts related to the work restrictions implemented due to the COVID-19 pandemic, which include travel restrictions, limitations on facility access to support the operation, subject matter expert availability, are still emerging. The current estimates are as of February 2021.

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	
Time Based Flow Management (TBFM) Enhancement 1 ACAT 3 NI	Apr-15	Sep-22	$188.3				Dec-23	$220.8	**Current Estimate vs. Original Baseline:** The schedule delay of 15 months (-16.9% variance) is associated with the following: 1) A replan to address high priority North East Corridor improvements; 2) the break in non-essential operations that occurred December 22, 2018 through January 25, 2019; and 3) work restrictions implemented due to the COVID-19 pandemic. The cost increase of $32.5M (-17.3% varaiance) is associated with the need to address the complexity of multiple stakeholders, training, and the degree of change management required in the field to implement regional integration as part of Trajectory Based Operations (TBO).
Traffic Flow Management System (TFMS) Enhancement 4 - ACAT 3 NI	Jun-17	Sep-22	$78.6				Sep-22	$74.0	**Current Estimate vs. Original Baseline:** The program is being replanned to determine a strategy on how to move forward and cost and schedule impacts will be provided once the replan is complete. The Office of Dispute Resolution for Acquisition (ODRA) final Findings and Recommendations (Order) to an upheld protest of the Traffic Flow Management 2 (TFM2) contract award were recieved on February 1, 2021. To comply the Program Office is implementing the order in a manner consistent with the safety mission of the FAA, and consideration for the current and future capabilities of the NAS.

*Impacts related to the work restrictions implemented due to the COVID-19 pandemic, which include travel restrictions, limitiations on facility access to support the operation, subject matter expert availability, are still emerging. The current estimates are as of February 2021.

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	
System Wide Information Management (SWIM) Segment 2B ACAT 2	Oct-15	Sep-21	$119.6				Sep-22	$124.9	**Current Estimate vs. Original Baseline:** The schedule delay of 12 months (-16.9% variance) is associated with the work restrictions implemented due to the COVID-19 pandemic. SWIM Segment 2B is comprised of four capabilities, three of which have experienced delays related to COVID-19 work restrictions. Of those, only one—the deployment of the SWIM Terminal Data Distribution Service (STDDS) Release 6—results in a schedule variance exceeding the original baseline completion date. The cost increase of $5.3M (-4.4% variance) is associated with under estimated costs for Transitioning to Operations & Maintenance (TOM) and additional costs for system development for SWIM capabilities partially impacted by the break in non-essential operations that occurred December 22, 2018 through January 25, 2019.
System Wide Information Management (SWIM) Segment 2C ACAT 4TR	Mar-20	Sep-25	$129.5				Sep-25	$129.5	**New Add**
Standard Terminal Automation Replacement System (STARS) Sustainment 2 ACAT 4 TR	Sep-17	May-22	$102.1				May-22	$102.1	
Terminal Flight Data Manager (TFDM) ACAT 1 NI	Jun-16	Sep-28	$795.2				May-30	$869.00	**Current Estimate vs. Original Baseline:** The schedule delay of 20 months (-13.6% variance) and cost increase of $73.8 (-9.3% variance) is associated primarily with the work restrictions implemented due to the COVID-19 pandemic. In addition, the break in non-essential operations that occurred December 22, 2018 through January 25, 2019 and new interface requirements.

*Impacts related to the work restrictions implemented due to the COVID-19 pandemic, which include travel restrictions, limitiations on facility access to support the operation, subject matter expert availability, are still emerging. The current estimates are as of February 2021.

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	
Time Based Flow Management (TBFM) Enhancement 1 ACAT 3 NI	Apr-15	Sep-22	$188.3				Dec-23	$220.8	**Current Estimate vs. Original Baseline:** The schedule delay of 15 months (-16.9% variance) is associated with the following: 1) A replan to address high priority North East Corridor improvements; 2) the break in non-essential operations that occurred December 22, 2018 through January 25, 2019; and 3) work restrictions implemented due to the COVID-19 pandemic. The cost increase of $32.5M (-17.3% variance) is associated with the need to address the complexity of multiple stakeholders, training, and the degree of change management required in the field to implement regional integration as part of Trajectory Based Operations (TBO).
Traffic Flow Management System (TFMS) Enhancement 4 ACAT 3 NI	Jun-17	Sep-22	$78.6				Sep-22	$74.0	**Current Estimate vs. Original Baseline:** The program is being replanned to determine a strategy on how to move forward and cost and schedule impacts will be provided once the replan is complete. The Office of Dispute Resolution for Acquisition (ODRA) final Findings and Recommendations (Order) to an upheld protest of the Traffic Flow Management 2 (TFM2) contract award were recieved on February 1, 2021. To comply the Program Office is implementing the order in a manner consistent with the safety mission of the FAA, and consideration for the current and future capabilities of the NAS.

*Impacts related to the work restrictions implemented due to the COVID-19 pandemic, which include travel restrictions, limitations on facility access to support the operation, subject matter expert availability, are still emerging. The current estimates are as of February 2021.

FAA Capital Programs
Major Programs - Completed or Cancelled

Programs	Original Baseline			Actual Results		Comments
	Original APB Date	Completion Date	Budget $M	Completion Date	Budget $M	
Automatic Dependent Surveillance Broadcast (ADS-B) – Baseline Services & Applications ACAT 1 New Investment (+E1E+E8:E10	May-12	Sep-20	$960.4	Sep-20	$987.2	**Program Completed.** **Current Estimate vs. Original Baseline:** The cost increase of $26.8M (-2.8% variance) is associated with additional funds provided to support the General Aviation (GA) aircraft incentive program to address "key barriers" to ADS-B out equipage identified by the Equip 2020 team, changes to scope, and new requirements for Airport Surface Surveillance Capability (ASSC).
Standard Terminal Automation Replacement System (STARS) Sustainment 1 ACAT 2	Sep-12	Feb-20	$531.5	Feb-20	$528.5	**Program Completed.**
Terminal Automation Modernization Replacement (TAMR), Phase 4 ACAT 2	Sep-12	Aug-19	$462.5	Oct-19	$486.0	**Program Completed.** **Current Estimate vs. Original Baseline:** The schedule delay of 2 months (-2.4% variance) is associated with the break in non-essential operations that occurred December 22, 2018 through January 25, 2019. Prior to the break in non-essential operations, the program was projecting to complete on schedule. During the break, all equipment deliveries to the sites were stopped. The cost increase of $23.5M (-5.1% variance) is associated with the impact of higher prime contractor costs.